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A Healthy Working Life
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Introduction to the proceedings of the USE2015 Conference

The papers in the proceedings are organised by the first author. The index is organised alphabetically by first author of papers. The title of the contribution is written below the author(s) and is hyperlinked to the paper (contribution = hyperlink).

Enjoy all the contributions presented at the USE2015 Conference. They have all contributed to the conference theme: '**A Healthy Working Life in a Healthy Business**'.

Professor of Applied Sciences Dr. Harm van Lieshout

USE2015 Conference Organising Committee

Review process of abstracts, papers, special sessions and posters for the USE 2015 conference

Abstracts for papers, special sessions and poster

An abstract for the paper/oral presentation was submitted to the USE 2015 Organising Committee. The abstracts were then reviewed by one of the scholars in the organising committee. They were either accepted (with or without comments); rejected; or rejected in this version with the possibility to resubmit an improved abstract. Some abstracts for papers were rejected and advised to consider a poster rather than a paper; vice versa, some poster proposals were accepted but the author was invited to (also) consider submitting a paper

Papers in proceedings

Accepted paper proposals that were submitted did not go through an additional review process, but were accepted and are included in the Proceedings. The Organising Committee did allow authors to submit short papers for those Proceedings, if they had valid reasons to not submit a full paper.

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How good are health care companies at branding?

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Abstract. This study investigates whether the core values health care providers express are distinctive. This is relevant since with increasing competition in health care, providers should be clear in their branding towards all stakeholders. By means of a questionnaire, a sample of 141 health care managers provided the core values of their organization. We aggregated these self-stated values in 11 main value dimensions. Two dimensions are dominantly used by care providers: 'care and affection' and 'functionality'. Since so many companies have comparable values whereas these values are also typical 'category dimensions', our conclusion is that health care companies are not good at differentiating on values.

1 Introduction

1.1   The care market in The Netherlands

In the Netherlands, health care is organized in a mixed social and competitive way. Everyone has compulsory basic insurance, covering all the minimal necessary care services and expenses, such as almost all (non-elective) delivered care in a hospital. Insurance companies negotiate with care organizations about the volume and price of the care to be delivered in a year. So, there is limited competition in the Dutch care market. However, care organisations are increasingly faced with free market developments and increasing competition. For example, regulations for new entrants are reduced, leading to new care suppliers. New small hospitals are started ('clinics'), focusing only on specific services. Another development in care is the growth of available information on the internet. Customers can find almost everything about certain diseases on the internet and they already feel like an expert when they visit a doctor.

Due to these developments a market orientation including a well-developed branding strategy is becoming increasingly important for care organizations.

1.2   Research question

An important key success factor for a company is to develop a strong brand (Keller, 2012). This means that a company should choose a clear brand positioning, focusing on those brand values that lead to unique and relevant brand associations. It is all about the mindset of customers, with the goal of realizing a prominent, differentiated position in the customers' mind.

With increasing competition, branding is increasingly important for Dutch health care organisations. However, branding and marketing is relatively new for care companies. Many care companies attempt to be unique by mentioning their 'core brand values' in their communication, for example on internet. However, based on subjective impressions we have the feeling that care companies are not very successful in differentiating their brands. Especially the brand values sometimes look quite generic, such as 'we care for you'.

Goal of our research project is to find out how good care companies are at branding. We focus on the central brand values care companies use in their communication.

1.3   Structure of paper

Chapter 2 provides an in-depth discussion of values. The reason for this is that values play a crucial role in branding. We end chapter 2 with a description of the Value Compass (Kostelijk, 2015, forthcoming), which is used in this study as an analytical instrument. Chapter 3 contains the research

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design of this study. Chapter 4 describes the results and chapter 5 concludes this study with an evaluation.

2 Literature

Consumers are looking for products or services that express what is important to them. If there is a signal telling consumers which values are implied by the product, it will help them to choose. A brand, and the image associated with the brand, can perform this signalling function. A brand with clearly defined values will attract those people who are motivated by these values. For instance, a young family shops at IKEA, if they are convinced that IKEA represents the modern yet cosy living that they desire. The brand IKEA signals the values represented by the IKEA brand, and tells consumers what they can expect in the store.

Brand management wishes to convince the target group that the brand represents certain values, preferably those values that are important for their target group. If brand management is successful, then they make their target group believe that the brand actually contains those values. This implies what has been labelled self-congruence (Sirgy, 1982) (Kressman, et al., 2006): consumers try to find a match between their self-image and the image of the brand. When brand management wishes to connect certain values to the brand, then this matching principle also applies: value congruence, a match between the values proposed by the brand and the values of the customer, results in a stronger relation between the customer and the brand (Kostelijk, 2015, forthcoming).

If consumers mirror their own values when interpreting brand values, then it makes sense to gain more insight into consumer values. Psychological research has shown that values are organized as a coherent structure, a value system, in which each value provides a different choice motivation (Schwartz, 1992, 2006). Within this value system, different types of values can be identified. Each of these value types represents values whose meaning match with the corresponding value type. The value types that were defined by Schwartz are mentioned in table 1. In this table, the values that characterize the value type are presented in the last column.

Schwartz emphasized the dynamic aspect of his value system: the interrelations between values. A key aspect in this value system is the assumption that some values reinforce each other, while other values have a conflicting impact on choice behaviour. Behaviour is a trade-off of these compatible and conflicting values. For example, an individual who values power likely also favours compatible values like leadership or other values emphasizing the possibility to have influence over another person. Equality, on the other hand does not agree with having power and is likely to be a conflicting value. The conflicts and compatibilities among value types were found to constitute universal interrelations (Schwartz, 1994). Schwartz (1992) suggested that two motivational dimensions structure the value system:

1. Self-enhancement versus self-transcendence: the conflict between values with a primary focus on the pursuit of the individual interest and the values focusing on the well-being and interest of others.
2. Openness to change versus conservation. This dimension focuses on the contrast between people's motivation to follow their own intellectual and emotional interests in unpredictable and uncertain directions, versus the motivation to preserve the status quo and the certainty it provides in relationships with close others, institutions and traditions.

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Table 1 The value types of the Schwartz Value System.

Value type	Defining goal	Corresponding value items
Self-direction	independent thought and action – choosing, creating, exploring	Creativity, freedom, choosing own goals, curious, independent
Stimulation	Values of this value type derive from the need for variety and stimulation in order to maintain an optimal level of stimulation. The defining goal of this value type: excitement, novelty, challenge in life	A varied life, an exciting life, daring
Hedonism	Pleasure or sensuous gratification for oneself	Pleasure, enjoying life
Achievement	Personal success through demonstrating competence according to social standards	Ambitious, successful, capable, influential
Power	Attainment of social status and prestige, and control or dominance over people and resources	Authority, wealth, social power
Security	Safety, harmony, and stability of society, of relationships and of self	Social order, family security, national security, clean, reciprocation of favours
Conformity	Restraint of actions, inclinations, and impulses likely to upset or harm others and violate social expectations or norms	Obedient, self-discipline, politeness, honouring parents and elders
Tradition	Respect, commitment and acceptance of the customs and ideas that one's culture or religion provides	Respect for tradition, humble, devout, accepting my portion in life
Benevolence	Preserving and enhancing the welfare of those with whom one is in frequent personal contact (the 'in-group')	Helpful, honest, forgiving, responsible, true friendship, mature love
Universalism	Understanding, appreciation, tolerance and protection for the welfare of all people and for nature. Two distinct values are present: social concerns, and concerns with nature	Broad-minded, social justice, equality, world at peace, world of beauty, unity with nature, wisdom, protecting the environment

Schwartz (1992) demonstrated that the dynamic relations among values result in a circular structure organized along these two central dimensions. This circular arrangement is a motivational continuum: the closer values are located in this circular arrangement, the more similar their underlying motivations.

If values motivate behaviour then we can expect values to guide consumer behavior as well. A limited number of recent studies used Schwartz's model to assess the impact of values on brand preferences and brand loyalty (Torelli, Özsomer, Carvalho, Tat Keah, & Maehle, 2012) (Zhang & Bloemer, 2008). Using Schwartz's value system, however, has a limitation. In the survey used by Schwartz, individuals were asked to rate the importance of values "as a guiding principle in MY life" (Schwartz, 1992, p. 17). In this way of asking, there is no reference to any particular situation. The hidden assumption is that the importance of values does not depend on the context. A number of studies, however, showed that values only affect behaviour if they are activated, and activation is situation-specific (Verplanken & Holland, 2002) (Verplanken, Trafimow, Khusid, Holland, & Steentjes, 2009).

A consumer choice context, such as the choice between which brands to buy, or the hospital someone would prefer to go to, is a specific context. In this specific choice situation, the importance of values is not necessarily the same as their importance as guiding principle in life in general.

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Consequently, we might expect that not all Schwartz's values are equally important to consumer

choice, and thus not equally applicable to brand values. Research on consumer choice has shown, that certain values indeed become more prominent in consumer decision making, whereas other values are less relevant (Kostelijk 2015).

The structure of the value system that consumers apply when making decisions follows the principle of conflicts and compatibilities as found by Schwarz. The consumer value system, to which we will further refer as the Value Compass (Kostelijk, 2015, forthcoming), is organized as a value system in which certain values reinforce each other, whereas other values conflict with each other. All consumer values fit this structure, but people differ in the importance they give to certain values. Consumer values were found to be organized by two motivational dimensions (Kostelijk, 2015, forthcoming):

- Promotion of self-interests versus Care for others. This dimension represents values motivating people to promote their own personal interests or to make a difference with others, as opposed to values motivating choices aimed at living in harmony with others, caring for others, and taking care of others.
- Fun versus Function. This dimension represents values motivating people to improve their quality of life by making hedonic choices, as opposed to values motivating them to make utilitarian (functional) choices.

Within each dimension, different types of values can be identified. The fun-dimension is represented by the value types enjoying life and stimulation, the opposing function-dimension by functionality and achievement. Self-interests are pursued by values related to prestige and beauty, whereas care for others is connected to safety, honesty, social responsibility, affection, and intimacy. Figure 1 gives a schematic representation of the Value Compass.

The Value Compass represents consumer motivations. We can imagine, for instance, that some consumers give higher priority to hedonic motivations, whereas others might be more concerned with prestige or status. Kostelijk's research (2015, forthcoming) also showed that consumers interpret brand values according to a structure similar to the structure of their own value system. In other words, consumers interpret the brand value system as if it were a human value system, and the Value Compass can be used to represent consumer values as well as brand values.

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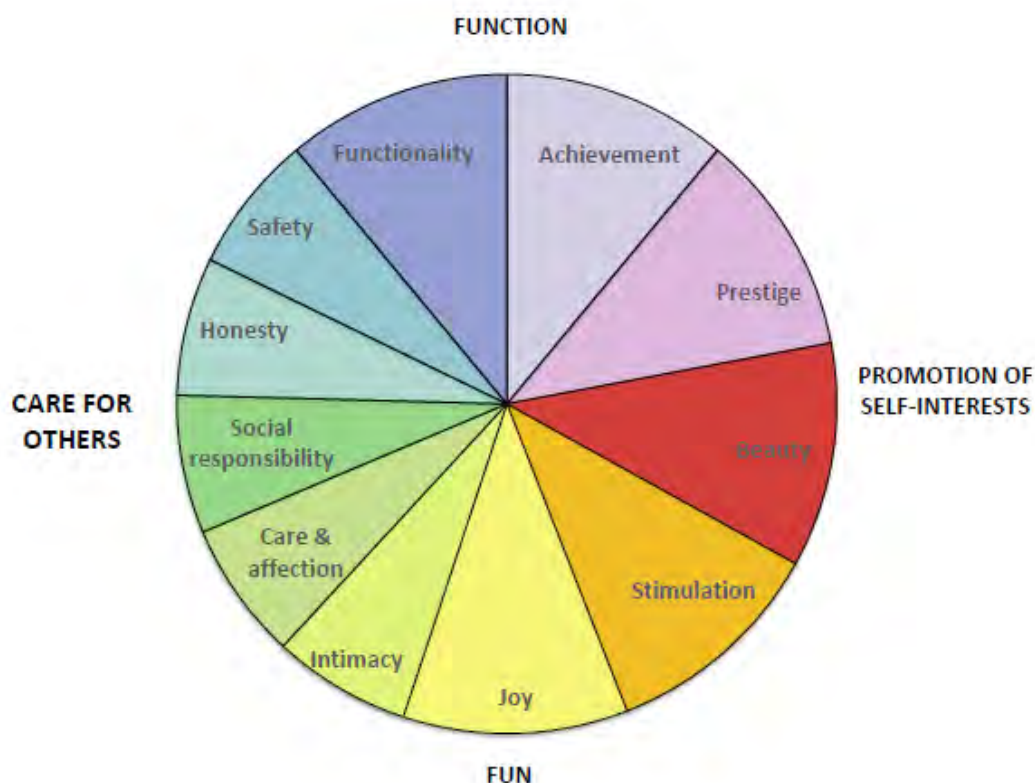
Fig. 1 Schematic representation of the Value Compass.

3 Research design

Main goal of the empirical research is to find out what brand values care organisations choose. We sent a questionnaire to a large LinkedIn group of 20,000 people working in care ("Dutch Health Network"). The most relevant part of this questionnaire started with: "Now we will ask you some questions about the core values of your organisation. This is about the values you want to express to your stakeholders, such as clients and the referrer/general practitioner.". Then we asked: "Did your organisation formulate such core values? And if yes, what are the core values your organisation want to express?".

When we received the questionnaires, many appeared to be filled in by consultants, not working at a care provider. We deleted these respondents. In the end, 161 managers of care providers returned the questionnaire. All care sectors were represented in the sample (table 2).

So, the managers had to fill in the open question about their core values. Many respondents came up with one or a few words representing these values (such as 'professional', 'innovative', 'reliable'), but some respondents responded with long sentences.

We interpreted the words/sentences by first ascertaining whether real values were mentioned. Twenty respondents provided answers that could not be related to values. We left these out.

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Table 2 Sample of care providers in this study

Domain	n	%
Hospitals	37	23,0%
Home care	36	22,3%
Mental health care	23	14,3%
Care for the elderly	20	12,4%
Care for the disabled	17	10,5%
Primary care (e.g. general practitioners, physical therapists)	12	7,5%
Child and youth care	8	5,0%
Welfare	8	5,0%
Total	161	100%

From the respondents who came up with value-related sentences, we summarized their texts in one-word values. This resulted in a total of 438 different core values. So, health care providers in our sample have a mean of 3.1 core values. Then we computed the frequency of the values mentioned. Finally we categorized the values using the so-called Value Compass: a model comprising of 11 dimensions companies can use to choose values (Kostelijk, expected 2015). Example: one of these dimensions is 'achievement'. The following values mentioned by the respondents were categorized among achievement: innovative, renewing, proactive, always better, entrepeneurial, dynamic, original, pioneering, result-oriented.

4.   Results

Table 3 shows the values most frequently mentioned in health care. These are the values the managers mentioned themselves. These 10 values represent almost half (47.5%) of all values mentioned in the sample. The most popular value is 'professional'.

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Table 3 The ten most frequently mentioned values

Value	Number of times mentioned
Professional, competent	45
Client-oriented	28
Reliable	26
Individual control, autonomy	20
Involvement	18
Close, nearby	17
Respect	17
Quality	12
Innovative	11
Together	11
Total	208

Table 4 provides an overview of the value dimensions in health care. The difference between Tables 3 and 4 is that in Table 4 some values are aggregated into a value dimension according to the Value Compass. For instance, the values professional and quality from Table 3 were both categorized among 'functionality'. And the values client-oriented and involvement are both part of 'care and affection'.

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Table 4 Core values in Dutch health care

Value dimension	Number of care providers using one or more core values in this dimension	%
Care and affection	97	68.8%
Functionality	84	59.6%
Honesty	39	27.7%
Achievement	35	24.8%
Intimacy	26	18.4%
Stimulation	24	17.0%
Safety	19	13.5%
Joy	15	10.6%
Prestige	14	9.9%
Social responsibility	7	5.0%
Beauty	-	0.0%
Total	141	-

From our analysis it appears that two value dimensions are dominant in health care branding: 'care/affection' and 'functionality/professional', used by respectively 70 and 60% of the health care organisations. Other value dimensions are less frequently used. Honesty (and transparency) is a relevant core value for 28% in our sample, achievement (including innovation) is mentioned by 25% of the care providers. On the other hand, beauty and social responsibility are hardly used in health care.

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5 Conclusions

The main research question was to what extent core values in health care are differentiating. Using the Value Compass we analysed the self-stated core values of a sample of 141 different care providers.

Our main conclusion is that the brand values chosen in health care are not very distinctive. Two dimensions are very popular. The first is 'care and affection', related to attention to the client/customer. Almost 70% of the care providers in our sample chose this dimension. The second popular dimension is 'functionality', related to professional and competent, used by almost 60% of the care providers.

The most popular dimension in our sample (care and affection) is by definition a 'category value' in care. Care is about care. But also mentioning that 'this hospital is professional and that our specialists are experts' looks quite redundant in the sense that customers always expect a hospital to be professional.

So, most care companies state the obvious by emphasizing that they provide high quality care, without profiling their 'brand' with a contents that differentiate them from other providers. This leads to the conclusion that care companies are not good at branding.

A recommendation is that care companies should improve their branding by choosing and formulating distinctive brand values more carefully.

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Occupational Health and Safety Law in Turkey

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Abstract. With globalization, dangerous industries established in developing countries affect these countries' workers' health negatively. Similarly, the costs result from work accidents and occupational diseases lead to huge losses in terms of national economy. Within these two cases, the concept of work-related health problems arises. Work-related health problems are one of the most important problems of people who are economically active (employed) in order to generate income or to contribute household income during the reference period or during a particular period of their life as paid, regular or casual worker, for their own account, unpaid family worker, or the employer. Countries, determine the standards that should be considered as work-related health problems according to their conditions. In Turkey, occupational diseases' classification is made in the Social Security Health Procedures Code. In this context; occupational health and safety right is a right arising from the nature of social state that constitutes an important step in the realization of the occupational health and safety regulations, and right to life and health. Therefore; countries must implement the necessary sanctions on issues like the creation of laws and regulations in terms of social responsibility; preservation of nature and the environment, prevention of the exploitation of workers and prevention of child labor. In this way, businesses know clearly and notably what is expected from them. Thus they can attempt to go a step further forward in the direction of business line. As in all over the world, in Turkey inadequacies and issues in working life can also cause occupational accidents and work-related health problems. 99% of the working places in Turkey consist of business which employ less than 250 employees, 84% of employees are hired in these working places[1]. The noteworthy case is that work accidents still occur in these working places. As it can be understood from these data, occupational accidents are common in all sectors in Turkey, regardless of the distinction large or small business, public or private sector, but compared with other sectors, number of accidents, the accident frequency rate, accident severity rate, death and the high injury rate is high in construction, mining and metal industries. It can be said mining, metals and construction sectors are almost in a race in terms of occupational accidents. In 2011, 570 workers in the construction sector, 119 workers in the mining sector, 129 in the metal sector and 34 workers in the textile sector lost their lives. In 2012, 256 workers in the construction sector, 44 workers in the mining sector, and 48 workers in the metal sector lost their lives. In 2014, it was reported that 301 workers died only in mining accident in Soma[2]. Meanwhile, the highest number of fatal occupational accidents with 781 people in 2009 appears in "unknown" category and that reveals serious shortcomings in the SGK data[2]. Particularly, such fatal accidents occurring recently have increased the importance of the necessary legal measures that should be taken. In order to eliminate this kind of problems in Turkey "Occupational Health and Safety Law" was enacted on 1 January 2013. Through this law, the protection of workers' health from hazards in the workplace and encounter of workers' a problem arising from the workplace is tried to avoid. That work is not only limited to the protection of workers from risks in the workplace, it also aims to protect the health of employees as a whole person. In other words, it is aimed to build occupational health and safety awareness and culture. In this study, the legal provisions of occupational health and safety laws being applied in Turkey have been discussed in the framework of research findings, on the other hand the importance of the legal provisions and research topic is highlighted.

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Introduction

Occupational health and safety is a basic human right. In Turkey, to put this right into practice, to ensure occupational health and safety in the work place, to improve existing health and safety conditions, and to regulate the duties, powers, responsibilities, rights and obligations of employers and employees, 'Occupational Health and Safety Law' was enacted on 1 January 2013.

6331 numbered Occupational Health and Safety Act is applied to all businesses and workplaces regardless of public and private sector distinction, and it is applied to all employers and employees of these businesses, including apprentices and trainees regardless of activity and the number of workers, and with this law[3], European Union accreditation has been achieved in terms of occupational health and safety.

The Important Points of Occupational Health and Safety Law

•Health and safety is important to every employee;

Law, regardless of the number of employees and workplace, covers all public and private sector employees without exception. To this end, the preparation of healthy and safe working environment in all workplaces will be provided.

•Clear of procedure, preventive approach is in the foreground;

Thanks to risk assessment report, a clear of procedure, general prevention policy is implemented, and in this way, safety and health measures for employees are ensured at the most basic point.

•Businesses are classified according to the hazard class;

Workplaces should be classified according to hazard class of which they are in, such as less dangerous, dangerous and very dangerous, and then respectively;

1. Should do risk analysis,
2. Prepare the emergency action plan,
3. Should complete employees' education,
4. Should complete measurement and inspection processes,
5. Employees must appoint representatives among themselves and,
6. In the workplace, the Occupational Health and Safety Committee should be created.

•Occupational safety specialists and occupational physicians are assigned in all workplaces;

Employers must assign an occupational safety specialist which has specialties that stated in the Article 6, 7 and 8 of Law No. 6331, an occupational physician and other health care providers in the workplace[4]. Occupational safety experts are classified into A, B, C in the law. According to the laws and regulations, the employers are responsible to do the followings according to hazard classes:

1. Class A in very dangerous workplaces,

2. Class B in dangerous workplaces and

3. In establishments with less danger, an occupational safety security specialist with Class C certificate and occupational physician are required to be found.

•All businesses are required to create a joint health and safety units.

Employers, responsible for maintaining the continuity of occupational health and safety must have occupational physicians and occupational safety specialist and as they can fulfill these needs by occupational physicians and occupational safety specialist who work for them, they can also get service from the joint health and safety units companies.

•State support is provided to businesses in the field of occupational health and safety.

Dangerous and very dangerous classified establishments with fewer than 10 employees are financially supported by Ministry to fulfill occupational health and safety services and less dangerous classified establishments that employ fewer than 10 people get this support with the council of ministers' decision.

•Risk Analysis is held mandatory.

Employers have to keep up to date risk assessment studies constantly to ensure control, analysis, research and improvement about working environment.

•Employee health screening done periodically, work accidents and occupational diseases are recorded by the Social Security Administration.

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Determination and record keeping procedures of employees' existing, risky, and subsequent health-related conditions are performed under the Social Security Administration control.

•Businesses are obliged to prepare an emergency plan in advance for emergencies.

Accident prevention policy or safety report is required from large industrial workplaces before starting to work.

•By giving occupational health and safety training to all employees, employee contributions to occupational health and safety is ensured through trade unions and employee representatives.

Employees are informed and receive training in occupational health and safety, this informing is constantly updated so that employees' more active involvement about the work health and safety is enabled.

•Occupational Health and Safety Committees has been formed in enterprises with fifty or more employees.

Occupational health and safety committees have been formed in businesses which last more than six months and have fifty or more employees and the employer is obliged to apply the rules in accordance with the legislation taken by the board.

•Employees have the right to refrain from working until the necessary measures taken.

With law, employees can use their right to refrain from working until the necessary measures are obtained, and benefit from all material and moral rights during the time he refrains from working.

Conclusion

In this study, 'Occupational Health and Safety Law' articles have been discussed in the framework of the research findings, the importance of law and research are highlighted.

The law in question is important from the point of addressing the Occupational Health and Safety in Turkey for the first time as an independent issue.

Published in the Official Gazette No. 28339 and entered into force on 01 January 2013 [2], 6331 numbered 'Occupational Health and Safety Law' is based on measures to be taken for the prevention of occupational accidents and occupational diseases. Through this law, although employers assume full responsibility, current situation of the establishments have been forced to constantly improve and the rights and responsibilities of all employees are arranged in parallel with the implementations in the European Union[5].

To implement the law in a healthy way and as a result of to prevent work-related accidents or occupational diseases, adoption and implementation of law by all individuals covered by the law will prevent big material and moral losses

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Start Clear! Healthy hands and beauty

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Abstract. Hairdresser students often have problems with their skin from the beginning of their occupational life. No other profession starts so early with skin problems, no other profession is so often affected with skin problems during active professional life. This is the reason why the AUVA started this project with emphasis on vocational schools influencing the SMEs by knowledge and attitude. We take a three step action (schools/apprentices/barber shops).This project will be running another year so we can only present preliminary results or trends. University of Vienna, Department of Psychology accompanies the project and develops a tool in a modular assembly system. Elements of this system can also be used in later projects.

1 Introduction

As mentioned above hairdressers are professionals at special concern because of their skin problems. Many of them leave their profession during school time because of their occupational skin disease. The AUVA has to give compensation and to care and pay for occupational re-training. If the problem arises in the beginning the measures should also start in the beginning of occupational life ("Safe Start ")
We stressed on **schools and teachers**. We arranged workshops for teachers and provided materials for their theory lessons (power point, folders, poster and film).We provided materials for practical demonstrations :"Dermalite"- System for checking how you have applied the skin protection cream / the sugar cube experiment to demonstrate how a proper skin protection cream works / games from Safehair 2.0 (an European Initiative for the hair dressing sector).All Austrian hairdressing schools are provided with protection creams, skin care and nitrile gloves for the next 3 years.

Hairdresser students are supplied with a starter package (scissors, combs, skin protection , gloves and information and hints on skin care in a stylish bag.
Barber shops can apply for a cost-free support on all questions concerning occupational safety and health by AUVA Sicher (a daughter of AUVA).Support for risk assessment in barber shops and other information is provided by www.eval.at and www.auva.at/service and www.auva.at/hautschutz

2 Figures

We covered all 14 schools and 110 teachers in all regions of Austria and all students in these 2 years. We covered social partners in this sector. We informed the Austrian labour inspection, they have a focus on barber shops this year. AUVA Sicher also tries to cover the barber shops (AUVA Sicher works on demand of the shop owners only, owners have to apply for AUVA Sicher). We also try to reach the owners on events like openings, exhibitions and evening for guilds, also the big traders in this sector.

3 Preliminary results

SMEs are difficult partners concerning ongoing servicing although support service is for free. Considering these circumstances a coverage of more than two third of possible shops is a good result. The usefulness of AUVA and AUVA Sicher is clear to those persons who came in contact with us. Using gloves for some operations is obligatory since e a new law ("personal Protection") and step by step shop owners try to fulfil this obligation. A crucial point will be to provide nitrile gloves in an easy way by some well-known traders.
The number of reports (occupational disease) increased (people are more attentive), but the number of occupational re-trainings decreased (skin diseases are treated in an earlier stage). A side effect is getting to know a whole branch and all actors in this sector. The contact to schools and guilds is very good.

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The first result from the evaluation group is amazing simply: ask peer groups what they would like to get or to have. Students and shop owners (each group separated from the other) want to know more about occupational diseases and how to prevent them. Occupational physicians want to have more such projects with practical procedures and materials. Teachers want to keep contact with us.

This project ends in summer 2016, the following months are provided for a detailed evaluation. The costs of the project will pay when we can avoid 15 re-trainiings in 3 years compared to the last 3 years before starting the project.

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Agile as Change Approach in eHealth Innovation Projects

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Abstract. Many new eHealth products have been developed, but few reach widespread adoption within healthcare organisations. Literature mentions bottlenecks for the acceptance of new technology in the healthcare industry, such as insufficient attention for change management and reluctant acceptance by intended users. In this paper, we argue that Agile software development is a valid change approach and is applicable in eHealth innovation projects. We compared Scrum with Kotter's eight step model of change (1995) and verified the theoretical findings with a case study where an innovative eHealth application was developed to support the care for persons with mental disability. We found support for our proposition that Agile practices support an emerging change process as required for the innovative nature of eHealth projects and lead to increased user acceptance. Agile practices especially facilitate co-creation and increase user self-efficacy but they do not automatically create a sense of urgency nor the management support needed to sustain the change.

1 Introduction

The healthcare sector is a challenging field for innovation, with many innovations never achieving large scale adoption (Heeks, 2006; Kaplan & Harris-Salamone, 2009). Innovative ideas are often developed as proof-of-concepts but do not lead to a lasting change within the organisations involved. With the ever increasing pressure on healthcare budgets, the growing demand for care and the shortage of available staff, there is clearly a need to improve the success ratio of these innovation projects.

Innovation projects tend to require radical changes in organizations and demand many changes of individuals in the organizations. For an innovation to succeed, a variety of factors must be addressed. Critical success factors for innovation in healthcare include technology, user acceptance, financing and legislation (Kaplan & Harris-Salamone, 2009; Broens et al., 2007). Since healthcare innovations invariably imply change for the intended user, explicit attention for managing the change is necessary.

In this paper, we focus on change management as a success factor for eHealth innovation projects. Change management covers the actions that should lead to higher organizational acceptance of the developed innovations.

The idea for this article rose while participating in an innovation project in which an expert system was developed for supporting healthcare workers caring for people with intellectual disability. An Agile software development method was chosen to develop the eHealth innovation together with intended users. While the project's goal was to develop a system, the Agile method turned out to be a strong facilitator of the change process. Prahalad and Ramaswamy (2004) have argued that the creation of customer value should involve collaboration between the innovators and prospective users in a development process that essentially becomes a process of co-creation. Our approach led to such a form of co-creation.

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The goal of this paper is to show that Agile software development methods are a working change approach in eHealth innovation projects. We compare Agile practices with the change management approach of Kotter (1995) and validate the theoretical comparison through a case study.

In the remainder of this paper, we first define the concepts of this per: eHealth innovation projects and fitting change management approaches for such projects. Then we briefly describe relevant practices of Agile approaches and compare the Agile method Scrum with Kotter's eight step model of change. In Section 3 we describe our methodology and present our case and in section 4 contains the results of the validation of our comparison. In section 5 we discuss the effects of Scrum as a change approach and we finish this paper with conclusions, limitations and suggestions for further research.

2 Agile development as a change approach in eHealth Innovation projects

In this section we describe the characteristics of typical eHealth innovation projects. We then look into change management approaches for eHealth. Then we describe relevant Agile development practices and come to our proposition where we compare Kotter's (1995) model to the Agile practies as an approach for eHealth innovation projects.

2.1.   eHealth Innovation projects

Healthcare organizations face a number of challenges that force them to change: increasing pressure on budgets, a growing demand for care and an increasingly tighter job market. The healthcare sector has a number of specific complicating characteristics for innovations, such as a wide range of roles, responsibilities and disciplines, complicated legislation and regulations involved, highly disciplined professionals who are trained to follow protocol, and the costs in case of failure (LeTourneau, 2004).

As a consequence, innovation projects in eHealth typically are of transformational nature, where the technology to be implemented sometimes is new to the sector, but at least new to the organization where it is developed and implemented (Garcia & Cantalone, 2002). In most eHealth innovation projects the outcomes are not exactly known when the projects are initiated so they are of emergent nature. Usually a system software product is developed that needs to fit with the actual work practice. In recent years a number of papers have focused on the importance of end-user involvement when developing healthcare innovations (Nies & Pelayo, 2010; Scandurra, Hagglund & Koch, 2008; Teixeira, Ferreira & Santos 2012). Some have even gone so far as to call users heterogeneous engineers (Roed & Ellingsen 2011).

2.2   Change management approaches

According to Garcia and Cantalone (2002), innovations range from new to the world to new to a specific organization. All innovations usually require major changes for individuals in organizations. The implementation of new ways of working requires people to explore previously unknown ways of working and adopt these as their new day-to-day standards. Changes like these do not come easily, but need to be supported by a deliberate process of change management. Because we focus this paper on the intersection of healthcare, change management and informatics, we will use the definition of change management by Lorenzi (2003): "the process of assisting individuals and organizations in passing from an old way of doing things to a new way of doing things".

There are two main approaches in change management literature: planned and emergent change (Burnes, 2009; Palmer, Dunford & Akin 2008). Planned change approaches describe a clearly defined goal, are top-down and use strict control mechanisms such as project management. Emergent change approaches describe a bottom-up process of interaction that leads to change. Although often positioned as opposing approaches, some consider the combination of both approaches the best road to achieve organizational change. Two examples of this complementary approach are

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Kanter et al.'s (1992) bold strokes and long marches and Beer and Nohria 's (2000) theory E and theory O. Based on a complementary approach both Kanter et al. (1992) and Kotter (1995) developed a generic plan to facilitate emergent change. Kotter's (1995) generic plan, the eight steps (table 1), is a widely recognized approach.

Table 1: Kotter's 8-step model

Creating a climate for change
1. Develop a sense of urgency
2. Building a guiding team
3. Creating a vision
Engaging and enabling the entire organisation
4. Communicating for buy-in
5. Empowering others to act on vision
6. Creating short term wins
Implementing and Sustaining the Change
7. Consolidating and producing more change
8. Institutionalize new approaches

Organizational change requires individual change. In research on organizational change, resistance to change is seen as one of the main causes that change does not "stick" (Kotter, 1995; Kanter, Stein & Jick, 1992; Beer & Nohria, 2000). Resistance to change can be reduced by enhancing readiness for change. Holt et al. (2007) and Rafferty & Simons (2006) found that self-efficacy and management support are important factors that enhance readiness for change. Self-efficacy is facilitated by end-user involvement or co-creation, as project outcomes that are co-created better fulfil the user's needs (Prahalad & Ramaswamy, 2004). Also the opportunity to experiment with new ways of working while creating a system adds to individuals' belief in their own capacity (Rafferty & Simons, 2006).

2.3 Agile software development in eHealth

In software development, the last decade has seen the rapid rise of Agile methods. United through the formulation of the underlying values in the Agile Manifesto (Beedle et al., 2001) these methods approach the development of software projects in an iterative, interactive, and exploratory fashion. The approach is iterative in the sense that new working functionality is produced in iterations, each delivering fairly small increments. The approach is interactive in the sense that customer representatives, for example the intended users, get actively involved in evaluating the previous iteration and in planning the contents of the next iteration. The approach is also explorative, meaning that the full specification only emerges as the consequence of subsequently planned iterations.

With regard to the Agile methods in eHealth a number of papers have been written. Offenbeek (1996) proposes the applicability of interactive and iterative methods in situations with a high resistance potential, to which we categorize healthcare. Krause and de Lusignan (2010) state that, from the point of usability of clinical applications, Agile techniques are more appropriate than processes that separate developers from users, and test products against theoretical assurance models. Kitzmiller (2006) presents the Agile approach as an improvement and evolution over the traditional plan-driven approach. For a general academic overview in Agile methods we refer to Dybå and Dingsøyr (2008) ans Lee and Xia (2010). Since Agile methods are an actively developing field, there is a continuous need for more rigorous studies (Lee & Xia, 2010; Abrahamsson, Conboy & Wang, 2009).

Currently Scum is the most widely used Agile method (Version One 2010). Scrum emphasizes the project management aspects of projects where it is difficult to know the full specification of the desired end product at the beginning of the project and therefore impossible to plan everything at the start of the process. Central to the method are a number of practices, such working with a list or backlog of prioritized workitems, short cycles that lead to demonstrable products and an adaptable

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planning whereby a self-organising team continuously inspects and adapts its own progress (see Fig. 1). For a full description of Scrum we refer to Schwaber and Beedle (Schwaber & Beedle, 2002).
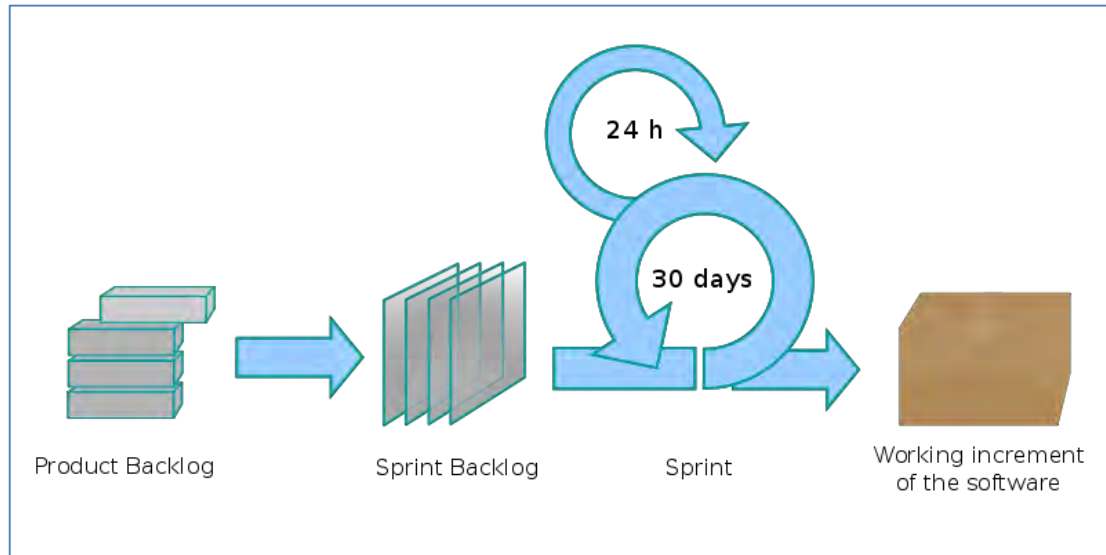
Fig. 1: Scrum process, from Lakeworks; Scrum Process; WikiMedia Commons; 9 Jan 2009; Web; 20 May 2012

2.4   Development of the proposition

Considering the previous paragraphs it is clear that approaches for eHealth innovation projects must support the innovative nature of the projects, ensure management support, increase user self-efficacy as a basis for increased user acceptance and allow for emergence (Burnes, 2004). Building on these characteristics we chose Kotter's eight steps (1995) as the change management approach for this study, because it supports emergent change and focuses on management support and organizational involvement. From a software development perspective, the Agile methods have been specifically tailored for projects that are innovative, have uncertain outcomes and require user-involvement. To operationalize Agile we chose Scrum. Scrum is one of the most widely used Agile methods in this time period and as such also the logical choice for the development approach in our case study.

In this section we compare the Scrum practices with the eight steps of Kotter's model and describe how they theoretically match, represented in the overview in table 2.

The first phase in Kotter's model (steps 1-3) aim at developing a climate for change. Scrum practices do not specifically support these. The sense of urgency, step 1, that is needed to start the actual eHealth project is not part of the Scum practices, but once a project has been started several Scrum practices support maintaining the sense of urgency. The basis of Scrum is a prioritized list, called the product backlog, and projects start with the stakeholders collaboratively translating the initial vision into finer grained items that are put into the backlog. This backlog then has to be prioritized through consensus of the stakeholders. The act of actively working on the specification of the project deliverables and prioritizing as a team, combined with the knowledge that the first results will be delivered in a short period of time, contributes to a sense of urgency. This sense of urgency is maintained by repeating sprintdemos and sprintplannings, a typical sprintlength being somewhere between two to four weeks.

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Kotter's step 2 describes the need for a guiding team. In Scum, the sprintdemos and sprintplannings offer a natural opportunity for the stakeholders within the healthcare organization to meet. They can collectively witness progress, reflect on the impact of the eHealth application on their working practices, voice objections encountered in their departments, suggest improvements and adjust priorities. Formally the Product Owner has the final say, but he or she tries to achieve consensus between the stakeholders. This group of stakeholders become ambassadors of the new product and guide the necessary changes in the organization until the next sprintdemo. One aspect of the guiding team, enough organizational power, is not specifically addressed by Scrum, although the product owner is likely to be the person providing the organizational power.

Kotter's step 3, the creation of a vision is supported in Scrum through the development and maintenance of the product backlog during the sprintplanning meetings. The product backlog essentially becomes the description of the product and allows a vision to emerge. During the springplanning, sprintgoals are formulated to summarize the results of every sprint. Finally, the emerging vision is strengthened by the practice of incremental realization through working deliverables, demonstrated at the end of each sprint.

The next phase in Kotter's model, step 4, is engaging and enabling the entire organisation. This step is about communication and that is a central principle in Agile methods. The progress that is demonstrated through a working product at the end of every sprint, has a powerful communication effect on the organisation involved. It is good practice to make the sprint demo open for a broader audience, appealing to all interested. Stakeholders can actively participate in the ongoing process of change rather than be confronted with the facts afterwards, adding to buy-in. The guiding team can also take the working deliverables and demonstrate them in their department. If the need for additional demonstration material is felt, Scrum allows for the priorities to be adapted as the need arises during the project.

Kotter's step 5 is the empowerment to act on the vision and is supported by Scrum in several ways. Part of the process is to regularly inspect which impediments are holding the project back. Having an early working version of the eHealth innovation helps in signaling these obstacles. Obstacles of a technical nature can be entered into the product backlog and prioritized be solved as quickly as needed. Obstacles of an organizational nature are typically tackled by the guiding team following a sprintdemo. The periodic nature of sprints forces the problem owners to fulfill their designated tasks quickly. The same argument holds for step 6, the creation of short term wins. Opportunities for interesting functionality or other uses of the eHealth system can be taken by the Product Owner into the adaptable planning.

How well Scrum supports Kotter's final phase, step 7 and 8 of implementing and sustaining the change depends on whether Scrum is still applied at that time or not. If Scrum is still in operation, then the above benefits are still in effect. In practice an often encountered scenario is that Steps 7 and 8 are disconnected from the development phase, sometimes due to the time needed to evaluate a pilot system or time needed to take decisions or change policy. Then the momentum for change that was gained during the Agile development phase is lost. A common issue in practice is that Agile development practices require strong discipline during execution, which work well under pressure. When the pressure is off, other priorities often intervene and the practices dilute.

Based on the above we conclude that Scrum practices to a large extent can be compared with Kotter's eight steps (1995). Strong points of the Scum practices are the development and maintenance of a sense of urgency and a climate of change once a project is underway. Scrum practices force management involvement and effectively result in co-creation of the emerging product. These practices increase user self-efficacy and management support, two important enhancers of readiness for change. Whether Scrum practices support the third phase of Kotter's

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eight steps (implementing and sustaining the change) will depend on the chosen project approach. If this phase is disconnected from the development phase there is a real danger that the momentum created through Scrum during the pilot project will be lost.

Table 2: Mapping of Scrum as a change approach according to Kotter's eight steps

Kotter	Supported through Scum practice
Creating a climate for change	
Develop a sense of urgency	Once the initial sense of urgency has been created and a project has been started: Periodic sprints, including sprint planning and sprintdemo's Specification and prioritisation of product backlog by stakeholders
Building a guiding team	Product owner role Sprint planning meeting Sprintdemo
Creating a vision	Initial product backlog Revisions of product backlog Sprint planning meetings Sprintdemo's Working product after every sprint
Engaging and enabling the entire organisation	
Communicating for buy-in	Working product after every sprint Gathering feedback during sprintdemo's Possibility to prioritise demonstration items Emphasis on visibility of progress
Empowering others to act on vision	Inspect for impediments Periodic sprints + Prioritisation backlog Working product after every sprint
Creating short term wins	Input through product owner Periodic sprints + Prioritisation backlog Working product after every sprint visualizing progress
Implementing and Sustaining the Change	
Consolidating and producing more change	When Scrum is still the project approach: Periodic sprints Prioritised product backlog
Institutionalize new approaches	n.a.

We mapped Scrum practices on Kotter's eight steps (table 2) and conclude that where Kotter describes the outcomes to be achieved with each step, Scrum practices effectively provide a working method on how to achieve the desired outcomes. The only step that is not automatically supported by Scrum is Kotter's stap 8, institutionalize the change. This stands to reason, because Scrum is a development approach and not an implementation approach. In the following section we present our case study to validate this proposition.

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3 Case study: developing an Intelligent Monitoring System

In this section, we describe our case study to validate our proposition. The case is a project in which we developed an intelligent monitoring system to support the care for persons with intellectual disability living semi-autonomously. First, we describe the methods used for the case study. Then we give a brief description of the setting and scope of the project. We show how the Scrum method was used during the development of the monitoring system. Finally we present how the process and impact were perceived by a set of stakeholders, i.e. the users and the management of the healthcare institution, to indicate to which extent the Agile approach supported change management and which Agile practices were deemed to have the most impact.

3.1   Methodology

The case research methodology was chosen for this study in order to be able to collect rich descriptive data from a case available to us. The case research approach also allows the researcher to take advantage of unique features and opportunities for triangulation (Eisenhardt, 1989). The main drawback to the case approach is that the generalizability of the results is limited to propositions for future research, not to a population.

This case study can be classified as a single case design with a single unit of analysis (Yin, 2009) the unit of analysis being a development project to create a pilot eHealth system called Intelligent Monitoring System (IMS). This system was developed in the period 2010-2011 in joint cooperation between the NOVO foundation, Hanze University of Applied Science and a system integrator. The case was chosen on the basis of availability, but we believe this case to be a typical example {{80 Yin, Robert K. 2009/f, p.49;}}, providing insight into a healthcare organization with relatively little experience in these kind of projects attempting to develop an innovative eHealth system which has impact on management, specialists and caretaking staff.

The main data was collected through focused interviews with six stakeholders from NOVO, listed in table 3 The interviewees were selected because of their involvement in the project, either as part of the projectteam or as intended users of the pilot system. The interview data were supplemented with observations and artifacts (e.g. the product backlog) collected during the development process. A case study protocol was developed including field procedures and interview guidelines and was reviewed by an independent senior researcher.

Table 3: Interviews

Interview	Job title	Part of projectteam	User of system
1	Personal coach	No	Yes
2	Personal coach	Part of the time	Yes
3	Behavioral scientist	Yes	Yes
4	Behavioral scientist	Yes	Yes
5	Manager	Yes	No
6	Manager	Yes	No

The interviews started with an introduction, including an brief explanation of Kotter's model and a refresher of the Scrum method. This was followed by open questions on the experience of the interviewee with innovation projects and their role in this project. The main part was a structured walkthrough of the eight steps of Kotter's model, each supported by a one page printout, questioning whether the interviewee experienced that particular step during the project and what causes they

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identified for that step occurring or not. The interviews were digitally recorded and transcribed by a third party. The collected data were stored in a secure case study database.

For the analysis the responses to the eight main questions about Kotter's steps were tabulated and then coded. Codes for Scrum practices were defined beforehand, codes for rival explanations were developed on the basis of the data.

3.2   The Intelligent Monitoring System (IMS)

The project concerned the care for persons suffering from mild intellectual disability (IQ 50-70). These clients are ambulatory resident and in general have some form of daytime activity such as supported work. The NOVO foundation helps the clients with their basic living conditions, such as safety, security, food and health, and also tries to promote self-reliance and personal development. As a

result of their disability the clients have issues with a sense of time, duration, place, distance, risk estimation, "if-then" cause-effect, planning, taking action, continuing and finishing activities and determining errors and/or dangers. Currently, the clients are mainly supported through human intervention, in which *personal coaches* observe, identify and intervene. These personal coaches are guided in their decisions by treatment plans written by behavioural specialists.

Due to shrinking of the potential workforce in the northern region of the Netherlands, NOVO expects it will be faced with employee shortage in the future. An Intelligent Monitoring System was envisioned as a potential solution to this problem. Such a system would be able to monitor the clients' situation and take appropriate interventions where necessary. This allows the client to resolve the situation and, perhaps, over time learn how to avoid them. This would lighten the workload for personal coaches, but the main potential benefit would be the shift from reactive care to proactive care. Another benefit is that this category of clients generally prefers as little human intervention as possible. If the client can resolve a situation with the help of the monitoring system then the personal coach need not be notified.

The Intelligent Monitoring System consists of a number of components (see Fig. 2):

- Sensors in the home of the client, i.e. a bed sensor to detect whether a client is in bed or not.
- A rule-based expert system containing rules for certain situations in the home of the client. In evaluating the rules the system recognizes critical situations based on the received sensor data and determines which interventions should be applied. These interventions are typically first sent to the client and escalated to the personal coaches after a number of resends.
- Actuators in the home of the client which can perform an intervention, e.g. playing a sound clip that tells the client it is time to go to bed or a phone capable of sending text messages. Physical actuators like closing a window or shutting down a computer are technically feasible but were not used in the project.
- A user interface for behavioural specialists to define and manage the rules for the clients in the expert system. To create a Graphical User Interface that allows a healthcare professional to create generic logical rules was both a technical and a usability challenge.
- A user interface for the coaches to see issues that require their intervention.
- A reporting system with which, among others, the effectiveness of interventions over a period of time can be traced.

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Fig. 2: Intelligent Monitoring System
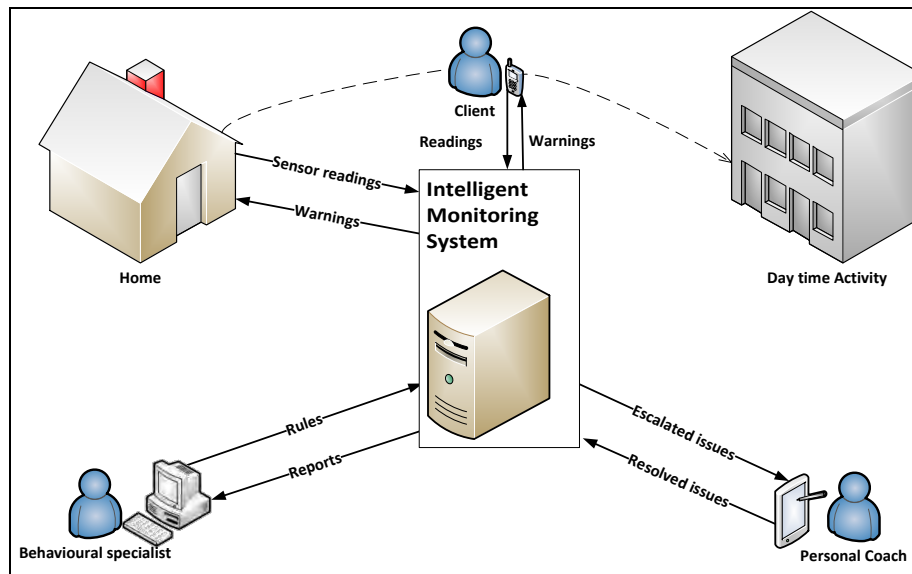
The goal of the project was to deliver a pilot system that could be tested with three clients for three scenarios. NOVO had no prior experience with developing this kind of innovative eHealth systems. The introduction of the IMS would have major consequences for all stakeholders involved, the most significant ones being:

- The behavioral specialists needs to learn how determine logical rules for clients with a certain treatment plan and to enter these in the user interface of the expert system. An example of such a rule could be "IF time>=23.00 AND isActiveInLivingRoom THEN send(timeToGoToBedMessage)". Over time the specialists would also need to validate the effectiveness of the rules.
- The personal coach on duty needs to be able to interface with the system on a real-time basis through a computer or mobile device to see if there are issues that the client failed to resolve. If so, the coach contacts the client and helps with resolving the situation. This is an entirely different workflow than the current one in which there can be multiple days between a situation, for example the client goes to bed too late, and the symptoms, for example the supervisor complaining that the client has been late for work this week.
- The clients and their families need to get accustomed to the systems presence in their house and how to handle notifications.
- The entire process of informing clients and their families about the system, getting consent, and having third parties perform the installation of the required components turned out to be a major task for the management.

The main development work was done over a one year period, resulting in the software system demonstrable in a test environment. The transition into the houses of the clients proved challenging however, leading to disagreement with the system integrator and the testing and implementation being stalled. During the final period, Scrum was no longer applied.

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3.3 The application of Scrum

When choosing a development method for this project, the main deciding factor was the novelty and innovativeness of the proposed system for all parties involved. Determining the correct requirements is a demanding task for any project, let alone for an interdisciplinary innovative project with healthcare professionals who have to alternate between their project tasks and operational crisis calls. To address the requirements elicitation under uncertainty Scrum was chosen.

The typical Scrum components were implemented in the following ways. The *Product Owner* position was taken by a behavioural specialist from NOVO, in close cooperation with a top-level manager. The *Scrum Master* role was taken by one of the authors. He was to ensure that the development process kept working and any impediments were resolved. The development *team* consisted of staff and students from the Hanze University of Applied Science. Expertise on Human Computer Interaction was added to the team.

The main product development was done in twelve *sprints* lasting three weeks each. Each sprint was given an explicit *sprint goal.* These sprint goals were planned for several sprints upfront but adapted after every sprint according to new insights. The work in the sprints was guided by the requirements which were prioritised in the *product backlog.* The main meeting at the end of every sprint was the *sprint demo.* In this meeting the developers presented their results directly to NOVO staff. Senior management and behavioural specialists were present at the earlier sprint demos, later on the personal coaches and IT-staff also joined. This demonstration would then trigger discussion about (dis)advantages of the implemented solution, possible exception scenarios and how to deal with them, implications for NOVO and their clients, and new ideas for features. Ideas and suggestions were recorded on the spot to prevent them of getting lost in the following discussion.

After the demonstration and discussion the *sprint planning* for the next sprint was done. The product backlog, together with the newly generated ideas, was again prioritised. The long term sprint planning was reviewed and a decision was made concerning which backlog items were to be developed in the next sprint. Organisational actions or impediments that were identified during discussion were handled by management.

Finally, the typical Scrum practices such as *daily stand up, scrum board* and *burn down chart* were applied internally by the development team, but were not part of the interaction with NOVO.

4 Results

In this section we present the collected data and our findings. Table 4 presents the main interview data, while table 5, in the appendix contains the sprintgoals as they were envisioned beforehand and as they were realised during the project. We also describe our findings related to the first six steps of Kotter's eight steps.

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Table 4: Representation of main interview data

Steps Kotter	Perceived?	Analysis – Scrum practices	Who	Quotes
1. Urgency	Y	10_APPRECIATE_OPPORTUNITIES 03_ADAPTABLE_PLANNING 02_SHORT_CYCLES 01_SMALL_ITEMS 13_LACK_OF_TIME	PC1[1] PC2 BS1 BS2 HM1 HM2 PC1 BS2 PC2 BS1 BS2 HM1 HM1 BS1 HM2	• "it becomes more tangible if you are taken along in the prcess and you get to see things, this motivates you" (PC1) • "[through the regular meetings] the project remained on the surface which meant I could stay engaged" (PC2)
2. Guiding team	Y/N	02_SHORT_CYCLES 03_ADAPTABLE_PLANNING 11_UNCLEAR_PRODUCT_OWNER 12_MISSING_STAKEHOLDERS	PC2 PC2 HM1 HM2 HM1 HM2	• "At the end [when Scrum was no longer applied] I lost sight who was leading the project." (BS1)
3. Vision	Y	02_SHORT_CYCLES 03_ADAPTABLE_PLANNING 04_WORKING_DELIVERABLES	PC1 BS1 BS2 HM1 HM2 PC1 BS1 PC2 BS1 BS2 HM1	• "Every Scrummeeting we looked again at what was important this time" (HM1)
4. Communicating	Y	02_SHORT_CYCLES 03_ADAPTABLE_PLANNING 04_WORKING_DELIVERABLES	PC2 HM2 PC1 PC2 BS1 BS2 HM1 BS1 BS2 HM1 HM2	• "In the end you have a demonstration which you can use to explain in the teams and there you are more enthusiastic because you can show it"(BS2)
5. Empowering	Y	02_SHORT_CYCLES 03_ADAPTABLE_PLANNING 04_WORKING_DELIVERABLES	PC1 BS1 BS2 HM1 PC1 PC2 BS1 BS2 HM1 HM2 HM2 BS2	• "You puzzle what can go wrong and what is needed and take that from the workfield to the Scrum. That helps to remove obstacles." (BS2)
6. Short term wins	Y	02_SHORT_CYCLES 03_ADAPTABLE_PLANNING 04_WORKING_DELIVERABLES	PC1 BS1 HM1 PC1 BS1 BS2 HM1 BS2	• "The stop button was directly available for [staff]" (HM2)
7. Consolidating	N			
8. Institutionalize	N			

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Step 1

With regard to the first phase of Kotter, all interviewees reported an initial sense of urgency when starting out on this project. This was not due to Scrum but to prior appreciation of the potential that the IMS held. During the project however, short cycles are credited for maintaining the personal sense of urgency even when challenged by other work demands.

The sense of urgency in the wider organization was maintained by regular demonstrations, to which the adaptable planning practice contributed. The changed priorities in the sprintgoals (see Appendix A) reflect the increased priority of demonstration material and demonstrations for clients and staff. In retrospect, the healthcare managers were unsatisfied with the sense of urgency in the wider organization. This might be explained by the fact that many staff members were not immediately involved in and affected by the pilot.

Step 2

The opinions with regard to the guiding team differ. There was a team with organizational power to guide the project which joined the Scrum meetings, but in hindsight healthcare management missed a number of stakeholders and found the product owner role not performed clearly enough. In this case no clear support was found for the contribution of Scrum practices to a guiding team. Only a few hits were found, such as a behavioural scientist who reported that "at the end [when Scrum was no longer applied] I lost sight who was leading the project."

Step 3

With regard to creating a vision, the interviewees responded that during the project a vision emerged and that it became clearer and more focused while working. The Agile practices of short cycles, adaptable planning and working deliverables are credited as contributing to creating and evolving the vision.

Step 4

Communicating the vision was actively done in many different ways (teammeetings, demonstrations, one-on-ones with clients and parents). A comparison of the a priori and a posteriori sprintgoals shows that the priority the development of demonstration material became a necessity during the project. Changes included the development of a portable demonstration suitcase and hands-on support from developers at demonstration sessions. Scrum practices that respondents mentioned are the short cycles, adaptable planning and working deliverables.

Step 5

When discussing the phase of empowerment of others the main response was about the ability to identify obstacles and have them resolved by prioritizing them and adapting the planning. One example was the demand for a mechanism for clients to pause the system when they wanted to, the "red button". Another example was the request for the option to specify time windows for receiving notifications or not. The most quoted Scrum practices were the short cycles and adaptable planning. In our observation the frequent demos also gave staff insight in the effects of the system on their daily work. This often led to exchanges like "For this to work we will need to change our working process. Let's plan a meeting to discuss this with the colleagues."

Step 6

The interviewees saw the short term wins as an extension of the empowerment. Again short cycles and adaptable planning are credited. One manager noted as an unexpected short term win for NOVO a general increase in the awareness of technological possibilities among staff.

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The phase of implementing and sustaining the change (steps 7 & 8) was not reached in the case study project. After the main development work Scrum was no longer applied and the momentum faded quickly.

Finally, this first time using an Agile method made an impression on NOVO. Based on the experiences in the IMS project the NOVO management decided to incorporate Agile practices into their organisation-wide innovation policy (Molenaar 2011).

5 Discussion and Conclusion

In our case study we validated our theoretical proposition that Agile is a valid change approach for eHealth innovations. We found support for part of our proposition and our findings are summarized in Table 4. Agile practices do create the envisioned results of Kotter's steps 1, 3, 4, 5 and 6. We did not find clear support for step 2, the guiding team, although the absence of guidance was felt when the Agile project stopped. The project of our case study did not reach step 7 and 8, and thus we did not find support for these steps.

Table 4: Agile practices supporting Kotter's eight steps in case study

Kotter's steps	Associated Agile practices
1. Sense of urgency	Agile can be used to maintain the sense of urgency among healthcare staff over the duration of the project by the practices of short cycles and adaptable planning.
2. Guiding team	No clear support was found that Agile supports the building of a guiding team.
3. Vision 4. Communicating	Agile can be used to create, evolve and communicate the vision through the Agile practices of short cycles, adaptable planning and working deliverables.
5. Empowering 6. Short term wins	Agile supports empowering of staff by allowing them to bring up potential obstacles and improvements, prioritizing these and adapting the planning of the next cycle if needed.
7. Consolidating 8. Institutionalize	This phase was not reached.

We conclude that Agile methods, in this case Scrum, provide a good part of the change management that is needed to successfully develop and implement eHealth innovations. Agile practices allow for emergence through the short development cycles, the creation of working deliverables that incrementally are further developed and the ability to prioritize the development process according to

emerging needs. The sprint demos enforce repeated discussion between the product owner, users and the building team on visible and tangible results that have meaning to both parties. Thus a common understanding and even shared language emerges, bridging the gap between completely different disciplines and solving the difficulty to "speak each other's language". Agile practices facilitate an increase of user self-efficacy because users effectively become co-creators of the product that is under development.

We found again that management support is a critical success factor. In our case, management had created the needed sense of urgency before the project was started. During the project, the management was extremely supportive, but not continuously involved. This hampered the decisiveness of the project and eventually led to suspension. We must conclude that Agile practices do not fill this gap.

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In this paper, we have examined the applicability of Agile software development methods as a change approach. Our comparison with the change model of Kotter (1995) and the validation of our proposition through a case study, has shown that the practices of Agile methods can facilitate organizations through the necessary steps of creating a climate of change, engaging and enabling the organization and implementing the change. In other words, Agile practices are a change approach. Currently Agile methods are generally confined to the development phase, thus leading to a loss of momentum in the implementing and sustaining of the change. Continuing Agile practices such as iterations and demonstrations in some form throughout the duration of the implementation could remedy this oversight.

Healthcare organizations now have an additional approach at their disposal, which may lead to an improved success ratio of sorely needed eHealth innovation projects.

6 Limitations and further research

The results presented in this paper have a number of limitations. We have chosen to focus on the Scrum method and did not consider other Agile methods such as eXtreme Programming. However, the underlying values are the same and Scrum is the most widely used method. From the change management point of view we have chosen to focus on the model of Kotter. This is a widely accepted model which fits the type of change management under discussion. However, other models could be considered.

Another limitation is the amount of practical evidence. The experiences of the participants in the illustration project support our theoretical proposition, but a single case may not be generalized without caution. Furthermore there is researcher bias as the authors participated in the project. Finally the data is secondary, the primary purpose of the project was not to research the relationship between Agile and change management.

Future research could be aimed at systematically investigating eHealth innovation projects with regard to the impact of the software development method on change management, such as a longitudinal multi-case study measuring user acceptance when applying Agile methods. Further research on the applicability of Agile methods in eHealth projects with different characteristics, such as size or application type, would also be a valuable contribution.

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Appendix A

Initial sprintgoals period 1	Realized sprintgoals period 1
Basic rule execution	Basic rule execution
Basic rule editor for behavioral scientist	Basic rule editor for behavioral scientist
Advanced rule editor	Advanced rule editor
GPS-tracking	GPS
Sensorintegration	*User interface personal coach*
Reports	*Refactoring, transfer*
Initial sprintgoals period 2	**Realized sprintgoals period 2**
Web application personal coach	Web application personal coach
Adapting to live pilot	*Demonstration suitcase, protocols*
Reports	*Demonstrations, stop button*
Simulation module	*Refactoring*
To be defined	*Reports*
Transferral to system integrator	Transferral to system integrator

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Resilience in the event of long-term absenteeism

Leni Beukema (1)

Long-term absenteeism is a persistent problem in the police organisation in the Netherlands. Around 4% of staff has been absent for over three months. For the National Police's Enhancing Professional Resilience programme, we conducted research into opportunities for increasing people's resilience when returning to work after such a long period of absenteeism. This research provides suggestions for dealing with the problem of long-term absenteeism effectively. The following issues turned out to be important: the scope of employees of their reintegration process, reciprocity in the relationship between line manager and police employee, greater knowledge of Post-Traumatic Stress Disorder (PTSD) and its causes and finally, dealing with diversity in the organisation in an active manner.

Introduction

Politie Nederland set up the Enhancing Professional Resilience (*Versterking Professionele Weerbaarheid*) programme in 2011 with three main objectives:

- To enhance the resilience of police officers
- To increase the expertise of police officers
- To increase employability and operational employability among the police

The project 'Everyone involved' (*Iedereen doet mee*), which was started in the spring of 2013 in five units and in Politie Nederland's IT service, and focuses on reducing long-term absenteeism, forms part of this programme. In the context of this project, TNO conducted quantitative research into backgrounds to absenteeism of three months and longer within Politie Nederland (Huis et al., 2014). Moreover it was investigated how rapid solutions can be implemented by a specific investment of specialists. In this process it became clear that some of the absent staff have questions about the meaning of work. The project management team ascertained that "they are questions that affect the individual police officer, but also the police organisation itself: what scope is there to effectively deploy people in difficult circumstances? And by effectively we mean matching the development of the employee in question and of the organisation as a whole. " (Ditewig, 2014)

Therefore a need for research came afore which, based on the quantitative knowledge found, was helpful in finding starting points for an approach of this type. We opted for a qualitative pilot in which insight is gained into underlying act mechanisms in the organisation that enable or prevent the necessary scope for adequate solutions. Stories of individual police officers who experience absenteeism in the context of Politie Nederland for longer than three months form a central part of this. We formulated questions at several levels. At individual level, we looked at police officers' motives for their work and how this is in keeping with the workplace. At organisational level, the central question was what common themes are coming to the fore in the individual processes that provide an idea of the starting points relevant to the police organisation for enhancing police officers' (moral) resilience. This article mainly focuses on the latter question.

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Context of the study

Average sickness-related absence in the Netherlands has already been declining for a number of years. Statistics Netherlands (CBS) reported that in 2014, sickness-related absence was at the lowest point since 1996. Whereas the sickness-related absence recorded during the second quarter of 2011 was 4.1%, during the same period three years later, this figure was 3.9% (source: Statistics Netherlands, 24 November 2014). Data from the National Working Conditions Survey (*Nationale Enquête Arbeidsomstandigheden*) processed by Huis et al. (2014) shows that the situation with the police as far as the frequency of absences is concerned is less rosy.
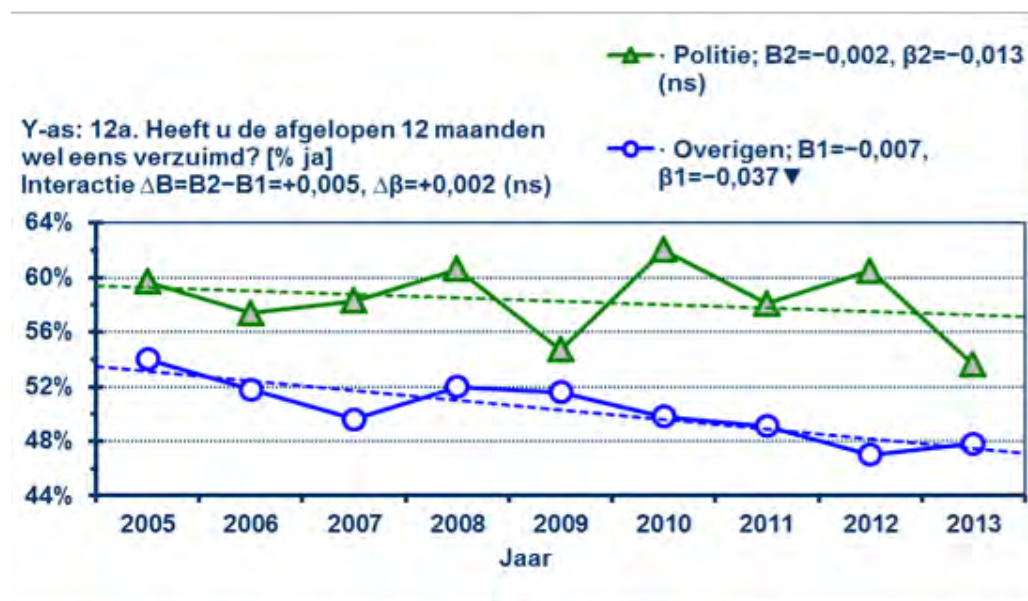
Figure 1.1 Frequency of absences for the police and other employees in the Netherlands. Source: NEA 2005 to 2013 (from Huis et al., 2014, p.1)[2]

The duration of absences within the police organisation is also relatively high. In the study conducted by TNO, around half of the National Police Organisation was examined (31,246 employees). Of those, 1280 employees were absent for longer than three months, which equates to 4.1% (Huis et al., 2014. p.15). The TNO study has revealed that the duration of the absence among this group of employees is just as long: the average absence is 420 days, in other words almost 14 months (p.44). The police's reintegration policy is therefore high on the agenda.

Literature about sustainable employability (Van Vuuren (2011), De Lange (2014), Brouwer, De Lange, Van der Mei, Wessels, Koolhaas, Bultmann, Van der Heijden, Van der Klink (2012)) draws attention to the importance of looking for people's capabilities and motivation for doing their work to the best of their ability. What's more, the fit between the individual and his or her working environment is essential for finding starting points for sustainable employability. In literature about reintegration, Coenen-Hanegraaf and Valkenburg (1998, 2012) combine both basic principles in the individual demand-driven approach. Whereas this approach originally developed with reintegration of people who were distanced from the labour market, it has also turned out to be useful in the context of

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(2)

Y axis: 12a. Have you been absent at all during the past 12 months? [%]

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people who are already working on the labour market (Beukema & Vd Vlist, 2001). Starting points form in this regard:

- prospects and motivations of people in the context in which they find themselves

- the individual as actor in his or her own process

- quality of the interaction

- reciprocity between individual and his or her environment (in this case, the work organisation).

On the one hand, reciprocity implies that employees are able to adapt to the organisation's rules and practices, and on the other hand, the organisation can try to meet employees' requirements and provide opportunities. Whenever the process deals with opportunities and motivations, this may enhance this individual's resilience. If the individual and the working environment also match well, this can cause a positive movement to get underway, which can be used to find points of reference for a suitable reintegration.

Sustainable employability within the police is influenced in a specific manner by the nature of the work. Police work can be drastic for the people 'in blue': situations in which they face violent incidents (domestic violence, discovering dead bodies, disturbances of the peace etc.) are now par for the course. Van Beek et al. (2013) have ascertained that police officers demonstrate high levels of commitment compared to similar groups (such as the military police, prison workers and police employees abroad), and that the work situation on average does not have any obvious adverse effects on psychosocial health. Police employees in the Netherlands don't deviate too much from the aforementioned comparison groups when it comes to mental health. This positive image of the average police employee does not deter from the fact that a study about the period between 1989 and 1994 revealed that in the Netherlands, five to seven percent of police staff developed post-traumatic stress disorder after experiencing radical or traumatic incidents (Carlier, Lamberts & Gersons, 1994, in: Smit et al., 2013). So far, the issue of PTSD has mainly been investigated in a quantitative manner based on the effectiveness of treatment (Smit et al., 2013) and from the perspective of the psychosocial health of police employees (Van Beek et al., 2013). Dealing with this phenomenon in the police organisation itself has been largely overlooked so far, whereas Van Velden et al. (2012), on the basis of an extensive literature study, draw attention to the importance of organisational causes of stress such as work-related pressure, conflicts, reorganisations etc. when developing PTSD – which is why we have explicitly included the issue of PTSD in the study.

Research strategy and design

Action research was the research strategy we employed (Coenen, 2012), in other words, people's actions are at the core: what happened before a person becomes ill, what factors resulted in the absence, how do the different people involved act during the period of reintegration? Just by considering people' actions we can reveal everyday goings-on within the organisation. By studying those actions and their significance for individual and organisation, you can get a concrete idea of points of reference for effective reintegration processes in the event of long-term absence.

Those starting points lie in the 'basic act patterns' in the interaction between individuals and the organisation. A basic act pattern means the way in which people (re)produce the organisation in their day-to-day actions in interaction with other people. People are unique and make their own contribution to the goings-on within the organisation in their own way. At the same time, the

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organisation has certain frameworks, routines, relationships etc. that play a part in guiding that individual action. This implies reciprocity in the relationship between individual and organisation, in other words, each individual story also contains that (part of) organisation's story. The organisation therefore can learn more than enough from the (sum of) individual stories.

When collecting data, we took individual sense making as starting point and a narrative approach, so that the work-absence-reintegration process could be mapped out based on its meaning for those who find themselves in an absenteeism situation. What's more, we also looked at actions and reactions when changes were proposed and/or implemented. The employee's so-called 'flywheel' (Coenen-Hanegraaf & Valkenburg, 2012; Beukema, 2015) from the individual demand-driven approach was used in the pilot to start looking for the core or motivations of the person with his or her basic patterns. The employee's core is in keeping with the employee's intrinsic motivation. In other words: if a solution is found that is in keeping with the motivations a person has for his or her work, a flywheel can be set in motion that may cause a positive spiral. The outermost edge of the flywheel represents the environment in which the employee works; in this pilot: the Dutch police organisation. After all, it's all about mapping out the employee's development opportunities in relation to the police organisation. This context is visualised in the "workplace's" flywheel.

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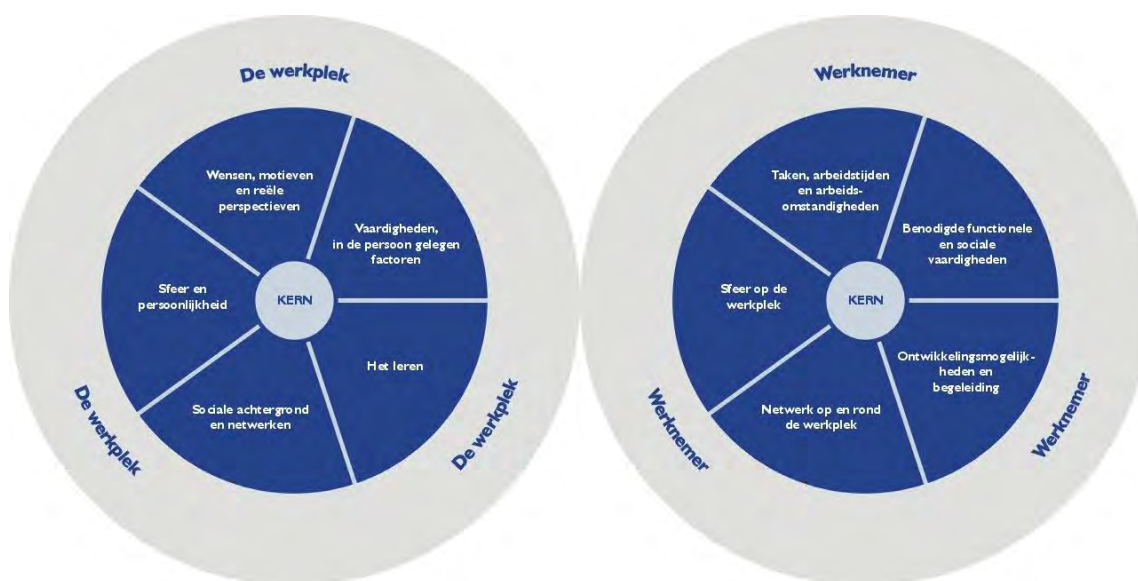
Employee flywheel[3]   Workplace flywheel[4]

Storytellers

Nine cases were included in the study. Conversational partners (story tellers) were selected at random, namely by questioning the five units concerned. This questioning was stopped when there were 12 names, who were approached in the order in which they arrived, but three people stopped participating because they found it a major burden. Of the nine story tellers, three had PTSD when their absenteeism started, one person's absence was caused by a work-related accident, three people had physical complaints that weren't directly work-related and for two people, burn-out

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(3) Requirements, motives and real perspectives

Skills, factors found in the individual

Learning

Social background and networks

Atmosphere and personality

CORE

    Context: workplace
(4) Responsibilities, working hours and working conditions

Necessary functional and social skills

Development opportunities and supervision/coaching

Network in and around the workplace

Atmosphere in the workplace

Context: employee

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complaints caused the absenteeism. Afterwards it was possible to make a comparison with the TNO report (Huis et al., 2014), which revealed that in the pilot, respondents who had physical causes for their absences are represented somewhat less (four out of the nine versus 50% of the files analysed by TNO). Psychological causes of absenteeism are therefore somewhat over-represented. The diagnosis of PTSD in particular is more heavily represented (three out of the nine story tellers versus 7.5% of the files analysed by TNO).

Privacy was essential to this pilot. The storytellers collaborated on the pilot voluntarily and didn't require their line managers' consent. It was up to them whether or not they wanted to notify their line managers of this. The stories recorded in the report were passed on to the participants. They all gave their consent to insert it in this way.

If the discussions revealed that it was possible to adopt a favourable approach, the employee in question was able to do this via his or her line manager. If other things were necessary to arrange this in the context of this issue, the project manager of the pilot began to see how this could be achieved.

Collecting and analysing data

At least one and in most cases two conversations were held per person. The flywheels formed the basis for asking questions. The questions in the flywheel were not simply "ticked off"; rather they can be seen as a guideline/relief structure for the conversation. The conversation was recorded and transcribed with the consent of the employee in question. Should a second conversation be necessary to reach the next step, this was included too and transcribed.

The informative discussion was followed by a collective analysis of the transcript with the group of conversational partners leaders from the pilot, consisting of eight coaches affiliated with the police. We discussed central themes of the employee concerned and asked ourselves what are leitmotifs running through the themes of all the conversations that have taken place. Once this analysis was complete, we returned to the storyteller. Questions that arose are: Do we have the right analysis? Have we forgotten anything important? Additional questions were asked if necessary. This feedback was sometimes given by e-mail or telephone, and sometimes in real life.

Where possible, there was an idea for a potential approach and the aim was for the storyteller to actually take steps too. For the pilot, the question then was: did the action help to enhance the storyteller's resilience? What helped and what didn't?

The nine stories are stories of individual police employees. We therefore named a number of basic patterns for each person that were of real influence for dealing with absenteeism for the interaction between that individual and the organisation. Based on this, we paid attention to the similarities we were able to find in those individual basic patterns, gaining an insight into basic patterns that are important to the organisation as a whole when tackling absenteeism.

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Results

Crux of the matter

At individual level, the storytellers' motives for working for the police are, of course, diverse, because each one is individual. Yet an important motive for police work springs from this because it is named by almost all of the storytellers: meaning something to people.

> *"Don't forget, once you have been infected with the virus once, you will never get rid of the sense of justice that goes with it ever again. "*

> *"By secondary school, I already knew that I wanted to join the police force, ...as I found the action appealing. The fact that you can make a small difference in difficult situations too, such as when imparting bad news.... that's when you matter to people."*

> *"I still like the police organisation, I still love the work that the police does.... Standing in the middle of society, you can really make a difference for people."*

Based on this motive, several people have explicitly named the importance of craftmanship as an important motivation for their work. People are very closely committed to that profession and are looking for the scope to implement it in a personal manner.

> *"One time it might be writing tickets and another mediating... I always try to work in a people-oriented manner. When I write out a ticket, I explain why we're doing it."*

> *"Over the years, I have seen rather a lot of community police officers come and go and I have also supported them rather a lot in order take steps at any given moment... That means that at a given moment, you have a certain obligation in relation to the content of your work."*

This works in different ways. Recognition and appreciation by line managers and colleagues has turned out to be essential to everyone. If that recognition is missing, it is soon taken personally. For older police officers in particular, it is regrettable that rather a lot of changes have occurred in the way in which they are able to do their work: less with people, and with greater standardisation and administration. Whatever they have identified with no longer applies, they feel attacked in their sense of justice and that can cause uncertainty and frustration.

When it comes to starting points for launching a positive development, we see three scenarios in the individual stories:

1. In two cases, the employee and organisation are working together to make the employee's return to work adequate. We can see this in someone where she and her line manager have found alternative work at a proper level in mutual consultation with each other. We have also observed this recently in another person where the line manager has learnt all about PTSD and the storyteller (with support from his network) says where he would preferably want to end up.
2. In three cases, we can see people taking the initiative to develop and the organisation facilitates this, but adopts a passive stance in the process itself. One person is following a study programme and hopes that it will widen his perspective. Two others have found new places to work which is permitted by their line managers as long as there are no formal complaints.
3. In four cases, we can see that the organisation isn't focusing on developing people and sometimes doesn't facilitate them in finding a solution to their situation. A new position is available for a storyteller, but a number of regulations are getting in the way that line

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managers are struggling to put to the side. Someone else is only offered what he believes to

be a suitable position once in eight years, which stops again when the line manager in question leaves. And two people say that they are not being helped by the organisation in their sickness process and sometimes they experience line managers (intentionally or unintentionally) even making the sickness process harder.

Basic act patterns

We have found five themes that transcend the individual level and are important when tackling long-term absenteeism. These themes have turned out to be leading in the way in which people deal with long-term absenteeism together in their everyday practice in the context of the police organisation. At the same time, the state of affairs found with these themes in the actions of individual actors is constantly being reproduced; only occasionally it has been possible to break existing routines and find new ways of doing things. These themes are:

Preventing broken relationships.

All of the stories have revealed the importance of reciprocal communication in relation to absenteeism. That is the case in a positive sense (for example, a superior who can see that something isn't going well, a line manager who takes the trouble to learn about PTSD, someone who prepares extensively for a meeting with his line manager and company doctor).

> *"I had written my own report and plan of action and was well prepared. I told my entire story, what steps I had taken to aid my own recovery and how I regarded my reintegration. For the first time whilst working for the police, I received compliments from the occupational health and safety (ARBO) doctor and was told by the representative of the HRM department, that they had never witnessed this before – which served to strengthen me further."*

It also forms the crux of many of the stories in a negative sense. People feel they have been left in the lurch, believe they haven't had enough opportunities to reintegrate, are suspicious etc. Communication is sometimes absent here, indirect, with different frequencies and not always with sufficient amount of respect.

Someone whose manager terminated confidence explains:

> *"When I arrived after six months of absence, for example… and I had to go all the way down the corridor to my line manager. And it is actually true, I came out of the lift, entered the corridor and saw at least five or six people standing and chatting in the corridor. And they looked at me…. and no truth of a lie, they all fled to their rooms, and no one stopped to ask me how I was. No one!"*

> *"I spent four months at home without even being contacted once. Nothing."*

Arbitrariness in reintegration.

Communication right from the start of the absence is necessary to achieve a systematic approach, but the last quotation reveals that this isn't always the case. And this isn't a one-off: several storytellers explain that they are not always able to follow the normal process when it comes to

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reintegration. What's more, regulations were followed randomly in a considerable number of stories and people felt left to their own devices.

"And now I am looking for all kinds of jobs myself and next week I will go and look in a different unit, where I am in demand, because I know an awful lot of people, of course."

"I therefore had to arrange that entire process of reintegrating, operating again and reintegrating again myself. The place of reintegration, when I began to reintegrate, the duration of the reintegration, everything."

Lack of familiarity with PTSD.

Within Politie Nederland, the amount of attention paid to PTSD has increased significantly over the past few years. In one of the stories, both colleagues and line managers were aware of PTSD early on. Once colleagues had spotted her situation, they would meet with their line manager.

"He said, sweetie, I already saw it in your eyes. And then I felt something along the lines of oohh, ppfff, how nice!.... And then, it was brilliant, I was removed from my stand-in position straight away and did a wonderful replacement project, which also gave me plenty of responsibility."

A number of stories of people struggling with PTSD clearly indicate that sufficient knowledge and attention is not a superfluous luxury. That applies to both the person who has PTSD and for his or her (working) environment. A story teller has placed his hope in a new line manager and prepares well for the meeting with him, together with his psychologist and the union's social representative:

"The aim was to let them know what is currently going on in my case… but in particular to make a plan of action, which was necessary, because nothing had been arranged.…. I briefly told him about my experience and what I was working on. As the conversation progressed, he became quieter and quieter.. He also said that he was greatly impressed."

PTSD grabs deep into the personal lives of people, but also of their environment, which turned out to be of major importance when looking for ways to reintegrate. The wife of a storyteller says that someone from welfare staff called her and she initially thought it was about her well-being.

"At a given moment, I felt that the conversation was getting one-sided and that they were starting to ask me all kinds of things about my husband, and I didn't like that. I didn't like that at all… Then I was simply really angry too. But also the disappointment of gee, someone asking me something. But no!"

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Dealing with diversity.

Police work is teamwork, whereby people work together based on trust. The corresponding group processes seem to offer scope to people who 'fit the bill', but less to people who deviate somewhat from the norm (see also Van Poeijer, 2011). In a number of stories, it is becoming clear that as you satisfy the profile of the 'average police officer' less, you feel rather excluded. One person explains how he was offered a three-day communication course when he requested a course for expanding his horizon:

> *"Because they said: you can't communicate properly….and I heard that reproach later too, so there is obviously an element of truth in this. But then, if you think that you can teach someone to communicate within three days, that's not going to work."*

Another person felt that his abilities are being ignored:

> *"In my eyes, I was still able to do so much. And I suggested this along the lines of a think tank or development or teaching or whatever. But I was kept away from all of it."*

Attention to development.

Work-related development appears to play an important role for the story-tellers. This is not only the case in the above quotation. Even if people have more opportunities than their position offers them, frustration about this can contribute to the development of absenteeism.

> *"I am in a junior position. I applied four or five times for a slightly higher position and I was always turned down for them, because I didn't have the qualities they were looking for. I once asked: have you read my CV? Yes, they had…Not really, no, not yet. They still don't know everything I've done."*

But even in the event of reintegration, it seems beneficial when development continues to be a point for attention in the work. Work at the right level is very important:

> *"I don't have a nice job now, but rather a pastime."*

> *"I am happy to have my study…. and once this whole thing is over, I will start to look for something to follow on from my course."*

Conclusions and discussion

In general, achieving an adequate balance for both parties between rights and obligations in relation to long-term absenteeism is a question that demands an open dialogue('a good conversation'). It is important for both parties to ask themselves how that balance can be achieved in order to be able to talk about it frankly. It's not about covering up differences of opinion or interests, but about making them transparent. Resources belonging to line managers (as representatives of the organisation) are greater than those struggling with absenteeism and often found in a vulnerable situation. Recognizing this difference in position is crucial for being able to start a good dialogue. That means understanding the other person's position, his or her value for the organisation and his or her perception of sickness or stress. A dialogue demands of the employee to pay reasonable comprehension of his or her own situation, handling it as actively as possible, trusting his or her line manager and – when trust is broken - is open enough to broach the subject. The organisation then offers the opportunity to look for an alternative point of contact.

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The stories from this pilot show the absence of these starting points relatively often. The discussion about these starting points in the organisations seems to demand a cultural change, but can in itself also be seen as the starting point to this shift in culture.

In the conclusions, we talk about provisional answers to the questions asked because, based on nine stories, it is of course difficult to make general verdicts about the police organisation as a whole. Yet it is worthwhile naming the common issues from the nine stories as start for a discussion within the organisation. The question then is: are these basic act patterns recognizable and complete for others? The members of the research group have also answered this question in the affirmative based on their own knowledge of and experience with the police organisation; all the more reason to submit the issues to other people. The TNO report (Huis, Houtman & Kallen, 2014) also backs this up. A number of corresponding conclusions can be found, in other words, of course. TNO also draws

attention to a blurred distribution of roles and responsibility, of potential improvement in training and support of line managers in this field and specifically, on the problem of PTSD.

Sensemaking of their situation by people to whom this relates casts a lively and familiar light on the issue of long-term absenteeism, which is often deemed an abstract concept, as revealed from responses to the research report. The narrative approach is therefore a valuable addition to current research methods and in a pilot such as this, provides starting points for joint action by understanding important themes, in other words joint language that can be helpful when talking about approach and priorities. 'Files' become people and it becomes clear that an individual approach must go hand in hand with a joint approached by those concerned. For HRM staff, that opens up new opportunities for considering the issue of long-term absenteeism and taking the relationship between the individual and the organisation as a point for attention.

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Recommendations for practice and HRM practice

From these general conclusions, we have reached a number of more specific recommendations that may play a role in the required discussion:

- When the absenteeism starts, it is necessary to discuss its cause and the steps that both parties can take to reach a solution. Insight into the different steps and the corresponding time frame can make the difference in time perception between those who are absent and the organisation. The Eligibility for Permanent Incapacity Benefit (Restrictions) Act (*Wet verbetering poortwachter*) provides the starting points for a discussion such as this, because contact times have been specified in this Act. General knowledge about these steps is necessary, supplemented with knowledge about terms of employment related aspects of the absenteeism on the one hand, and dialogical conversation on the other. What's more, finding suitable replacement work (supplemented with partial reporting sick) aids recovery.
- Special attention requires dealing with PTSD. Information is necessary about how PTSD that is directly caused by the incidents experienced can be handled and how organisational sources of PTSD can be prevented. Attention to PTSD in the organisation is now on the increase, but more intense and specific information is required to prevent the sickness process from being strengthened by an ineffective treatment.
- In the case of long-term absenteeism, a major appeal is often made on the home front. In the stories, partners, as well as children, are involved in dealing with absenteeism. It is important to partners and children that the organisation pays attention to this involvement if they are to retain enough energy. What's more, a systematic approach can boost recovery and encourage return to work.
- In the context of this pilot, leadership is all about focusing on employee development, including on the development of those struggling with absenteeism. The following have turned out to be important: drawing attention to things in good time, facilitating replacement work at the required level, helping to think about future prospects. From the stories, the line manager's role appears crucial; a role that is not always tackled equally as adequately. It is important that line managers understand their own strong and weak points and delegate communication about absenteeism and recovery if necessary.

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Barriers and Challenges to Apply Health and Safety criteria in Regard to Eco-Industrial Regulation: A Case Study of Saha Group, Sriracha, Thailand

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Abstract

In the movement to industrialise Thailand, sustainable development and sustainability have been promoted in many different ways. The concept of an Eco-Industrial Park (EIP) is one of the strategies to implement the concept of industrial ecology by inter-company collaboration. The application of EIP aims simultaneously to reduce a range of environmental impacts, including impacts on human health and ecosystems. In Thailand, planning for EIP still is in its infancy. However, political influences have determined decisions, rather than a clearly defined economic strategy. Thus, not all projects have been successful. Of the 22 criteria adopted by the Thai government for assessing EIP performance, most pilot projects have only focused on 'wastes' and 'by-products' management, none address Health and Safety (H&S). In this paper we look at barriers and challenges to effective implementation of EIP in a selected industrial park (Saha Group Industrial Park, Sriracha) by using the H&S aspect to assess the effective implementation of the concept of EIP. Data was collected by survey questionnaire in the H&S sections of the businesses in 2014. Five main barriers were found in the application of Health and Safety criteria to Eco-Industrial regulation. First, the definitional requirements for H&S criteria were not clearly understanding by the industrial park. Second, there are lacks of specific tools from related government agencies to support the individual needs of each industry. Third, the government's policies are not understood by the entire workforce. It's only done by senior management, so the implementation is inconsistent. Fourth, the funding supported for running the projects from the government is lack of continuity both in the pilot projects and the new projects in each fiscal year. Lastly, the extra "encouragement" of tax reduction for participating firms, as well as potential regulatory action or litigation are clearly needed. Finally, the success of Eco-Industrial project in Thailand depends on cooperation from all parties in the park.

1 Introduction

In Thailand, for many years, the government has taken a clear direction to transform the country into a newly industrialised country. Many policies, including investment in infrastructure and industrial development, have been designed to fulfil this purpose, but have caused negative health effects on employees and local people (Phoolcharoen, Sukkumnoed, & Kessomboon, 2003). The Thai government has issued rules and regulations for the supervision and administration of factories – especially for environmental protection and workers' health. In 2000, Industrial Estate Authority of Thailand (I-EA-T), with start-up funding from the Deutsche Gesellschaft für Technische Zusammenarbeit (GTZ) initiated a pilot project for economic development based on the concept of industrial ecology (Chiu & Yong, 2004; Industrial Estate Authority of Thailand and GTZ, 2004). The Thai government has embraced the Eco-industrial Park (EIP) concept which aims simultaneously to reduce a range of environmental impacts, including not only the quantity of waste and gas emissions, but also the impacts on human health and ecosystems. The Industrial Estate Authority of Thailand and Department of Industrial Works (DIW) have played an important role in Eco-Industrial Development (EID) since the first launch; but various factors have impeded its development (Panyathanakun et al., 2013).

Since then, 17 pilot projects have been launched by Thai government agencies to apply environmental criteria to develop ecological sustainability in some industrial firms through waste exchange or water/wastewater management. However, no IP exist yet in Thailand that recognized to success in EIP paradigm. In the fiscal year 2012, the DIW selected five pilot sites for its Eco Industrial Town Project, based on potential; readiness and capacity for Eco Industrial development. One of these

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was Saha Group's Industrial Park, Sriracha, Chonburi Province, Thailand. This industrial park ended

up with 11 projects that were expected to focus on waste management and community network development. Nevertheless, there are no Industrial Park (IP) projects in Thailand that use the Health and Safety aspect in EIP paradigm, even though there is readily available data from the companies involved. This study aims to examine the barriers and challenges in the selected IP operation project that impede applying Health and Safety criteria to Eco-Industrial regulation. The finding of this study will help to understand the problems and find the appropriate tools to improve Health and Safety management for the site selection process and consider the possibilities to develop an EID strategy to meet the requirement of EIP regulation in Thailand.

2 Concept of Eco-Industrial Park

An eco-industrial park (EIP) is an industrial park which businesses cooperate with each other and the surrounding community in an intent to reduce waste and pollution, effectively share resources such as wasted materials, green waste, water, energy, infrastructure, and natural resources, and help achieve sustainable environmentally friendly project for the developer (See Fig. 1). Sustainable development in industrial parks has been explained by various researchers (Van Beers & Biswas, 2008) by applying and emerging appropriate methodologies, while Zhou et al. (2012) offered proper indicators for the determination of the sustainable quality of industrial parks. There is no academic or standardized definition exists to define an EIP. However, some of the definitions available from literature sources consider EIP as a synonym for the concept developed by researchers in the field of industrial ecology (Roberts, 2004; Tudor, Adam, & Bates, 2007). EIPs are a promising strategy to promote sustainable industrial development and to improve the industries' environmental performance in terms of managing materials, energy and waste. EIPs provide substantial benefits for participating companies, for their neighbourhoods and for their extended regions. The commonly accepted international definition was based on the one initially created by an Indigo Development team in 1992 and then expanded for the US-Environmental Protection Agency in 1995.

In 1995, Côté & Hall (1995) proposed the definition of EIP as an industrial system which conserves natural and economic resources; reduces production, material, energy, insurance and treatments costs and liabilities; improves operating efficiency, quality, worker health and public image; and provides opportunities for income generation from use and sale of wasted materials.

Yet another definition was put forward by Garner & Keoleian (1995) as a scientific subject of the physical, chemical and biological interactions and interrelationships both within industrial systems and between industrial and natural ecological systems.

Then, it was refined in 2001 by Ernest Lowe in an Eco Industrial Handbook published by the Asian Development Bank (Lowe & Evans, 2001) that an eco-industrial park or estate is a community of manufacturing and service businesses located together on a common property. Member businesses seek enhanced environmental, economic, and social performance through collaboration in managing environmental and resource issues.

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The definition and the subsequent development of EIPs have been profoundly based on the practice of industrial ecology theory, which pays attention to the exchanges within industrial systems to specify a deep reduction of restricted resource consumption and a minimization of waste production in the framework of a sustainable development paradigm. Despite the EIPs configurations being importantly based on the concept of sustainability, the problem of defining their appropriate layout inside the boundary and the consequent land used design, to minimize land consumption, have not frequently been major in the wide range of studies and practices regarding the EIPs. However, the particular problem of a harsh dwindling of land consumption at the EIP planning phase acquires a precious mission and also requires to be cautiously evaluated inside the sustainable urban development point of view (Tondelli, 2014).
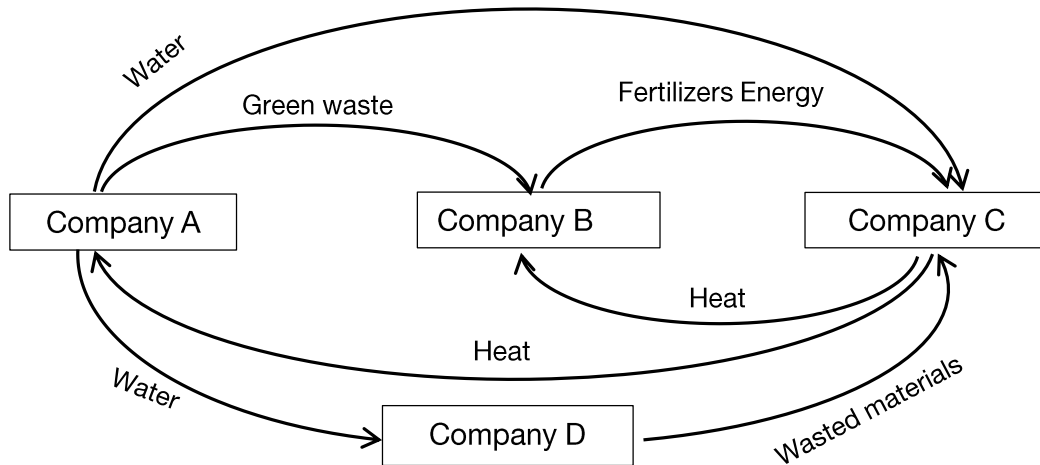
Fig. 1. The exchanges concept within industrial systems in EIP.

3 Eco-Industrial Development Strategies

Regularly, EIP's was known as the environmental performance which better than simple compliance to regulations. This alone made support for the innovations which they requested as a priority in regulatory agencies (Lowe & Evans, 2001). According to Indigo Development Institute (n.d.), the public and private sectors began more than one hundred EIP projects in Asia, Europe, Africa, North America, Latin America and Australia. Since each country is at a different stage of environmental policy and regulatory development, the goals of policy makers in environment and industrial development will be very well supported by meeting the needs of industrial park developers and managers who wish to create EIPs.

An EIP may also be planned, designed, and built in the direction that makes it easier for businesses to work together, and those results in a more financially sound, environmentally friendly project for the developer. In Table 1, other strategies in various areas are adopted by EIP tenants, but do not necessarily contribute to the inter-firm cooperation of industrial parks. Strategies such as resource recovery or deconstruction and remanufacturing could be adopted either by individual tenants or serve as a theme for an EIP as a whole.

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Table 1. Eco-Industrial Development Strategies.

Country/ References	Strategies	
Australia Roberts, B. H. (2004). The application of industrial ecology principles and planning guidelines for the development of EIPs: an Australian case study. Journal of Cleaner Production, 12(8), 997-1010.	• A holistic systems approach to resource management, balancing environmental performance with economic and industrial viability. • Use of an interdisciplinary approach for research, planning and implementation, linking fields such as ecology, economics, engineering, business, public administration and law. • Examination of material and energy flows through complex industrial systems. • Reduction of energy / material flows used for production and impact of consumption on the environmental sustainability. • The re-design of manufacturing system to include activities which reduce ecological footprints.	
Globe Côté, R., & Hall, J. (1995). Industrial parks as ecosystems. Journal of Cleaner Production, 3(1), 41-46. Côté, R. P., & Cohen-Rosenthal, E. (1998). Designing EIPs: a synthesis of some experiences. Journal of Cleaner Production, 6(3), 181-188.	• Site Selection and Design: Prepare a site development plan. And the relevant regulations and guidelines are available. • Building Design and Construction: Develop a landscaping plan to minimize wasteful use of land, heat and water as well as for architectural building requirements. • Substitution/Use of Environmental Products: Review of materials and wastes to substitute chemicals whose quantity, toxicity, persistence and degradation raise serious concern. • Material Cycling/Exchanges: A system to allow the cycling, exchange or transfer of materials within the park. • Feedback and Communications: There is a need for feedback mechanisms to regulate the flow of materials and the growth of populations and communities.	
Thailand Industrial Estate Authority of Thailand. (2012). Specification criteria and indicators to promote into the Eco Industry. Tunsathien, B. (2012). Guidelines for the operation of Eco-industrial city In Thailand (in Thai). Paper presented at the Provincial Industry Development Program, The Twin Tower Hotel, Bangkok Thailand.	Industrial Estate Authority of Thailand, I-EA-T (5 dimensions / 22 sides) • Physical / 3 sides • Economical / 3 sides • Societal / 2 sides • Environmental / 9 sides • Managerial / 5 sides	Department of Industrial Works, DIW (5 dimensions / 20 aspects) • Physical / 2 aspects • Economical / 4 aspects • Societal / 2 aspects • Environmental / 9 aspects • Managerial / 3 aspects

Based on the range of classification of EIP initiatives in literature (e.g. Schlarb, 2001, Indigo Development, n.d., Roberts, 2004 and others), it is clear that the explanation of EIP has not been well developed to scope the boundaries in order to identify what kind of initiatives can constitute an EIP (Trillium Planning and Development INC., 2003). New EIPs can be constructed around already existing operations or created from scratch. Cooperation that develops over a period of time is needed to implement and keep EIPs running. Therefore an evolutionary approach should be adopted (Saikkuu, 2006). Recently, Massard et al. (2012) has summarised a set of Eco-criteria which undertaken at the meso scale to foster a transition to a long-term viability of industrial system (See Table 2). The most exemplifying eco-innovation parks consider a combination of several of the below-mentioned criteria.

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Table 2. List of Eco-criteria (Massard et al., 2012)

Eco-criteria	Details
Energy efficiency	Optimization or reduction of energy use, including energy needed for buildings and other infrastructure as well as production
Renewable energy sources	Use of and/or onsite production of renewable energy includes solar, wind, hydropower, combined heat and power generation by waste, geothermal energy, tidal/wave generated energy, biofuels
Waste management	Onsite collection, transport, onsite/external processing (recycling) or disposal of waste
Water management	Onsite wastewater treatment, reduction/optimization of water use for infrastructure and production
Material / chemical flow	Synergies, materials exchange among companies, collaborations, Input-output scheme defined by industrial symbiosis
Biodiversity	Biodiversity conservation or natural revitalization in the industrial/urban and surrounding area
Mobility, transportation	Efficient viable transport of goods or people with low environmental impact (e.g. electric vehicles, plug-in hybrids)
Land use	Optimization/reduction of land use for industrial/urban infrastructure, revitalization of derelict land (industrial/urban zone)
Air pollution prevention	Reduction in pollutant emissions through cleaner production processes or end-of-pipe technologies
Noise prevention	Reduction in noise emissions through cleaner production processes or end-of-pipe technologies
Environmental management	Certification and labels with environmental standards at the park scale such as ISO 14000
Cultural, social, health, safety	Cultural aspects, social aspects: gender equity, professional reinsertion, child care. For health: safe and clean natural and working environment in the industrial/urban and surrounding area

The majority of EIPs do not seem to plan the development of exchanges or partnerships. Existing examples of industrial ecosystems reflect the difficulty to organize and maintain initiatives that are based upon the exchange of energy and materials (Adamides & Mouzakitis, 2009). The eco-criteria with the highest occurrence consist of waste management, energy efficiency and material flow, respectively. These criteria are usually considered as common strategies for industrial park management in many countries. Their innovative component in case studies is sometimes unclear. Therefore, the high occurrence does not mean that the resource management can be in any case characterized as innovative. Supportive policies are imperative to EIP development. Many national policies still emphasize end-of-pipe emissions measurement rather than an industrial ecology systems approach with a focus on integrated planning (Chiu, 2001). Conversely, eco-criterion like health and safety is probably underrepresented due to the tendency to apply solutions at the micro scale (company) rather than at the meso scale (park) and to their under indicating in the industrial ecology literature (Massard et al., 2012).

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4 Occupational Health and Safety (OH&S)

Since 1950, the International Labour Organization (ILO) and the World Health Organization (WHO) have shared a common definition of occupational health. It was adopted by the Joint ILO/WHO Committee on Occupational Health at its first session in 1950 and revised at its twelfth session in 1995 (International Labour Organization; ILO, n.d.).

The definition reads that Occupational health should aim at the promotion and maintenance of the highest degree of physical, mental and social well-being of workers in all occupations; the prevention amongst workers of departures from health caused by their working conditions; the protection of workers in their employment from risks resulting from factors adverse to health; the placing and maintenance of the worker in an occupational environment adapted to his physiological and psychological capabilities; and, to summarize, the adaptation of work to man and of each man to his job.

The basic definition of a labour standard was that adopted by Block, Berg, & Roberts (2003) in their study of the U.S. and Canada. A labour standard was defined as a governmentally established procedure, term, or condition of employment, or employer requirement that is designed to protect employees from treatment at the workplace that society considers unfair or unjust. The common element across all the standards is that they are mandatory – they are imposed and enforced by government.

Universally, OH&S is a cross-disciplinary area concerned with protecting the safety, health and security of people engaged in work or employment. The goal of all OH&S programs is to support a safe work environment. Integration of OH&S objects into environmental management systems can avoid duplicate measures and find optimal solutions, because the regulations of prevention are identical in environmental protection and safety management. Nevertheless, the methods currently used in environmental management and engineering such as life cycle assessments, technology reports, and the models of industrial production can interrupt this integration. People can also regard occupational safety risks more easily than environmental risks as a natural part of their work (Honkasalo, 2000). By integrating environmental and safety matters the company can get advanced collaboration especially in noise control, chemical safety, waste management and industrial accident prevention, occupational and environmental factors which are intimately connected to each other. Consequently, the workers need to have the knowledge of the risks and hazards at their work place, which also affect the surrounding and their living areas.

In 1968, Ministry of Industry promulgated the Thai Industrial Standard Act to establish the Thai Industrial Standards Institute as national standards body responsible for standardization activities in Thailand. In 1981, ISO 9000 was introduced to Thailand. In 1991, the institute announced an adoption of TIS/ISO9000 series as National Standard for Quality Systems. In every aspect, it is similar to the ISO 9000 series established by the International Organization for Standardization and to the European Standards EN 29000. Thai industry can be more competitive in the international market through this international standardization. In 1985, ISO14000 was disseminated to standardize environmental protection issues. Then other standards were launched mainly in the industries such as OHSAS18001 (Intarajinda et al., 2011).

Chaikittiporn (n.d.) stated that most of establishments in Thailand are considered small and medium enterprises, which are increasingly playing an important role for the socio-economic development of the country. However, a large amount of accidents and occupational diseases are present in these establishments. There is an urgent need to provide practical support to SMEs for establishing safety, health and productive workplaces. This can be done through establishing clear long-term strategies for strengthening and accelerating health and safety standards for the country. Kazutaka (2012) examined that the design and use of locally adjusted action toolkits play a key role in facilitating the improvements in each local situation. The roles of these approaches in promoting the safety and health at work were considered based on their recent experiences in preventing work-related risks and improving the quality of working life, particularly in small-scale workplaces. In participatory steps, built on local good practices can lead to many workplace improvements when the focus is on locally feasible low-cost options in multiple aspects.

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5 Occupational Health and Safety Role in Eco-Industrial Park

Occupational health and Safety is a basic element and constitutes a social and health dimension of the principle of sustainable development. OH&S practices constitute a set of key activities for such development. Unfortunately, a few studies have been drawn on the role of OH&S to sustainable development (Kakabadse et al., 2003; Adei & Kunfaa, 2007; Amponsah-Tawiah, 2013; Kurup & Stehlik, 2009). Studies exploring the role of OH&S on sustainable development are either fragmented or their relationships only glossed over in an endeavour to make arguments regarding OH&S in a certain particular agenda (Amponsah-Tawiah, 2013). In Ontario, eco-industrial networking projects in Sarnia are more about business retention than attracting new investment because construction costs and other factors have influenced investment decisions. A number of projects have generated significant returns on investment as well as improved the level of environmental quality, health and safety (Canadian Eco-Industrial Network, n.d.).

Following the Amponsah-Tawiah's report in 2013, it reviews literature on the triple bottom line (TBL) and how they are affected by OHS policies and the effects of work related hazards on sustainable development (See Fig. 2). The TBL comprises of three Ps: profit, people and planet. It refers to the financial, social and environmental performance of the corporation over a period of time. A sustainable labour force is prudently connected to business quest to optimize profitability. Various descriptors such as compensation claims, employee turnover, and accident record arising out of disregard for OHS issues have severe impacts on productivity and shareholders asset maximization. Planet confines the environment and it facilitates trades to be eco-efficient. The environment stays largely the most extraordinary arena that sustainable development literature appears to have been written on actively for the past two decades. The environment is exquisitely coordinated with every single human attempt and that the sustainability of human species has so much to do with the environment. Finally, the role of firms to "people" was concluded by Willard (2002) that employees need to be able to rely on a safe work environment that continuously reduces risk of injury and health and safety protection. This is the basis for maintaining a sustainable workforce.
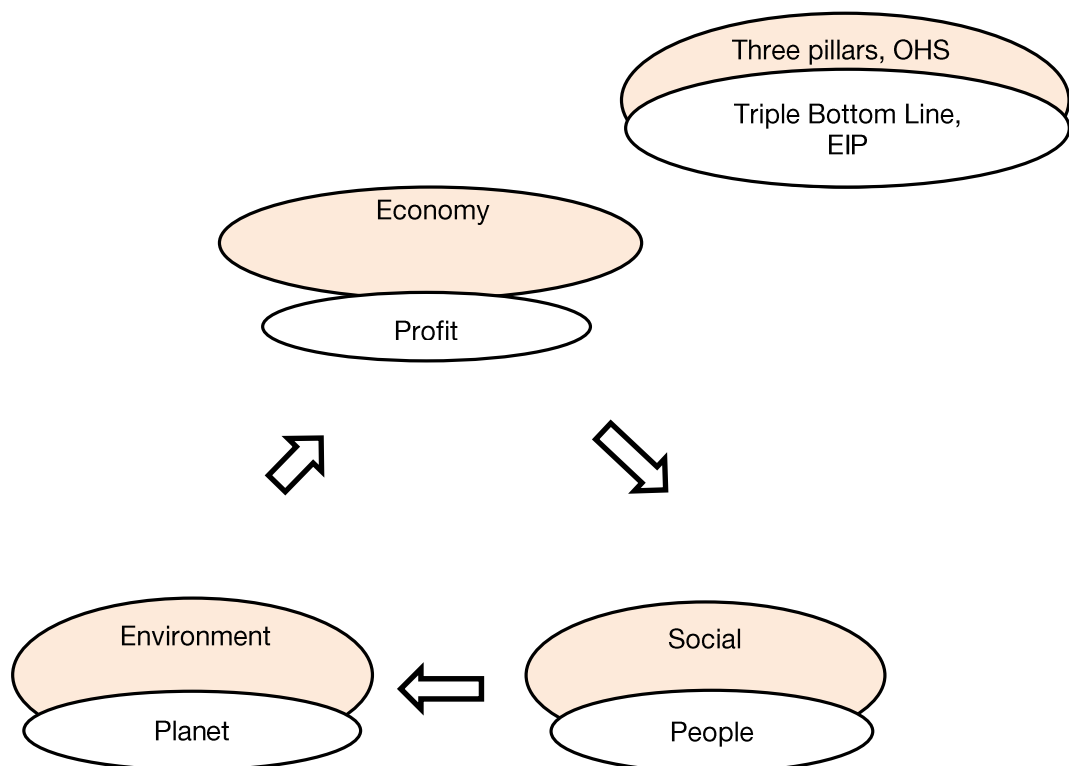
Fig. 2. OH&S sustainable development interface (Amponsah-Tawiah, 2013)

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Table 3 is a summary of OH&S role in EIPs. Regarding these results, we can summarise the possible indicator that regard a proficient view of the problem. Basically, data of OHS is an important elementary and readily data from company. Safety performance can reduce the accident rate, hence the personal injuries and material damage, and simultaneously improves working conditions which raise employees' motivation and reduce their absenteeism. Hence, Health and Safety indicator can be seen as an opportunity to promote environmental sustainability in the EIP development.

Table 3. OH&S role in various EIPs.

Role / References	Descriptors
Benefits Canadian Eco-Industrial Networking (n.d.) *Benefits of Eco-Industrial Networking*.	The recent growth of eco-industrial networks in Canada stems from the wide range of economic, environmental and social benefits gained by businesses and communities alike. In Ontario, a number of projects have generated significant returns on investment as well as improved the level of environmental quality, health and safety.
Chiu, S. & Tseng, M. 2004. Production management toward sustainable development. Proceedings of the Fifth Asia Pacific Industrial Engineering and Management Systems.	The consideration of products with regard to their features is being done primarily as a result of customer demands. The international concept of "Extended Producer Responsibility" is quickly establishing itself as a modern consideration in identifying, organizing and minimizing safety, health and environment risks on a product's entire life cycle, from the procurement of raw materials to production, use and disposal.
Criterion Deog-Seong, O., Kim Kyung-Bae, & Jeong Sook-Young. (2005). Eco-industrial park design: a Daedeok Technovalley case study. Habitat International, 29, 269-284.	Daedok Techno Valley (DTV) Development Project is the first Korean attempt to design EIP by restructuring a conventional industrial estate development plan. By concern with public health, safety and environmental protection, industry has been at the centre of the debate on sustainable. Nonetheless, higher levels of progress towards sustainability in the aspects of 'external green space design' and 'energy efficient healthy building design' could be achieved within the site.
Industrial Estate Authority of Thailand 2012. Specification criteria and indicators to promote into the Eco Industry.	Thai agencies by DIW and I-EA-T have set up the specifications standard for Industrial Parks and Industrial Estates that plan to develop to Eco-industry. They have to follow Eco-criteria in 5 dimensions and 20 aspects (DIW) or 22 sides (I-EA-T). In this regard, "Health and safety" was set up as one of the aspect in the environmental category.

6 Specification criteria and indicators for the Eco-Industrial development in Thailand

In 2010, the cabinet of Thailand approved the concepts of Eco Industrial Development which were proposed by the National Economic and Social Development Board (NESDB) and assigned the National Industry Development Committee and Eastern Seaboard Development Committee to set up and regulate development plans at both the national and the regional levels (Varathorn & Plubcharoensuk, 2013). In the next following year, the 11th National Economic and Social Development Plan (2012 – 2016) prioritised the Eco Industrial Development and restoration of the environment in the area of the main industrial zone. The Ministry of Industry developed the indicators of EID consisting of 5 dimensions and 22 aspects -- Physical, Economic, Social, Environmental and Managerial (Industrial Estate Authority of Thailand (I-EA-T), 2012; 2013).

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An overview of each dimension is given below:
1. The physical dimension aims to achieve a proper landscaping plan for the surrounding area including infrastructure development under the EIE.
2. The economic dimension aims to achieve growth and sustained positive economic results, as well as to strengthen the local economy, the surrounding communities, and industry. Other target areas of this category include marketing development, transportation, and logistics.
3. The social dimension is intended to facilitate a better quality of life for people who work in the estate and who live in surrounding communities.
4. The environmental dimension is focused on supporting the efficient use of resources, and effective emission and remedying pollution. I-EA-T proposes the appropriate management of waste water, solid waste, noise pollution, air pollution, efficient use of energy, eco-friendly processes, safety and health management, eco-efficiency, and environmental monitoring.
5. The managerial dimension aims to organize a systematic management process for the estate and to facilitate continuous improvement. This will focus on collaboration among stakeholders, maintenance and improvement of the estate's management system, effective management of information and reporting, and continuous improvement in the capability of personnel

However, both of them have been developed the Eco – criteria to achieve sustainable EID, I-EA-T explains the specifications standard of Eco-industry city for Industrial Estates and factories that plan to recognize an IE as an Eco-industry city have to follow these Eco-criteria in 5 dimensions and 22 sides. While DIW specifies that industrial parks and factories have to perform in both 5 dimensional and 20 aspects. By define development policy industrial estate into Eco-Industrial city, the composition and development of the 5 dimensions can be seen in Table 4.

Table 4. Eco-Industrial city feature in 20 (22) aspects related to 5 dimensions of development proposed by DIW and I-EA-T, B.E. 2554 (A.D. 2011)

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Dimension	Department of Industrial Works, DIW (20 aspects)	Industrial Estate Authority of Thailand, I-EA-T (22 sides)
Physical	1.Location and space layout 2.Building and surrounding area design	1.Industrial Estate (IE) Area 2.Public Utility and Infrastructure Systems 3. Buildings of Factories in the industrial estate
Economic	3.The economics of the industry 4.The economy of local community 5.Marketing 6.Transportation and logistics	4.Economy of the Industrial Sector 5.Local economy 6.Community economy
Environmental	7.Water management 8.Air pollution management 9.Waste and waste materials management 10.Energy management 11.Sound management 12.Production process 13.Eco-efficiency 14.Health and safety 15.Environmental monitoring	***Eco Efficiency*** 7.Resource Management 8.Energy management ***Production process & Product*** 9.Production System and Product ***Pollution Control*** 10.Water Pollution 11.Air pollution 12.Waste 13.Noise, Odour, Dust and Smoke Pollution and Nuisance ***Safety & Health*** 14.Safety & Health Industrial Symbiosis 15.Business Linkage/Inter Utilization/ Industrial Symbiosis Management
Social	16.Quality of life and society of the surrounding community 17.Quality of life and social life of workers	16.Quality of life and Society of Employee 17.Quality of life and Society of Community around Industrial Estate
Management	18.The management of the involved area 19.Improvement and maintenance of international management system 20.Information and reporting	18.Area based Cooperative Management 19.Regulating Enhancement on Factory 20.Encourage Factories to apply the International and National Management System 21.Promotion of Innovation/Novel Management Tool/ System for Application by Factories 22.Information Disclosure and Reporting

Although the development of Eco-criteria in Thailand which set up from the two main government agencies are not totally the same but the major concepts are aiming to same direction. Zoning design, infrastructure systems and other equipment and facilities are adequately provided to support industrial operators. There activities are based on the resources management with the highest possible efficiency and eco friendliness.

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7 Background of Site Selection in Eco-Industrial Park (EIP) concept

Saha Group Industrial Park, Sriracha was constructed in 1977 on approximately 288 ha of land in the municipality of Laemchabang Subdistrict, located in Tambon Bueng, Sriracha District, Chonburi Province. The idea was in compliance with government policies that encourage the expansion of industrial areas to upcountry regions to contribute to sustainable prosperity, improved quality of life, greater social benefits and better environment for upcountry people (Sahapatana Inter-Holding Public Company Limited, 2013).The park is operated by Saha Pathana Inter-Holding Public Company Limited (SPI) which provides lands and finished buildings to engage in the business of developing industrial areas, with an initial objective to serve the increasing needs for industrial space of its own subsidiaries. The revenue generated from this business is in the form of rent and utility fees. In additional, the company provides consultation, business planning, management, and implementation services to its subsidiaries in exchange for consultation and service fees. There were a total of 65 lessees in September 2014.

In the fiscal year 2012, Saha Group Industrial Park, Sriracha participated in Eco Industrial Town Project which was launched by the DIW. In this first stage, only 18 firms joined the project, which used the name "Green Factory". The objective of this project was to enhance Thai industry in such a manner that all concerned parties were involved (Sahapatana Inter-Holding Public Company Limited, 2014). Focus group discussions and brainstorming activities involving all stakeholders were conducted in order to identify targets. Unfortunately, it is not quite clear in the understanding of the definition and the pathway to get into EIP paradigm. Mainly, an area based working group was set up to implement the plan for an EIP within the next five years starting from 2012. The results of focus group discussions contributed to the concept, framework, plan and activities can be summarised below.

1. A project on advancement towards International Standard Industries: To enable industries to apply international standard on environmental management for economic competitiveness and environmental friendliness. On September 25, 2012, a training course was conducted on Environmental Management of ISO 14001, with ten industries participating. Out of ten, three industries requested comprehensive advice on environmental management, accounting for 10% of the total number of industries within the Park.

2. A project on promoting zero discharge principle in Industries: To increase the application of zero discharge in industries. During August and September, 2012, comprehensive advice was provided on waste water treatment system to ensure the discharge remained within the standard level of an Industrial Park, to five industries, accounting for 83.3% of the total number of industries having a problem of wastewater management.

3. Activities conducted jointly with communities: To develop proactive social activities that would enhance better understanding between industrial operators and surrounding communities. During August 28 to 29, 2012, a training course was conducted in order to enhance knowledge on how to sort household solid waste and how to make use of the waste in order to minimise the volume. There were 13 communities participating in the training, accounting for 100% of the total communities nearby.

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8 Methods and materials

The main attention in this paper is focused on the barriers and challenges in applying Health and Safety criteria to Eco-Industrial regulation based on the data from firms located in Saha Group Industrial Park, Sriracha. Data collection was mainly done by field site investigation from May to September 2014. The article presents only selected results of the data collection from the occupational health and safety (OH&S) officer or the personnel in charge of Health and Safety section of the businesses in factories. The survey questionnaire was prepared to collect the data/information to identify how the Health and Safety is managed in each factory. The survey tool used to collect data consisted of 5 parts:

Part 1: General Data comprising Factory Data and Personnel Data.

Part 2: Health and Safety Data such as Occupational health supporting activities in companies.

Part 3: Knowledge of occupational health and safety through the requirements of Eco-Industrial Park regulations.

Part 4: Opinions about OH&S management through Eco-Industrial Park regulations. This question used a Likert five-point scale.

Part 5: Problems, obstacles, and suggestions for implementation of OH&S.

To present the OSH management of a group of companies operating in the area in EIP case study, secondary data from IP report was gathered to describe the practice and operation of IP. Then, a survey questionnaire with the OS&H officers in manufacturing factories were required to evaluate level of awareness and participation of IP members in OSH implementation through Industrial Ecology schemes. In addition, survey research by in-depth interviews with the manager or the personnel in charge of IP businesses and observation were used to identify the problems, barriers, and needs to contribute the good operation and more effective Health and Safety management along with EIP regulation in Thailand.

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9 Results and Discussion

As of September 2014, there are 65 companies located in Saha Group Industrial Park, Sriracha which can be divided into 10 industrial groups. The main groups are Textiles and miscellaneous items, plastics/rubber/paper/metal, food and beverages, Footwear, Electrical products and IT, and Garment. Plastics/rubber/paper/metal group is the biggest group, comprising 15 factories or 23.08 percent of the total number of factories in the IE. It is followed by Services group (8 factories), Textiles and miscellaneous items and Food and beverages group (7 factories) as indicated in Fig. 3.

Industrial cluster
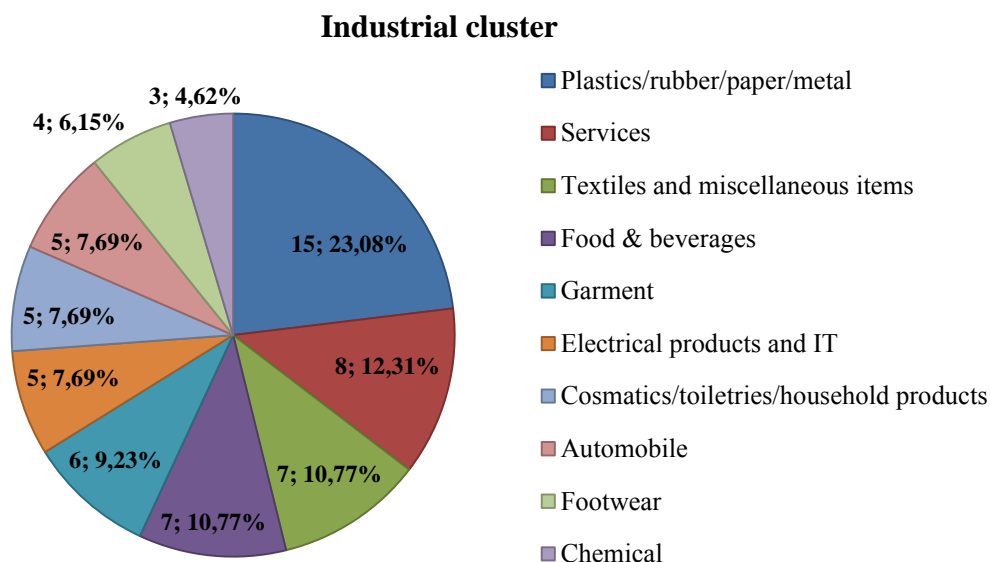
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industrial cluster in Saha Group Industrial Park, Sriracha, September 2014

Of the 44 participants who responded, 56.8 percent (25 out of 44) of office workers and those in the manufacturing section have to work six days a week. 54.5 percent of office workers work from 8 am till 5 pm while 61.4 percent of workers in the manufacturing section work in double-shift operations. In the year 2009, Saha Group Industrial Park, Sriracha was certified for total level of Thai Labor Standard Management (TLS 8001-2546) by the Department of Labor Welfare and Protection, the Ministry of Labor. This is a sign that they have complied with the social responsibility standard of Thai businesses. A variety of management systems enforced in the surveyed companies is shown in Table 5. The Board of Directors attaches importance to safety and occupational hygiene. In this regard, the following guidelines have been prescribed (Sahapatana Inter-Holding Public Company Limited, 2013).

1. Business undertakings shall comply with laws, regulations and policies on safety, occupational hygiene and working environment with due regard to the safety of life and properties as well as to the impact on the health of employees, trading partners and stakeholders. Regular monitoring and safety assessments must be conducted.

2. Occupational safety shall be promoted. Work regulations, procedures and standards are prescribed to ensure working safety is consistent with risks. Working environment and safe work procedures are improved. Tools and equipment for safety protection are also provided to employees.

3. Preparations are made for emergency events. An emergency plan has been devised and regular drills and improvements are carried out. This is to prevent and minimize any loss to life or properties of the Company, employees, trading partners and related persons.

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4. A safe working culture has been built for the entire organization to ensure sustainably safe work operations.

Table 5. Management Systems in Saha Group Industrial Park, Sriracha, September 2014

Type of MS	Number of Users	Percent (%)
ISO 9000	38	86.4
ISO 14000	30	68.2
GMP / HACCP	8	18.2
OHSAS 18000	7	15.9
TS 16949	6	13.6
ISO 5001	2	4.5

Most companies in Saha Group are ISO 9001 certified for their production standard. The Company takes into account the environmental impact of its business operation in terms of resource use, energy consumption and pollution by considering direct and indirect economic, environmental, and social factors. By doing that, Saha Group Industrial Park - Sriracha has therefore been certified Multisite ISO 14001:2008, an environmental management standard, by the Office of Certification Body (OCB) under the Thailand Institute of Scientific and Technological Research (TISTR). Saha Group Industrial Park - Sriracha is also Thailand's first industrial estate that has been certified an energy management standard (ISO 50001) (Sahapatana Inter-holding Public Limited Company, 2013).

Apart from business consultation provided, the Saha Group also encourages all of the firms located in the Industrial park to follow the regulations and policies on Occupational safety consistent with the laws. However, the company has no power to force firms to comply; so many companies ignore the policy. In companies, it is important to focus more often on specific prevention activities such as workplace health checks, threat level indicators and other health promotion projects to support employers to promote health in the workplace. Different sets of occupational health concerns in companies have been presented in Table 6.

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Table 6. Occupational health supporting activities in companies.

Variable	Frequency	Percent (%)
Workplace health check		
Pre-placement medical examinations	39	88.6
Pre-assignment medical examination	4	9.1
Medical check after an injury	9	20.5
Health risk factors check : Chemical, Heat, Noise, lung X-ray, Urine test, Ear	31	70.5
Others: Urinalysis for drugs	3	6.8
The threat level indicators		
Noise	41	93.2
Heat	31	70.5
Chemicals: Toluene, styrene, MIBK, Formaldehyde, NaOH Xylene, Total Hydrocarbon	30	68.2
Others: Total dust, Respirable dust	8	18.2
Health Promotion		
"White Factory" (drug-free)	28	63.6
Physical activity	2	4.5
Quality control of cafeteria	15	34.1
Smoking cessation program	18	40.9
Others: Standards on Drug Use Prevention and Solutions	8	18.2
Emergency plan		
Chemical leak	29	65.9
Flooding	12	27.3
Others: Radiation leaks, Gas leak, Transportation of hazardous waste, Garbage / waste fire, Sewage sludge spill	13	29.5

9.1 Workplace health check

A total of 88.6 percent of participating firms provided the pre-placement medical examinations which helps to manage risks in the workplace with the aim of avoiding illness or injury to the applicant or fellow employees. Moreover, some jobs also have legal requirements and standards that need to be met. Approximately 70.5 percent of companies provided the health risk factor checks in the workplaces covering the key risk factors of chemical, heat, and noise. They also conduct lung X-rays, urine tests, and ear tests to monitor other health risks. While only 20.5 percent of participating firms required medical checks after an injury for their employees and about 9 percent required pre-assignment medical examination.

9.2 The threat level indicators

Generally, where a threat has been reported by an employee, implementation of important safeguards to help prevent and detect incidents in the workplaces is carried out prior to law enforcement intervention. Survey results show that the number of organizations that have basic indicators checked in noise, heat, and chemicals are 93.2%, 70.5%, and 68.2%, respectively. It is also important to determine other threat indicators checked, like total dust and respirable dust, for some organizations to help identify the insider-risk which affects employee's health.

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9.3 Health Promotion

A variety of health promotion projects is supplied by firms located in Saha Industrial Park. The most popular project, named "White Factory", aims to prevent drugs getting into businesses and to lower the number of drug abusers. While employers knew skilled workers were misguided in abusing drugs, they were giving them a chance to reform their behaviour and return to work and not be a burden on society. Other projects launched to encourage health promotion in the workplaces are: Smoking cessation program, Quality control of cafeteria, Standards on Drug Use Prevention, and Solutions Physical activity.

9.4 Emergency plan

Firms located in industrial park have emergency plans in place to respond effectively to health and safety incidents and other emergencies that might occur in the workplace. These plans include dangerous chemical leakage, chemical emission, flooding, radiation leaks, gas leaks, transportation of hazardous waste, garbage / waste fire, and sewage sludge spill. The managers of the industrial park regularly provide practices in emergency response plans and provide reports to government of emergency training plans.

10 Barriers to the application of Health and Safety criteria in Eco-Industrial regulation

The growing popularity of occupational safety and health management systems in Thailand has stimulated critical debate about their effectiveness. This paper asks whether the performance of occupational safety in potential Industrial Parks lives up to the expectations of Eco-Industrial regulations. This study has identified five main occupational health related issues that have resulted in the poor application of Health and Safety criteria in regards to Eco-Industrial regulation:

First, the definitional requirements for health and safety criteria have been watered down. There is an urgent need to provide practical support to all of the firms located in Industrial park in establishing safe, healthy and productive workplaces.

Second, it can be clearly seen from the field work that the implementation of Saha Group Industrial Park, Sriracha in health and safety is consistent with the Eco-Industrial criteria. Unfortunately, the two main organizations – DIW and I-EA-T, were focused most of EIP projects on 'wastes' and 'by-products' management. There are no organizations that specifically address and provide properly technical services in Health and Safety criteria in the Eco-Industrial regulations, so implementation or application in the whole park is inadequate.

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Third, a review of empirical research reinforces the view that government's policies can improve health and safety outcomes (Crook & Sverrisson, 1999; Adler & Newman, 2002; McGinnis, Williams-Russo, & Knickman, 2002), but only if they meet strict conditions concerning senior management commitment, effective workforce involvement and program integration. In Saha Group Industrial Park, Sriracha, they play a critical role in following government's policies to fit for EID purpose. The way roles and functions are allocated to government agencies, and the structure of agencies involved, can have a big impact on how well they respond to the Government's policy priorities, health and safety management and opportunities for better performance.

Fourth, several barriers to successful implementation are identified, including the failure to meet essential success factors, the lack of continuous surveillance programs both on environmental monitoring and health examinations undertaken for physical hazards in workplaces, and their problematic application in certain sectors such as small business, contractors, and the part-time workforce.

Fifth, there are still no clear policies about the extra "encouragement" of potential regulatory action or litigation. Many organizations will not act upon their implied moral obligations without compulsion.

11 Challenges for the application of Health and Safety criteria regards to Eco-Industrial regulation

The operation of eco-industrial development in Thailand is not entirely transparent. The political influences have determined decisions, rather than a clearly defined economic development requirement and strategy. In many areas, this has resulted in excessive investment in development of industrial sites with little chance of fully using the land and gaining adequate return on this public investment. A review of Eco-Industrial projects in Thailand suggests that stakeholder participation may increase public trust in decisions, as long as participatory processes are perceived to be transparent and consider conflicting claims and views (Koenig, 2000).

However, since the year 2000, when Thailand began to seriously tackle pollution problems, government officials in each section still do not know how to play their roles (Kititasnasorchai & Tasneeyanond, 2000). This uncertainty may be partly due to lack of manpower resources and technical expertise to implement the technical regulations. Nevertheless, the Thai social custom involving the patronage system, in which personal relations come before the principle of what is right or wrong, contributes somewhat to ineffective law enforcement as well. This problem becomes worse in provincial areas where there is far less pollution-control personnel and budget. These areas may need time to fully appreciate the benefits from complying with pollution control requirements, and to learn to coordinate with each other better. The industrial waste management system in Thailand is still lacking comprehensive data on industrial waste generation and flow (Plubcharoensuk, Nakayama, & Shimaoka, 2008). In accordance with these problems, there are few accurate data on industrial wastes originating as waste water, solid waste, noise pollution, air pollution, energy usage and there is little environmental monitoring of the factories. These are the primary data for assessing EIP. This study has focused on one Eco-criterion namely "Health and Safety", to propose the alternative way to assess EIPs in Thailand.

12 Discussion

It is clear that planning for EIP still is in immaturity developmental phase in Thailand. This work confirms that health and safety management can become an important criterion used for the high potential Industrial Parks that they claimed to be engaged in (or intended to be engaged in) EIP such as Saha Group Industrial Park, Sriracha.

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The following barriers and challenges have been identified as priority issues for Thai operators to be concerned:

- Knowledge - most of establishments in Thailand are considered to follow the government policies. The problems found from this study were the unclear understanding of definitional requirements criteria in the industrial park especially by the entire workforce. Moreover, there are lack of technical services from related government agencies in mentoring of the working environment and providing important knowledge to employers and workers in Health and Safety criteria in the Eco-Industrial regulations. There are also lacks of guidance and specify the specific needs of each industry from the experts for managing the OH&S to use as a tool that enhance the Eco-Industrial development in Thailand.

- Economic - It is also not clear about the measures or incentives to get from the government after participating in this project. There was no continuous programs in the year 2013 because of no funding supported from the government in that fiscal year. Nevertheless, compliance with the government's policies also, is expensive. So, clear policies about the special motivation for the organizations have to be offered.

- Legal - Eco-Industrial conceptual requirements may be reinforced in environmental related law. It is accepted that the operation of Eco-Industrial Parks in Thailand is a kind of voluntary participation. Potential industrial park would be persuaded or selected by the government agency to be funded in each fiscal year. Likewise, the Parks can persuade firms to set up in the Park without compulsion.

13 Conclusion

This work has aimed to analyse the barriers and challenges for the application of Health and Safety criteria regards to Eco-Industrial regulation relating to the personal safety and protection of its workers in firms' performance in the selected IP. For this purpose, we first identified good management practices, and then carried out an empirical study by using a questionnaire conducted with firms' safety officers. The findings of this work consequently represent an important source of motivation for firms to implement a Health and Safety management in line with the requirements of Eco-Industry policies. Finally, the success of Eco-Industrial project in Thailand depends on cooperation from all parties in the park. Government agencies should consider compulsory regulation rather than the voluntary encouragement and reconsider the special consideration such as tax reduction policy to convince the private sector to fully participate in this project.

14 Acknowledgements

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Digital Delivery of Occupational Safety and Health Content: Making Research Easy to Use and Easy to Steal

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The findings and conclusions in this presentation have not been formally disseminated by the National Institute for Occupational Safety and Health and should not be construed to represent any agency determination or policy.

Abstract. Prolific as they are, smaller businesses have higher rates of injuries, illnesses, and fatalities. Because there are so many of these firms, it is difficult for occupational safety and health agencies to reach them all with the needed help. By involving intermediary organizations in their outreach activities, OSH agencies can provide resources to small enterprises. If the resources they provide are easy to use and easy for intermediary organizations to localize, the OSH interventions are more likely to be adopted by the small business owners who receive them. When products are available digitally, costs are lower, small businesses and intermediaries can more easily repurpose them, and peer groups can share them more broadly. Safety products that are easy to use and easy to steal are more likely to see wide adoption.

Breadth of Small Business

Small enterprises dominate the business landscape. In the United States, 79% of firms have fewer than 10 employees (U.S. Department of Commerce, 2008). This heavy representation is consistent throughout the international community (Hasle & Limborg, 2006; Champoux & Brun, 2003; Walker & Tait, 2004). There is strong evidence that small businesses bear a proportionally large burden of workplace fatalities, and when injuries occur, they tend to be more severe in smaller organizations (Champoux & Brun, 2003; Hasle & Limborg, 2006). Smaller enterprises are less likely to institutionalize any type of safety activity: to train new employees, to host a safety committee, to access a consultant, or to have written rules or policies, and they are more likely to operate in higher-risk industries in the first place (Sinclair, Cunningham, & Schulte, 2013; Champoux & Brun, 2003).
"Small" is a relative term, and defining an enterprise by its gross employee number can be misleading. Within the literature, many researchers have identified attributes shared by businesses that might qualify them as being characteristically small, regardless of the number of workers on the payroll (Hasle & Limborg, 2006). European nations have institutionalized this insight more adroitly than their North American counterparts. In her introduction to "Small and Medium-Sized Enterprises and the Environment: Business Imperatives," Hillary (2000) summarizes many international efforts to define commercial enterprises by a bevy of characteristics, though she contends that wholesale standardization "does little to help us understand the diversity of the sector." Many of the characteristics that differentiate a business as being "small" or "micro" are the very attributes that result in higher safety and health risks for workers. Across the board, small enterprises, even defined as imperfectly as they are, have been consistently documented as having the highest rates of injury and illness (Buckley, Sestito, & Hunting, 2008; Fabiano, Currò, & Pastorino, 2004; Fenn & Ashby, 2004).

A Small Definition

The five categories for defining small enterprises that I propose below are simply variations on or amalgamations of categories suggested by others. I have organized the characteristics for the purpose

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of understanding why small businesses are less likely to learn about, understand, and implement safety and health research.

Newness

When growth is a business goal, firms succeed and grow, or they fail; given enough time, many businesses are either no longer small or no longer in business. Thus, one of the defining characteristics of small enterprises is their newness. New businesses tend to lack an established safety culture—or any culture (Champoux & Brun, 2003). The owner-manager does not generally have broad management experience and almost certainly has no safety expertise (Cunningham & Sinclair, 2015). Champoux and Brun suggest that the people in small-sized enterprises "are generally younger, less educated and less experienced than their counterparts" (Champoux & Brun, 2003).

Centralized Power

In the culture vacuum of a new operation, the owner sets the tone. Hasle and Limborg (2006) describe the owner's role as "the dominant actor in relation to any changes made in the small enterprises." Employees follow the lead of the owner and find it particularly difficult to suggest anything controversial. The organizations are flat and work can take a uniquely interpersonal dimension among all employees. Because of this social construct, employees are not inclined to raise controversial issues, such as safety concerns. (Hasle, Kvorning, Rasmussen, Smith, & Flyvholm, 2012)

Dearth

Small enterprises are faced with regular shortfalls: They have no time, slack resources, broad expertise, or available capital. Because of their disproportionate revenue streams, the same financial outlay for the same safety control paid by a large firm comes at a relatively higher cost to a smaller firm (Hasle & Limborg, 2006). They have no "war chest" of past profits to invest in non-production capacity, no extra hands to designate to safety and health activities, no spare hours for developing their cost centers. They tend to operate in survival mode (Champoux & Brun, 2003; Hasle, Kvorning, Rasmussen, Smith, & Flyvholm, 2012; Sinclair, Cunningham, & Schulte, 2013). If an activity does not contribute directly to a revenue stream or a cost-cutting measure, it often becomes a victim of dearth.

Isolation

Small firms tend to be isolated from peer networks. They don't have the spare cash to join groups or the spare time to attend meetings. They rarely receive inspections or avail themselves of services. Additionally, they are geographically dispersed, a physical manifestation of their social solitude (Hasle & Limborg, 2006; Champoux & Brun, 2003; Sinclair, Cunningham, & Schulte, 2013).

Distorted Perception

Owner-managers can become fixated on financial survival to the point of ignoring the very real peril of mortal survival. Thus, health and safety become a minor focus and receive minimal organizational heft (Hasle, Bager, & Granerud, 2010). Owners with inaccurate perceptions of risk disavow any sense of corporeal jeopardy. Accidents rarely occur within a single company, giving the impression that safety concerns can be handled as they arise and do not need to be planned for, or that when problems hit, bad luck is the culprit (Hasle & Limborg, 2006; Sinclair, Cunningham, & Schulte, 2013; Champoux & Brun, 2003). Owners underestimate their odds of experiencing a tragedy and overestimate their knowledge about preventing one (Hasle, Kvorning, Rasmussen, Smith, & Flyvholm, 2012). Despite the true odds, their planning comes to nothing more than a statistical shrug.

The Role of the Initiator

Organizations that hope to initiate safer, healthier practices within smaller enterprises need to understand the baggage that comes with newness, centralized power, dearth, isolation, and distorted perception before they can offer meaningful assistance. Initiators such as professional organizations, government agencies, and academic institutions produce research, training, guidance, and best practices. Thanks to these initiators, there is no shortage of occupational safety and health information available. For example, the National Institute for Occupational Safety and Health (NIOSH) publishes approximately 300 technical documents per year. However, very few of these documents are designed

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for use by small business managers. Furthermore, very little of the research generated by public health initiators is ever adopted by at-risk firms. Referring to work done at the National Institutes of Health in the United States, Glasgow, et al. (2012) summarize this disparity: "The ultimate goal of new discoveries is to enhance human health, yet most discoveries are slow to or never fulfill this promise." The most

encouraging interventions are not necessarily the ones that are ever put into practice (Flaspohler, Lesesne, Puddy, Smith, & Wandersman, 2012).

A paradox lies at the heart of the disconnect between what initiators produce and what small enterprises adopt, and it is embodied in two conflicting ratios. The first is a few-to-many ratio: no matter how many initiators exist, there will always be more businesses. It is impossible for any single organization to make contact with a meaningful quantity of existing businesses (Sinclair, Cunniningham, & Schulte, 2013). The second is a much-to-any ratio: the quantity and depth of occupational safety and health research is too vast for any small business owner to digest and apply. In short, there are too few organizations designated specifically to aid small businesses, but the volume of information they share is overwhelming.

By understanding the traits of small businesses, we can disrupt the paradox. To do this, we need strategies for translation and distribution that will lead to the adoption of workplace safety and health research.

Translation

If research organizations define small firms by their underlying traits rather than simply their "smallness," they can customize their research outputs. However, if they fail to understand the traits of small enterprises, initiators' research will never be put into practices (Flaspohler, Lesesne, Puddy, Smith, & Wandersman, 2012). The translation effort is unfortunately not as simple as reusing products, trainings, or techniques that were designed for larger firms (Champoux & Brun, 2003). These solutions often depend on a tradition or an organizational system of safety, staff dedicated to the topic, available time and money, membership in industry communities, and an awareness of a hazard. To adjust for the special needs of the audience, initiators must recast safety research into practical, step-wise solutions that can be implemented inexpensively and immediately in small firms (Hasle & Limborg, 2006). Interventions must be simple so that non-experts can deliver them (Sinclair, Cunningham, & Schulte, 2013). They should be tied to production (Champoux & Brun, 2003). They should abandon lawyerly nuance and should tackle the biggest, most prevalent, most dangerous hazards. Any outputs should be turn-key solutions. Stephen Hawking's wisdom from his book *A Brief History of Time* (1988) is applicable here: "Someone told me that each equation I included in the book would halve the sales. I therefore resolved not to have any equations at all." The owners of small firms are not safety and health experts, and generally neither is anyone on their staff. They need information and tools that deliver help in the most intuitive, meaningful way possible (Hasle & Limborg, 2006).

Distribution

After they have created tools that are customized for small firms, initiating organizations still need an avenue for reaching these enterprises. The most effective distribution method is face-to-face (Hasle & Limborg, 2006; Sinclair, Cunniningham, & Schulte, 2013). This is consistent with the advances in marketing that have ushered in the "Relationship Era" (Garfield & Levy, 2013), and relationship marketing techniques should be applied to safety and health outreach. The tenets include cooperation between the producer and the consumer, ongoing interactions that build trust and mutual respect, and exchanges that rely on past experiences and roll into future transactions (Finne & Gronroos, 2009). "Brand loyalty" is increasingly built around interpersonal experiences and through open feedback loops, not bullhorn advertising and a slick sales force.

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Relationship Marketing

The few-to-many reality precludes initiators from forming close, ongoing relationships with small business owners consistent with Relationship Era principles. The chance that a company will feel "brand loyalty" for an initiator that provides it with intermittent safety and health information is slim, a concept described by Duncan and Moriarty's Relationship Communication Model (1998). However, if the safety and health products come from a consistent source, an intermediary with whom the user has an existing relationship, the likelihood that it will be heard, accepted, and adopted increases. Though their networks are not extensive, small business owners and managers look to "familiar outsiders" for validation, that their working environment is acceptable. These include clients,

partners, and employees (Hasle, Kvorning, Rasmussen, Smith, & Flyvholm, 2012). An intermediary can be any touch point in a business's value chain. An intermediary can be anyone with whom money, information, or paperwork is exchanged. Specifically, intermediaries may be accountants, financial advisors, legal aids, insurance companies, occupational health experts, human resource representatives, marketing agencies, peer networks, workers' compensation departments, labor unions, municipal authorities, bureaucratic departments, health care service providers, equipment or material suppliers, trade associations, and vocational schools (Sinclair, Cunniningham, & Schulte, 2013; Hasle & Limborg, 2006; Cunningham & Sinclair, 2015). Stronger intermediaries tend to have an existing interest in occupational safety (even on a personal level) and a relationship with a small business owner (Sinclair, Cunniningham, & Schulte, 2013).

Social Exchange

All relationships operate on the exchange theory: the expectation that each side has something to gain. Exchange requires balance. People want minimal costs and maximum benefits out of their relationships. If costs exceed benefits for either side, the relationship will fail. There is an expectation of reciprocity (Sinclair, Cunniningham, & Schulte, 2013). Exchanges are not just economic transactions involving goods and services. They are social too (Cunningham & Sinclair, 2015).
When products and services move from an initiator to an intermediary to a user, an exchange occurs at both levels, and at both levels, the value of workplace safety must be conveyed so that the receiver perceives a benefit. In other words, safety needs to be sold.

Selling points from intermediary to consumer include the economic advantage of a safety and health practice, its effectiveness, its compatibility with current processes, its reliability, its simplicity, and the degree to which it bestows a competitive advantage (Dearing & Meyer, 1994; Holsapple & Jones, 2004). From the initiator to the intermediary, the selling points need to reinforce the ways in which the practice will make the intermediary more valuable to its consumers. For example, a government agency could pitch new safety training to a chamber of commerce by explaining how the training will enhance chamber programming, thus drawing new members and better serving existing members (Sinclair, Cunniningham, & Schulte, 2013).

When cultivated properly, relationships between initiators and intermediaries only need to last long enough to diffuse a practice to the intermediary. Once the staff is trained and has internalized its role in inculcating the practice among small businesses, neither the intermediary nor the initiator has more to gain from the relationship. Effective diffusion does not create long-term dependency (Cervantes, 1997). Once a champion in the intermediary organization has established a durable program, the initiator can gently bow out (Cunningham & Sinclair, 2015).

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Adoption

The endgame of occupational safety and health research should be adoption leading to safer, healthier workplaces. Flaspohler et al. (2012) have introduced the Interactive Systems Framework, which proposes three systems that lead to adoption. The first involves distilling information in a simple, clear way; the second seeks to provide training or technical assistance to users; the third explores mechanisms for implementing an innovation into practice.

When the ISF is appropriated by an intermediary model, the products and services that initiators and intermediaries provide must do two major things: Make the new practice as easy as possible, and provide the organizational structures and special skills that are needed so that the small business will have the capacity to adopt the practice (Flaspohler, Lesesne, Puddy, Smith, & Wandersman, 2012).

Hasle et al. (2012) identify three mechanisms that lead to adoption: regulation, incentives and information. Yoder and Murphy (2012) look at how these mechanisms operate as barriers or motivators leading to behavior change. Two common barriers are time and money. These can either be subsidized, or they can be removed by demonstrating that a new practice is time- and cost-

effective. Motivators in the safety and health world are nearly impossible to observe. It is hard to see, and therefore feel motivated by, a *lack* of injury or illness, as this supposition tends to be the status quo. Motivation to embrace a safety practice often comes in the form of a near-miss or an incident with a peer.

Going Digital

Working with intermediaries changes the one-to-many ratio into a less daunting one-to-several-to-many arrangement. This efficiency can multiplied when the products and services are made available digitally. Digital media excels at one-to-many distribution. A safety walkthrough checklist can be generated once and disseminated endlessly. It can be passed quickly and inexpensively to several intermediaries who can each send it to small businesses. "Train the trainer" events can become webinars, filmed once and shared with intermediaries independent of time and distance. While not every product is conducive to digital delivery, many are. Templates, publications, programs, trainings, and checklists can all be shared online as documents, videos, posters, slideshows, or images.

At the end of 2014, the National Institute for Occupational Safety and Health digitally published modules for training home health care workers. While home health care workers are exposed to many hazards, the initiating researchers selected seven areas of utmost importance and created a specific training module for each. The material was designed for intermediaries to use. Knowing that the intermediaries would not be as knowledgeable about or interested in workplace wellness, the material was designed for easy adoption. Each module contains a lesson plan with cues and text, hand-outs and slides, which can be delivered by a neophyte. No special skill set is required to deliver the training. NIOSH is currently working with state departments on aging as intermediaries. Because it is available digitally, the training, its components, and its delivery channels can be modified to meet intermediary or consumer needs.

Localized Content

An initiator can track user behavior and then optimize materials based on real-time feedback. Then an initiator can differentiate which "elements of an intervention are essential (core) and which can be modified to local context" (Neta, et al., 2015). Intermediaries may want to modify products to better serve their small business clients. Regardless of the actor, interventions and innovations will inevitably be adapted, modified, and localized. If an innovation can be reinvented, it will be adopted more quickly and it will be more self-sustaining (Rogers, 2003, p. 183). Digital production and delivery make this process easier. When initiators publish new safety practices, they ought to take a keen interest in how intermediaries interpret them and then how consumers implement the innovation (Finne & Gronroos, 2009).

While well-designed content is easy to understand and to implement, it should also be flexible. It is not likely that an intervention will meet the exact needs of a "specific target group which can be

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different in terms of size, work tasks, socio-economic context, etc." (Hasle, Kvorning, Rasmussen, Smith, & Flyvholm, 2012). The most popular component of a campaign from NIOSH to hospital administrators about preventing accidental needle sticks was a collection of poster templates that could be customized by the adopting hospitals.

Designing for Theft

The idea that content from an initiator will be modified, repurposed even *corrupted*—this can be unsettling. However, widespread adoption almost guarantees adaptation (Neta, et al., 2015). The key is to design materials for their inevitable repurposing. Returning to the home health care training, the modules were purposely designed to cover only one topic (thus freeing users from needing the entire suite of modules) and to be taught in any order. In many cases, it is advantageous to enable intermediaries to strip out the initiator's branding or to add their own. Branding should reflect the level of loyalty the small business owners feel toward the initiator or the intermediary.

Digital content is simple to store in multiple locations. Initiators should take care in selecting formats and channels that enable intermediaries to purloin health and safety products in their entirety. If a planning tool or a how-to video can't be appropriated by an intermediary, the small business owner will never see it. Content that gets stolen, adapted, and shared is content that gets used.

User-friendly products that are effortless to localize enable intermediaries to become information brokers for small businesses. They receive small-business-specific resources from initiators and curate these for their constituencies. In their role as curator, intermediaries can resolve the much-to-any ratio where too much information is available for any small business to swallow. The intermediary can cull the best, most practical small business help, sharing it in one spot, and giving the owners of small enterprises a single conduit for what would otherwise be a stultifying glut of information. The relationships they have with small business owners allow them to recognize deficiencies in the firms and add value to their side of the social exchange by locating a resource to remediate the deficiency. When a practical intervention is found that solves a problem, "the organization makes the intervention a routine part of operations" (Cunningham & Sinclair, 2015).

Conclusion

Small businesses are among the most hazardous. Traits common among small firms are inextricably tied to the safety and health of their workers. These enterprises are new, and lack structure, a safety culture, and trained leaders. All decisions and major responsibilities rest on the owner. They have a dearth of time, money, staff, and know-how. It is difficult for them to see safety practices across the industry due to their isolation, and it is even more difficult for them to see their own high probability for an injury, illness, or fatality.

Intermediary organizations can alleviate many of these deficits by including safety and health tools and products as an added service. They, in turn, must rely on help from initiator organizations.

Efficient initiators who have an interest in their proposed safety and health practices being adopted by small businesses are advised to simplify the practices, create digital products, and design them so they can be stolen, shared, and adapted for further use.

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MAVImplant, an online tool for building a 3D mockup workplace for small enterprises

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Keywords: online tool, 3D software, workplace design, SME, health and safety at work, small enterprise

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Workshop: Online tools: good practice to guide the implementation of OSH measures in small enterprises

Abstract

As part of its strategy to address micro and small and medium enterprises (SMEs), the INRS (National Research Institute for Safety and Health) has developed an online tool called "MAVImplant", dedicated to designing mockups of workplaces. Reaching these companies relies on the idea of proposing a stand-alone tool that will be of appreciable use for small enterprises managers at a critical moment, when they must undertake the major task of investing in their future production tool.

Users can access this open Web application, on which they can build a 3D mockup of their future workplace. They are guided throughout the successive workplace design steps. At each step of the project, the software supplies information and assistance relating to occupational health and safety (OHS) and "good practices" of workplace environment design. Introducing OHS issues upstream in the project facilitates taking preventive actions at source.

To ensure that SMEs are addressed effectively, the tool is adapted in a variety of "trade applications" that implement the items of equipment and the actions and rules specific to each sector of activity. These elements have been defined by workgroups composed of representatives of the profession and prevention specialists.

The assistance provided to the user is intended to be simple and non-constraining. Practical examples and references are provided to facilitate the autonomous use of the tool.

Different mockup visualization tools based on virtual reality concepts allow the user to conceptualize the future work environment. The software is interactive: the user enters the information and inserts the 3D objects in the mockup, and these actions trigger the display of messages that help them to progress. This online tool allows the SME managers to communicate on their project with the different actors involved: the future users, the architect, and the experts concerned. Collaboration is aided by specific tools: the insertion of post-it comments in the mockup, the addition of comments on the objects, sharing of the mockup between users. Exchanges between the latter are aided by the edition of a report summarizing the project's specifications. Prevention is taken into account by the organization and reservation of spaces, and the layout of flows and traffic, as well as attention given to the risks that can be dealt with through the design of the workplace.

MAVImplant was first implemented in two pilot sectors: baking and pastry-making, and automobile maintenance and repair. After analyzing feedback from these two sectors, adaptations for other sectors will be developed.

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Workplace design: a critical juncture for SMEs

The construction of a new workplace or the renovation of existing premises is a vital project for the manager of a micro, small or medium enterprise (all of them being called "SME" in this paper) [1]. It demands considerable financial investment. It represents the opportunity to design their future production tool, with an impact on future production performances in both quantitative and qualitative terms. The premises will influence the employees' environment and work situation. The workplace of SMEs is often very close to their points of sale, thus the image of the enterprise in the eyes of its clients is at stake.

Confronted by such challenges, the SME manager lacks the arms necessary to carry out their project. They are far from having the experience of a contracting authority. They often lack the requisite competences regarding construction, regulations, and even project management. Thus they rely on a prime contractor or a design and construction manager who is most frequently an architect. However, they do have competences that the architect lacks: the rules specific to their trade, and of course the needs related to their specific project. But their professional activity leaves them with little time available to group these rules and needs to together and formalize them. As for issues relating to the prevention of occupational diseases and risks, they are often poorly known and are dealt with at the end of the project.

This highlights the conjunction of a need for management (carrying out a workplace design project), prevention (integrating good practices in health and safety - OHS), and dialogue (between the SME manager and the architect). A tool capable of satisfying these three objectives would be particularly well-adapted for SMEs to facilitate integrating these elements from the design stage [2].

Its utility becomes fully apparent in the upstream phase of the project, from the expression of needs, the so-called "program" phase, in the workplace and the work environment design procedure. This early phase permits prior reflection to define the essential points of the project and it greatly facilitates handling OHS issues. Indeed, it will enable the implementation of prevention actions at source, since it is known that the efficiency of solutions integrated at the outset is better and less expensive than the corrective actions often applied later [3,4].

A computer mockup tool

A study at the INRS (National Research Institute for Safety and Health) was performed to define a tool satisfying the objectives described above [5]. A prototype was built and its usability validated [6]. This was followed by the production of the "industrial" tool called MAVImplant ("virtual installation mockup" – in French "Maquette Virtuelle d'Implantation").

It is a software application that can be accessed online: craftsmen and architects are familiar with using the Internet [7]. It permits building virtual 3D mockups of the workplace and is structured to guide the user progressively through the project. It incorporates functions that assist the user to layout spaces and position machines and the operators that use them. It provides advice relating to "good practices" in workplace design and OHS. It also provides a summary report intended for the design and construction manager (Figure 1).

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Figure 1: The MAVImplant tool can be used to build a virtual 3D mockup of the future workplace. The user is guided in their approach progressively, step by step (see the black menu bar at top of screen)

The target users are SME managers and all the people involved in the project from the angle of the "trade" to be practiced.

In what follows, we present the tool's characteristics from the angle of its adaptation to the objective targeted SMEs: customization, ease of use, appropriation of the project, tool interactivity, collaboration in the approach.

Adaptation by "trade"

In order to reach SMEs, the tool must be customized in relation to the user's situation, and especially their occupation [8]. To do this it was decided to adapt MAVImplant by "trade" (e.g., hotels, baking-pastry making, carpentry, etc.). Deploying the tool therefore relies on adapted applications, specific to each area of the activity targeted.

The association of professional advisors in this approach is a key element of its success [9]. Also, for each trade, collaboration is organized with representative partners. The latter attend workgroups that draw up recommendations, items of equipment and rules specific to the trade and which will be integrated in the software. They will then be responsible for disseminating the product and providing support for its use.

Simple and stand-alone utilization

The software guides the user in the mockup construction approach. Successive steps are proposed: placing work areas, laying out the building, integrating the process, laying out the passages and corridors, etc. The user builds the mockup step by step, by inserting 3D objects characteristic of their trade in a "scene" (Figure 2).

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Figure 2: The mockup is built by inserting 3D objects from a library (see the product line lower banner).

Furthermore, MAVImplant provides assistance in the form of "warning" windows when relevant. Once the SME has considered that their project has been sufficiently well-defined, they edit a report comprising the views they have selected. This document is a "summary of needs" that can then be examined by an architect.

Using MAVImplant online makes the application easy to use and immediately available. Potential users can access the application in "visitor" mode to understand the logic of the approach proposed without any prior subscription.

The application is stand-alone, meaning that no preliminary training is required. Tooltips are superposed over the action buttons and the application has an integrated online help function.

The functions are designed to be intuitive. The GUI (Graphical User Interface) refers to current practices of contemporary 3D Web applications ("serious games").

Building "one's" project

The main difficulty for SME managers is to visualize a work situation that does not yet exist, using abstract representations: these are either drawings or plans at best. That is why mockups are sometimes built using cardboard. 3D numerical representations permit "direct" views of the situation; they can be implemented very early on, and incorporate the modifications or changes proposed very quickly. They follow the project from the beginning up to its completion.

MAVImplant allows the user to make the project their own, because they can use 3D numerical visualization tools on "their" mockup (zooms, changes of angle), and 2D plan type views are also available. A "First Person" visualization mode, well-known to video game players, allows the user to "submerge" themselves in the mockup and thus in the future working environment (Figure 3).

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Figure 3: Visualization in "First Person Mode"

The user is placed in a familiar universe: the 3D objects are rendered realistically. Their dimensions can be modified to correspond to the items of equipment that will be actually installed.

This subjective approach is also processed from the viewpoint of the future operators: avatars are inserted in the scene. A function then allows simulating their 3D vision in the situation (standardized viewing angles that take into account eye viewing and head movements) (Figure 4).
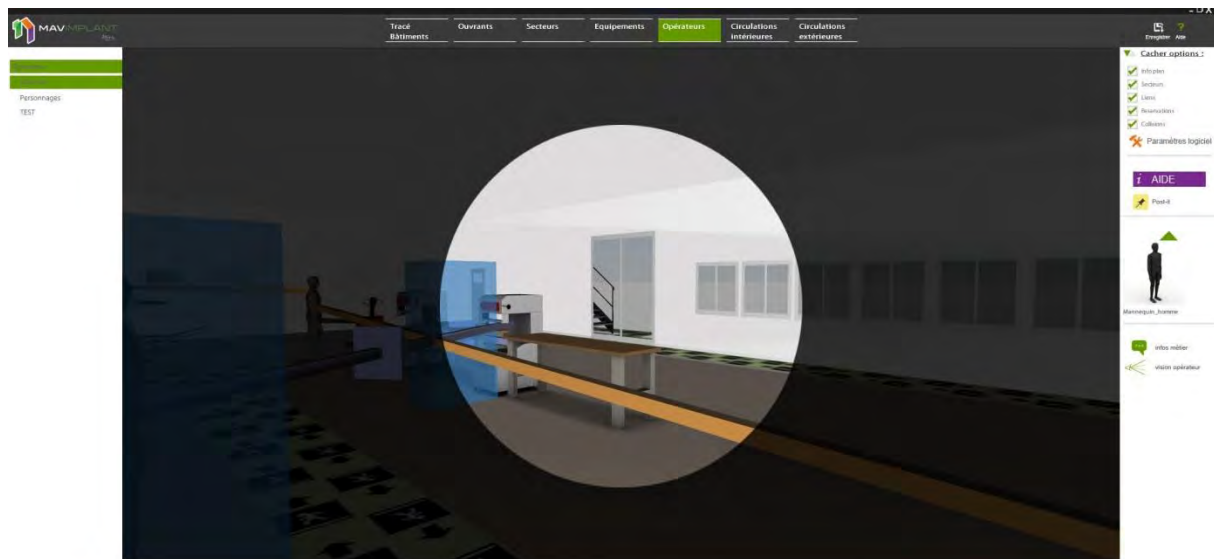
Figure 4: Representation of the "comfort" viewing angle of an operator.

The use of passages and corridors is taken into account by a simplified simulation of driving a vehicle in the mockup (motorized vehicles, manual lift trucks, etc.).

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An interactive tool

The user's involvement is ensured by mechanisms of interaction between their actions on the mockup and the options or guidance proposed to them.

Once the user has started to use the software, the succession of step proposed will depend on the type of project they choose. Thus the first step of a rearrangement of the working premises will start with the layout of the building, whereas a new construction will start with the positions of the work areas.

The insertion of certain objects leads to associated messages: advice on installation, connection, etc. Some operations trigger alarms that have to be solved: overlapping of items of equipment on reserved spaces, collective protection against falls from height on roofs, and so forth.

This interaction is immediate and can be seen directly on the mockup by the user: handling objects (modification of dimensions, moving objects, etc.) has an immediate impact on the mockup, and the display of messages and alerts is done directly on the scene.

Sharing the project

Generally, the success of a workplace and premises design project, and taking into account prevention issues in particular, relies on the participatory approach taken by the actors concerned from an early stage of the project and up to its end [10,11].

MAVImplant includes functions that facilitate this communication.
The mockup proposes a "post-it" tool that allows users to follow-up comments on the project on a daily basis.
After discussions, comments can be added to objects in the mockup and which will feature in the report.
The project can be adapted in several versions (e.g., variants) that can be shared on the Web by selected users.
The report edited permits tracking the customized needs of the project and it becomes the basic medium for exchanges between the SME manager and the design and construction manager.

Taking prevention into account

Of course, for the INRS, an essential feature of the tool is that it takes questions of prevention into account. This is also done by giving advice to the user: it does not involve any constraint on building the mockup, and satisfies a need for the SME manager who is responsible for these questions.

The software proposes a specific approach to performing the project which favors the integration of prevention. For example, the insertion of a step dedicated to positioning work areas (called "sectors") is a key element in a workplace and premises design project. However, this practice is still not sufficiently widespread

The organization of space and circulation is also an essential point in preventing risks of falls, risks linked to handling, and those linked to movement. Space management is integrated by the option of reserving volumes for access points, actions on items of equipment, handling operations and storage. Tools are proposed to visualize the organization of the space and the process in the form of links making it possible to optimize flows, movements, and the proximal space areas, or on the contrary separating "antagonist" places (e.g., separation of explosive areas).
The alarm and advice messages mentioned previously are aids directly linked to the user's actions. They can be triggered by elements specific to the building itself (differences in level, pits, etc.) and by

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the layout of passages and corridors (overlapping of the areas crossed, etc.). These also concern risks linked to items of equipment when they can be dealt with by acting on the layout of the premises (noise, pollutants, etc.).

Conclusion

The development of specific risk assessment tools has led to the introduction of risk prevention in SMEs [12]. Ensuring that this practice will continue to increase now requires the dissemination of more global tools [2].

The strategy taken by the INRS is to provide the SME manager with a tool useful to them at a critical juncture, and whose use permits the "natural" integration of positive OHS practices. When applied to the workplace and premises design software MAVImplant, it was warmly welcomed by the professional organizations contacted. Adapting it to SMEs required the integration of software specifications that reflect their culture, by combining the need for autonomy, dialogue and assistance.

The first pilot trades employed to launch the software application are baking-pastry-ice-cream making and automobile repair and maintenance. Collaboration with the professional organizations representing these trades has made it possible to deploy the tool. Analysis of the feedback on its use in these sectors will enable orientating the choices to be made for other trade applications, and developing them.

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Assessment of Benzene Exposure by the Biomarker and Health Effects Identification among Workers at Gasoline Stations

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Abstract. To investigate benzene exposure and health effects among workers at gasoline stations, urinary tt-MA (trans, trans-Muconic Acid) was measured as a biomarker of exposure and health effects were investigated though experienced adverse symptoms. Among 170 non-smoking workers from gasoline stations, urinary tt-MA were found in 24.7% of workers (range = 23.0 to 1127.8 µg/g creatinine) and 26.2% of those workers had tt-MA level exceeded 500 µg/g creatinine. A majority of workers (84.2%) had experience from benzene toxicity related symptoms. Most experienced symptoms were at moderate severity level (73.4%) and significantly correlated with tt-MA identification. The results suggest that employers should provide health surveillance program among workers at gasoline stations by biological monitoring and observing health effects though adverse symptoms related to benzene toxicity.

1 Introduction

Benzene was classified as group I human carcinogen by IARC. It is a 1.63% component in gasoline (by volume)[1], which can be evaporated into ambient air while fueling process at gasoline stations and it is also found on vehicle exhaust emission[2]. Previous studies in Thailand indicated that inhaled benzene concentration of gasoline station workers was lower than 0.1 ppm[3]. Those exposed workers had heath risk on cancer[4] and experience of mild severity level of benzene toxicity related symptoms such as headache, dizziness and fatigue[5, 6]. The studies at higher benzene concentration (>0.1 ppm) reported mild to severe symptoms of benzene toxicity, which were significantly higher prevalent in exposure workers compared to general population[5]. El-Magd et al. reported that symptoms included exhaustion, confusion, tremors, drowsiness were found in Egyptian gasoline station workers[7]. Besides, Gwack et al. indicated that Korean workers exposed to benzene had other symptoms of benzene toxicity such as sore throat, irritation of nasal airway, eye irritation, coughing, nausea and redness[8]. However, at low concentration (< 1 ppm), health effects from epidemiological data are still unclear.

Trans, trans-muconic acid (tt-MA) is metabolite widely used biomarkers to identify low benzene exposure (<1 ppm) because of the high sensitivity of detection among exposure workers[9]. Therefore, the objectives of this study were to determine benzene exposure via urinary tt-MA determination and to investigate health effects though experienced adverse symptoms of gasoline station workers.

2 Methodology

This study was designed as cross-sectional analytic study to investigate the health effects and benzene exposure by biomarker identification among workers at gasoline stations. There were 98 gasoline stations in the city of Muang Khon Kaen, the capital city of Khon Kaen province, Thailand and a total of 686 workers at these gasoline stations.

2.1 Study population and sample size

The sample size was calculated by the formula of estimated mean of population[10]. The standard deviation from previous study was 7[11]. The error of urinary tt-MA measurement was 1.00 mg/l[12]. The

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minimum requirement of sample size was 148 samples. The recruitment for this study were gasoline station workers who worked in various selected gasoline stations in the study area of Muang Khon Kaen, held full time job, worked at least 8 hours per day in the gasoline stations, worked in the gasoline station for more than 6 months, aged more than 18 years old and were non-smokers. The simple random sampling was done for representative subjects from each zone by taking into consideration of the total population of workers in each zone. There were categorized 3 zones; urban zone, suburban zone and rural zone. There were 170 workers passed the recruitment of this study. Thus, the numbers of subjects selected in each zone were 62 workers for urban zone, 64 workers for suburban zone and 44 workers for rural zone.

2.2 Data collection and analysis
The structural questionnaire was produced by literature reviews and examined for content and validity. It included 2 parts, the 1st part enquired personal information such as gender, age, level of education. The second part enquired health effects. The health effect was shown by adverse symptoms. The adverse symptoms of the workers experienced during or after work shift during the last 6 months, were classified into 5 levels which were; (1) non-symptoms, (2) mild symptoms (13 symptoms), (3) moderate symptoms (13 symptoms), (4) severe symptoms (4 symptoms), (5) chronic symptoms (cancer).

For determination of urinary tt-MA, ten millilitre of urine sample was collected from workers in a sterile container, containing thymol, after work shift, sealed and stored at 4 °C until analysis within a week. Method of analysis followed a standard method from Bureau of Occupational and Environmental Disease, Department of Disease Control, Ministry of Public Health, Thailand[13]. Urine sample was extracted by solid phase extraction C18-LP 100 mg and eluted with 1% aqueous acetic acid. Urinary tt-MA analysis was carried out with High Performance Liquid Chromatography (HPLC) equipped with a UV detector operated at 264 nm with the following conditions: mobile phase of aqueous acetic acid: methanol (82:18); reverse phased C18 column at 20 °C. Urinary tt-MA levels were expressed as microgram per gram Creatinine (µg/g Cr). The quantity of urinary tt-MA was compared with the biological exposure index; BEI (500 µg/g Cr) set by American Conference of Government Industry Hygienists (ACGIH)[14].

2.3 Ethical approval and consent
This study was approved by Khon Kaen University Ethics Committee in human research. All participants were given informed consent before entering into the study.

2.4 Statistical analysis
Data were analyzed by using STATA version 10 software. Health effect was described by descriptive statistics (frequency and percentage). The quantity of tt-MA was explained by descriptive statistics (mean, standard deviation, minimum, maximum) and inferential statistics i.e. 95% confidence interval (95%CI). Spearman's correlation and simple logistic regression were used to identify correlation of tt-MA and health effects. The statistic significance was identified at p-value<0.05.

3 Results

3.1 Demographic characteristics of gasoline station workers
Among 170 gasoline station workers, the participants were female and male workers occupied in equal number. Age of the participants ranged between 21 - 40 years. The majority of workers had age between 31 - 40 years (35.8%), followed by age between 21 - 30 years (31.8%). Most of them were married (62.9%), 35.3% were single and 1.8% was divorce. Regarding the education level, it was found that 61.8% of the participants had attended secondary school, 37.0% had finished primary school and 1.8% of them were uneducated. The job function was classified into 2 groups; fueling workers and

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cashiers. Fueling workers were 91.2% and cashiers were 8.8%. For the workplace zone of workers, 37.7% were from suburban zone, 36.5% were from urban zone and 25.8% were from rural zone.

3.2 Health effects of gasoline stations workers

The benzene toxicity related symptoms accounted for 84.2% or 143 workers. The highest frequency of appearing symptoms was moderate level accounted for 73.4% (105 workers), followed by mild level accounted for 17.4% (25 workers). The severe level accounted for 9.2% (13 workers). When considering frequency of appearing each symptom found that exhaustion and headache were highest frequency, followed by dizziness at mild level. The moderate level was found that highest frequency was confusion. The severe level found 3 symptoms out of 4 symptoms. Anemia, rapid heartbeat/ arrhythmia and unconsciousness were found excepted convulsion. The chronic symptom in this study referred to cancer was not found in this study (see in Table 1).

Table 1 Adverse symptoms of workers considering all reported symptoms (n=170)

Mild level	n (%)	Moderate level	n (%)	Severe level	n (%)
Total	25 (17.4)	Total	105 (73.4)	Total	13 (9.2)
Exhaustion	78 (45.9)	Confusion	54 (31.8)	Anemia	6 (3.5)
Headache	78 (45.9)	Muscle weakness	52 (30.6)	Rapid heartbeat/ Arrhythmia	6 (3.5)
Dizziness	55 (32.4)	Tight chest	31 (18.2)	Unconsciousness	1 (0.6)
Sore throat	40 (23.5)	Cramp	28 (16.5)		
Irritation of nasal airway	38 (22.4)	Nausea/ vomiting	22 (12.9)		
Dry skin, Local dermatitis	38 (22.4)	Blurred vision	22 (12.9)		
Eye irritation	31 (18.2)	Redness	12 (7.1)		
Skin rash / Blister	31 (18.2)	Excessive fatigue	7 (4.1)		
Suffocation	22 (12.9)	Tremors	4 (2.4)		
Loss of appetite	21 (12.4)	Drowsiness	1 (0.6)		
Coughing	20 (11.7)				
Rhinorrhea	8 (4.7)				
Palpitation	3 (1.7)				

The majority of appearing symptoms tended to be found in suburban zone, followed by urban zone. The interesting result was found at severe level that the proportion of appearing symptoms was highest at urban zone. The distributing of symptom was found in 3 zones. The anemia was found in all zone, rapid heart beat/arrhythmia was found in urban and rural zone and unconsciousness was found only urban zone (see Table 2).

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Table 2 Adverse symptoms considering the highest severity level of symptoms (n= 143)

Symptoms	n (%)	Urban	Suburban	Rural
		n (%)	n (%)	n (%)
Mild level	25 (100.0)	7 (28.0)	15 (60.0)	3 (18.0)
Exhaustion	9 (36.0)	2 (22.2)	6 (66.7)	1 (11.1)
Headache	11 (44.0)	5 (45.4)	6 (54.6)	0
Dizziness	6 (24.0)	1 (16.7)	5 (83.3)	0
Sore throat	5 (20.0)	2 (40.0)	3 (60.0)	0
Irritation of nasal airway	4 (16.0)	1 (25.0)	3 (75.0)	0
Dry skin, Local dermatitis	6 (24.0)	4 (66.7)	2 (33.3)	0
Eye irritation	3 (12.0)	1 (33.3)	1 (33.3)	1 (33.3)
Skin rash / Blister	5 (20.0)	2 (40.0)	2 (40.0)	1 (20.0)
Suffocation	1 (4.0)	1 (100.0)	0	0
Loss of appetite	0	0	0	0
Coughing	3(12.0)	1 (33.3)	2 (66.7)	
Rhinorrhea	1 (4.0)	0	0	1 (100.0)
Palpitation	0	0	0	0
Moderate level	105 (100.0)	38 (36.2)	40 (38.1)	27 (25.7)
Confusion	50 (47.6)	15 (30.0)	22 (44.0)	13 (26.0)
Muscle weakness	50 (47.6)	18 (36.0)	20 (40.0)	12 (24.0)
Tight chest	24 (22.8)	8 (33.2)	11 (45.9)	5 (20.9)
Cramp	23 (21.9)	10 (43.5)	9 (39.1)	4 (17.4)
Nausea/ vomiting	19 (18.1)	7 (36.8)	4 (21.1)	8 (42.1)
Blurred vision	19 (18.1)	2 (10.5)	12 (63.2)	5 (26.3)
Redness	9 (8.5)	2 (22.2)	4 (44.4)	3 (33.4)
Excessive fatigue	5 (4.7)	3 (60.0)	2 (40.0)	0
Tremors	2 (1.9)	1 (50.0)	1 (50.0)	0
Drowsiness	1 (0.9)	0	1 (100.0)	0
Severe level	13 (100.0)	6 (46.2)	3 (23.1)	4 (30.7)
Anemia	6 (46.1)	2 (33.3)	2 (33.3)	2 (33.3)
Rapid heartbeat/Arrhythmia	6 (46.1)	3 (50.0)	0	3 (50.0)
Unconsciousness	1 (7.6)	1(100.0)	0	0

3.3 Benzene exposure via tt-MA identification

The results of benzene exposure showed that tt-MA in urine sample was found in 42 workers (24.7%) which gave the average of 74.4 µg/g Cr (microgram per gram creatinine). The minimum was 23.0 µg/g Cr and the maximum was 1,127.8 µg/g Cr. The highest proportion was found among workers in suburban zone (45.2%), followed by rural zone (28.6%). Moreover, there were 11 workers or 26.2% of those workers had urinary tt-MA levels over BEI recommended by ACGIH (500 µg/g Cr)[14]. The results pointed out that most of those workers worked in urban zone (5 workers), followed by suburban zone (4 workers) and 2 workers worked at rural zone (see Table 3).

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Table 3 The quantity of tt-MA found in workers classified by zone (n=170)

Parameter	Urban (n=62)	Suburban (n=64)	Rural (n=44)	Total
Mean ± SD	76.10 ± 208.12	80.30 ± 180.81	63.61± 148.73	74.43±183.01
Min	23.04	31.17	24.78	23.00
Max	1127.84	946.76	647.93	1127.84
Found tt-MA n (%)	11 (26.2)	19 (45.2)	12 (28.6)	42 (100.0)
tt-MA> BEI n (%)*	5 (45.5)	4 (36.4)	2 (18.1)	11 (100.0)

*BEI = 500 µg/g Cr

3.4 Correlation between tt-MA and adverse symptoms

Workers presented urinary tt-MA (n=42) had benzene toxicity related symptoms for 76.2 % (32 workers). The highest frequency of symptoms was at moderate symptoms. More details were explained in Table 4. Spearman's correlation analysis indicated no significant correlation between levels of tt-MA and levels of symptoms in this group.

Table 4 Proportion of workers who had urinary tt-MA classified by levels of symptoms (n=42)

Symptoms	tt-MA< 500 ug/g Cr	tt-MA > 500 ug/g Cr	Total
	n (%)	n (%)	
Non symptoms	6 (19.4)	4 (36.4)	10 (23.7)
Symptoms	25 (80.6)	7 (63.6)	32 (76.2)
Mild symptoms	7 (28.0)	2 (28.5)	9 (28.1)
Moderate symptoms	15 (60.0)	3 (43.0)	18 (56.3)
Severe symptoms	3 (12.0)	2 (28.5)	5 (15.6)

   For individual experience of symptoms, 32 workers had experience of at least 2 or 4 symptoms in different level for individual. However, numbers of symptom were not correlated with levels of tt-MA (see Fig. 1).
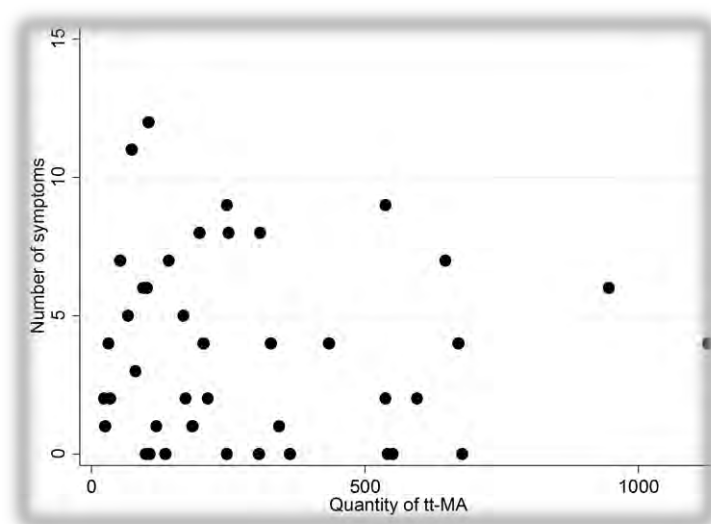
Fig. **1.** The correlation between quantity of tt-MA and number of adverse symptoms

   Considering 143 workers who had adverse symptoms, the result identified the significant correlation between level of symptoms and finding of tt-MA in this group (p-value=0.037) as shown in Table 5.

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Table 5 The correlation between finding tt-MA and levels of symptoms by chi square (n=170)

Level of symptoms	Not found tt-MA n (%)	Found tt-MA n (%)	p-value
4 Levels of symptoms			0.037*
Non-symptom	17 (13.3)	10 (23.8)	
Mild level	16 (12.5)	9 (21.4)	
Moderate level	87 (68.0)	18 (42.9)	
Severe level	8 (6.2)	5 (11.9)	
Classified into 2 levels of symptoms			0.018*
Non-symptom and mild level	33 (25.8)	19 (45.2)	
Moderate and severe level	95 (74.2)	23 (54.8)	

* Significant association at p <0.05

When each symptom was considered, symptoms at moderated level (i.e. confusion, muscle weakness) significantly correlated with benzene exposure (tt-MA). Other symptoms were not significantly correlated with tt-MA as shown in Table 6.

Table 6 Univariate analysis of benzene exposure (tt-MA) associated with symptoms (n=170)

Symptoms	tt-MA Found (n=42) n (%)	tt-MA Not found (n=128) n (%)	OR	(95% CI)	p-value
Confusion	7 (16.7)	47 (36.7)	0.34	(0.14-0.84)	0.019*
Muscle weakness	4 (9.5)	48 (37.5)	0.18	(0.06-0.52)	<0.001*
Cramp	7 (16.7)	21 (16.4)	1.02	(0.40-2.60)	0.968
Anemia	1 (2.4)	5 (3.9)	0.60	(0.06-5.29)	0.628
Arrhythmia	2 (4.8)	4 (3.1)	1.55	(0.27-8.78)	0.629

* Significant association at p-value <0.05

4 Discussion

Adverse symptoms among 170 gasoline station workers were found at moderate severity level accounted for 84.2%. The highest frequency of reported symptoms in this level was confusion, followed by muscle weakness, tight chest and cramp, respectively. This confirms the previous study mentioning the reported symptoms of confusion, muscle weakness and cramp among gasoline workers[5]. Those workers were from suburban zone where was identified by previous study to provide high service of gasoline station[15]. Besides, the workers reported the basic symptoms, mild symptom, such as exhaustion, headache and dizziness. The previous study in Bangkok, Thailand also reported the same symptoms[6] and Nuntanuch and Chaiklieng[5] found more symptoms i.e. the fatigue at this severity level among gasoline workers exposed to benzene. The interesting finding for individual experience to symptoms is that 32 workers had experience of at least 2 or more symptoms in different severity.

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Urinary tt-MA was found in 24.7% of gasoline workers in this study. This confirms previous studies which mentioned to finding of urinary tt-MA among various workers exposed to benzene i.e. gasoline station workers16, refinery workers17 and traffic police man18. Interestingly, the result indicated that 26.2% of tt-MA presented workers had tt-MA exceeded BEI (500 µg/g Cr) recommended by ACGIH14. Most presented tt-MA workers were in suburban zone where had daily high service for gasoline at the station along high way road, however, exceeded BEI level of tt-MA presented workers predominantly worked in urban zone where was found highest benzene concentration in ambient air15.

Among 42 workers exposed to benzene via tt-MA level determination, tt-MA was not significantly correlated with levels of adverse symptoms and number of adverse symptoms. Interestingly, experienced adverse symptoms were significantly correlated with benzene exposure (tt-MA identification) among 143 gasoline workers experienced of benzene toxicity. However, this correlation was not depended on tt-MA levels. Moreover, some moderate symptoms i.e. confusion and muscle weakness significantly associated with benzene exposure.

This study confirmed high numbers of workers who had experienced adverse symptoms related to benzene toxicity ranging from mild to severe levels that were also associated with urinary tt-MA identification. This finding strongly suggests the need for work safety training to protect workers from adverse health effects due to occupational benzene exposure. Limited detection or variation of urinary tt-MA in the present study could be explained by benzene require metabolism resulted in the variation of muconic acid competition from the other metabolites which require GSTT1 (glutathione-S-transferase T1) activity, also variation in CYP2E1 (cytochrome P450 2E1) key metabolic step-inducible by alcohol has this been measured[19, 20]. Thus, this factor should be considered when perform biological monitoring for surveillance program of workers in occupational benzene exposure and observation of adverse symptoms related to benzene toxic for screening of health effects.

5 Conclusions
Among 170 gasoline station workers, A majority of workers (84.2%) had experience from benzene toxicity related symptoms. Most experienced symptoms were at moderate severity level (73.4%) and found in suburban zone. The highest frequency of symptoms were confusion, muscle weakness, tight chest and cramp. Urinary tt-MA were found in 24.7% of workers (range = 23.0 to 1127.8 µg/g Cr) and 26.2% of those workers had tt-MA level exceeded 500 µg/g Cr. The highest proportion was in suburban zone accounted for 45.2%. Moreover, the significant correlation between experience of adverse symptoms and benzene exposure via tt-MA identification was found with level independence. Moreover, moderated symptoms i.e. confusion and muscle weakness significantly associated with benzene exposure. The suggestion, employers should provide health surveillance program with effective biomarkers of exposure among workers at gasoline stations. Particularly, individual susceptibility and factors influencing biomarkers of exposure should be considered under low level of benzene exposure.

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SME Business Leaders' Motivations and Barriers in Workplace Safety and Health Leadership

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Abstract. In Singapore, 99% of businesses are small and medium enterprises (SMEs). Business leaders play an influential role in raising workplace safety and health (WSH) standards through their leadership. The aim of the study was to understand SME business leaders' motivations and barriers, and how they influenced their WSH leadership behaviours. Telephone interviews were conducted with 123 participants. SME business leaders' most commonly cited WSH motivations were a concern for their employees' wellbeing and accidents being costly to businesses. Importantly, 22.8% of participants expressed no motivation in WSH. Generally, SME business leaders' WSH barriers were uniformly attributed to a lack of expertise, financial resources, time, and difficulties in encouraging employees' compliance to WSH. SME business leaders who had a motivation to improve WSH in their companies demonstrated significantly greater WSH leadership involvement, as compared to those with no motivation. A significantly higher proportion of SME business leaders who had no motivation in WSH (60.7%) were unaware of the WSH risks in their businesses, as compared to those with a WSH motivation (23.2%). Our findings imply the importance of raising a business leaders' awareness of WSH risks in their business operations if some form of behaviour change is to occur.

1 Introduction

1.1 Small and Medium Enterprises

In Singapore, small and medium enterprises (SMEs) are defined as "businesses with annual sales turnover of not more than $100 million or employing no more than 200 staff". Today, 99% of businesses in Singapore are SMEs, employing 70% of the workforce and contributing to nearly half of Singapore's gross domestic product (SPRING Singapore, 2014).

Singapore's workplace fatal injury rate was 1.8 per 100,000 employed persons in 2014 (Workplace Safety and Health Institute [WSHI], 2015). While Singapore has not released explicit figures on the proportion of work-related incidents attributable to SMEs, researchers in other countries have established that smaller companies account for higher workplace injury and fatality rates as compared to larger companies (Sinclair & Cunningham, 2014). Policy makers recognise the challenge in raising SME's workplace safety and health (WSH) commitment due to their financial and manpower limitations. Yet, therein lays an opportunity to target SME owners to improve WSH practices and as they often assume multiple roles within the business (e.g. owner, financial manager, human resource manager) and have a shorter decision-to-action line due to their small set-up (Hasle, 2013).

1.2 Leadership in Workplace Safety and Health

Unless championed at the highest levels of an organisation, a pervasive and sustainable change in employees' WSH mindset and practices is almost impossible (Flin, Mearns, O' Connor, & Bryden, 2000). Business leaders decide on the priority of WSH relative to other organisational outcomes, and set the tone for the importance of safety and health in their company. Accordingly, the Health and Safety Executive (HSE, 2010) in the United Kingdom found evidence that director-level leadership for safety and health was associated with decreased work-injury levels of up to 25% more than companies who did not have management responsibility for WSH.

A key characteristic of strong WSH leadership has been described as the direct involvement of senior management on WSH issues (Flin & Yule, 2004). Although there is limited evidence as to which leadership behaviours are most effective (Martinez-Corcoles, Gracia, Tomás, & Peiró, 2011), those that are visible (e.g. communicating with staff on WSH issues, involvement in site inspections) were

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asserted as more powerful as they allowed employees to see their leaders' priority and commitment to WSH (Branham, 2010). However, the senior management of larger companies have commonly cited their involvement in oversight roles (e.g. setting the company's WSH policy, monitoring WSH performance, chairing WSH meetings) which are more invisible in nature to employees (WSH Institute, 2012a). It is also important to highlight that majority of WSH leadership research presume an existing management commitment to WSH, such as effective leadership styles and communication (e.g. Griffin & Hu, 2013; Hoffmeister et al, 2014; Törner, 2011). Yet, few studies have explored the antecedents that motivate or hinder senior management's personal commitment to WSH, especially for SMEs.

1.3 Motivations and Barriers Influencing Safety and Health Leadership

Motivation is defined as the process that initiates, directs and sustains goal-oriented or voluntary behaviours (Mitchell, 1982). It is responsible for predicting behaviour by influencing one's choice of action. Research that has explored senior management's motivations in the area of occupational safety and health has largely agreed on the following factors: legal requirements, financial considerations, moral responsibility, and protection of business reputation (Gunningham, 1999; Shearn & Miller, 2005; Wright, Antonello, Norton Doyle, Genna, & Bendig, 2005). It is also important to understand that motivations do not function in isolation, and it is common for an individual to have more than one reason at a time for involvement in WSH (Wright et al., 2005).

The duty to comply with legislation has been evidenced as one of the strongest drivers of senior management's involvement in WSH (O'Dea & Flinn, 2003). Legal requirements were found to motivate employers in two ways, due to a fear of persecution and also an increased awareness and interest in the legislated issue. In Singapore, the Workplace Safety and Health Act places a legal duty on employers to take reasonable and practicable steps to ensure their workers' safety and health. Motivation via financial considerations entails the "safety pays" or "accident costs" arguments (Gunningham, 1999). "Safety pays" refer to investments returns from WSH. However, these are usually longer-term in nature, making it difficult for SMEs to rationalise given their immediate struggle to survive. "Accident costs" on the other hand has been found to have catastrophic implications on an SME's bottomline. A single serious accident can result in business closure from the direct costs of dealing with the incident and the loss of key workers (Moore, 2009). Hence, our study focused on "accident costs" as a potential driver for SME business leaders' involvement in WSH. Moral responsibility to protect the safety and health of employees was another key driver for employers. This was expressed differently for bigger and smaller firms – for the 'larger societal good' by big firms, and a 'personal concern' by SME owners who often know and interact frequently with employees due to their small size and tight knit nature (Shearn & Miller, 2005). Fairman and Yapp (2005) have suggested that SME leaders are less concerned with reputation protection in WSH due to their business' relative lack of prominence in the market. Hence, we have replaced it with business competitors improving WSH as a potential motivation. This is based on the fact that SMEs are highly concerned with their competitors given the tight market and difficult survivability of smaller organisations (Singapore Business Federation [SBF], 2012).

Motivations alone are insufficient to influence behaviours, and are often mitigated or hindered by external factors known as 'barriers' (Mitchell, 1982). Hasle (2013) asserts that SMEs are not small 'big firms' and face unique barriers in WSH as compared to their larger counterparts. Operating within financial constraints, SMEs commonly cite that they are unable to invest in WSH initiatives and personnel (Surienty, 2012). The lack of dedicated WSH professionals also results in a lack of expertise and SMEs were more likely to find WSH regulations too complex and onerous to comply with (MacEachen et al., 2008). Additionally, SME employers have cited being time poor for WSH in the face of competing business priorities (Moore, 2009). Another common challenge raised by SME leaders was a lack of compliance by their workers to WSH requirements. Wilson and Koehn (2000) found that small business employers tend to attribute poor risk management to individual employees rather than taking the responsibility upon themselves or their company's WSH procedures.

Beyond the influence of motivations and barriers, Wright et al. (2005) emphasised that an awareness and understanding of WSH risks remained the primary determinant of employer action. This argument was based on research findings where employers with the capacity to make WSH improvements did not take action even after internalising the economic costs of incidents. This was due to a lack of awareness of the extent and severity of the WSH risks in their business.

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Considering the literature, our study sought to answer these research questions:
• How do SME business leaders demonstrate their involvement in WSH leadership?
• What are SME business leaders' WSH motivations, barriers, and understanding of WSH risks in their companies?
• How do SME business leaders' WSH motivations, barriers, and understanding of WSH risks, influence their involvement in WSH leadership?

2. Method

2.1 Participants and Procedure

The participants were recruited as part of a larger study in 2013 to evaluate the impact of Singapore's bizSAFE programme (https://www.wshc.sg/bizSAFE), a national initiative aimed at building WSH risk management capabilities in SMEs. The sampling frame was obtained from a list of workplaces registered with the Ministry of Manpower. A disproportionate stratified sampling was used to sample a higher proportion (70%) of businesses from the three main higher-risk industry sectors of Construction, Manufacturing and Marine, with the remaining 30% from the lower-risk industry sectors classified as 'Others'. This was to address our study's priority with businesses in industries with higher work-related injury rates in Singapore. Representatives from each workplace were randomly selected to participate in telephone interviews in either English or Mandarin. There were a total of 1390 participants with a response rate of 32%.

Our sample comprised of 123 participants selected from the larger study. The margin of error for our sample was estimated to be 8.8%. The inclusion criteria were participants in senior management roles of businesses that employed no more than 200 staff. Senior management roles referred to Company Owners, Chief Executive Officers, Managing Directors and General Managers. We did not account whether participant's businesses had an annual sales turnover of not more than $100 million, according to Singapore's SME definition, as collection of financial information was deemed too sensitive. The exclusion criterion was participants whose businesses were in the bizSAFE programme to ensure sufficient generalisability of our findings to the SME population who were largely non-bizSAFE. In 2012, bizSAFE had an overall industry penetration of 6.5% in Singapore.

According to industry sector, 27.6% of participants were from Construction, 24.4% from Manufacturing, 14.6% from Marine, and the remaining Others (33.3%) included participants from the Services, Trading, Retail, IT, Design, and Education industries. By establishment size, 56.1% had not more than 10 employees (micro enterprises), 30.9% had 11 to 50 employees (small enterprises), and 9.8% had 51 to 200 employees (medium enterprises). By establishment duration, 30.9% had existed not more than 5 years, 24.4% for 6 to 10 years, 22% for 11 to 20 years, and 20.3% for more than 20 years.

2.2 Materials

Our materials were incorporated into a perception survey used for the bizSAFE evaluation study. The relevant measures are elaborated below.

Five items were used to assess senior management's involvement in WSH leadership. These were derived from the common behavioural indicators cited in WSH leadership guidance materials (e.g. Institute of Directors, 2013; HSE, 2013; WSHI, 2012b) on how business leaders demonstrate their commitment to WSH. Participants were asked, "As senior management, do you do the following?" A 'yes' or 'no' response scale was used. A summed score on all 5 behavioural indicators (maximum score of five for all 'yes' responses) was used to represent each participant's level of involvement in WSH leadership.

Four items were used to assess the WSH motivations of SME business leaders. One item each was used to cover legal requirements, accident costs, moral responsibility and business competitors. Participants were asked, "You are motivated to improve safety and health in your company because…" A five-point Likert response scale ranging from 1 (strongly disagree), 2 (disagree), 3 (neutral), 4 (agree), to 5 (strongly agree) was used. A higher rating indicated higher agreement that the item was a motivation for the participant. Each item included an N.A (not applicable) response option for participants who may not regard that item as a WSH motivation. An open-ended question "Any other reasons that would motivate you?" was also asked.

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Four items were used to assess the WSH barriers of SME business leaders. One item each was used to cover financial costs, lack of expertise in WSH, tight time schedules, and difficulty in getting workers to comply. Participants were asked, "You find it difficult to manage safety and health in your company because..." A similar five-point Likert response scale as WSH motivations was used. A higher rating indicated higher agreement that the item was a barrier for the participant. Each item included an N.A (not applicable) response option for participants who may not regard that item as a WSH barrier. An open-ended question "Any other reasons that hinders you?" was also asked.

Two items were used to assess WSH risk awareness. Participants were asked "Is your company aware of the various safety and health risks present in your workplace?" A 'yes' or 'no' response scale was used. As a counter check measure, a follow-up question required respondents to "Name a common risk found in your workplace." Those who could not answer or gave generic answers such as "accidents" were re-categorised as unaware of their company's WSH risks even if they indicated 'yes' for the earlier question.

2.3 Data and Analyses

Our data for participants' scores on their level of involvement in WSH leadership behaviours (dependent variable) did not meet the following parametric assumptions – significant results were obtained for tests of normality and Levene's tests for homogeneity of variance. Skewed data responses (non-normality) are not uncommon in psychological research especially on moral issues such as WSH, where the tendency for social desirability bias is high (Pallant, 2011). Hence, non-parametric tests using IBM SPSS Statistics 20 were conducted as the assumptions of random sampling and independent observation were met. However, it should be noted that non-parametric tests tend to be less sensitive than their parametric counterparts and may fail to detect differences between groups that actually exist.

3. Results

3.1 Leadership in Workplace Safety and Health

For involvement in WSH leadership behaviours, SME business leaders were most likely to communicate and get feedback from employees on WSH matters (78.9%), conduct regular WSH inspections (77.2%), and monitor the WSH performance of their company (74.8%). They were less likely to set WSH performance targets for their company (59.3%) and attend WSH committees and meetings (53.7%). 47.2% of participants were found to engage in all five WSH leadership behaviours, 15.4% engaged in four behaviours, 8.9% engaged in three behaviours, and 18.7% engaged in none of the WSH leadership behaviours.

3.2 Motivations and Barriers Influencing Safety and Health Leadership

To explore SME business leaders' WSH motivations, the responses for 'strongly agree' and 'agree' to each motivation were summed. Among the 123 participants in our study, concern for employees' wellbeing (72.4%) was the most commonly cited motivation. This was followed by accidents being costly to business (67.5%), compliance with legal requirements (56.9%) and lastly, competitors improving their WSH (47.1%). Unexpectedly, 28 SME business leaders (22.8%) consistently indicated 'N.A.' to all the WSH motivations and did not respond the additional open-ended question. Of these, 11 participants were from Construction, 8 participants were from Manufacturing, and the rest were from the lower-risk industries classified as 'Others'. As it was a sizeable proportion of our participants, they were inferred as having "no motivation" in WSH, and were used for further analysis. Table 1 shows the distribution of participants' Likert ratings on all WSH motivations.

To explore the relationship between SME business leaders' WSH motivations and their corresponding level of involvement in WSH leadership behaviours, line graphs were first generated. Across all four motivations, visual inspection revealed a similar pattern – participants with no motivation had the lowest scores on their level of WSH leadership involvement. This was followed by those who indicated 'neutral'. Participants who indicated 'strongly/agree' and 'strongly disagree/disagree' generally had similar higher levels of WSH leadership behaviours, hence they were combined. This

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resulted in four groups – 'strongly agree/agree', 'strongly disagree/disagree', 'neutral', and 'N.A.', for further statistical comparison. For each motivation, Kruskal-Willis tests revealed significant differences ($p < .001$) in WSH leadership scores among the four groups of participants. Table 2 shows the detailed Kruskal-Willis results. Further analyses with Mann-Whitney U tests revealed significant differences only between participants who indicated 'strongly/agree' as compared to those who had no motivation ($p < .008$). Table 3 shows the detailed Mann-Whitney U results.

For SME business leaders' WSH barriers, the responses for 'strongly agree', 'agree', and 'neutral' were summed. 'Neutral' responses were included for a better estimate as we observed a tendency towards the middle response by participants. It is normal for people to choose a neutral option to reflect a tentative opinion especially for socially undesirable questions (Edwards & Smith, 2011). Moreover, our study had included an N.A. response option to prevent participants from choosing the neutral option as a 'dumping ground' (Kulas, Stachowski, & Haynes, 2008). This resulted in a lack of expertise in WSH (63.4%) as the most commonly cited barrier, closely followed by implementing WSH measures being costly (58.5%), difficulty in getting employees to comply (57.7%) and lastly, tight time schedules (53.6%). Table 1 shows the distribution of participants' Likert ratings on all WSH barriers. Moreover, we found that 85.7% of participants who indicated "no motivation" in WSH, also consistently indicated 'neutral' on all WSH barriers.

The relationship between SME business leaders' WSH barriers and their corresponding involvement in WSH leadership behaviours were also first explored using visual inspection of line graphs. Across all four barriers, a similar pattern emerged – participants who indicated 'strongly agree' and 'neutral' had the lowest scores of WSH leadership involvement. Participants who indicated 'agree' and 'strongly disagree/disagree' generally had similar higher levels of WSH leadership involvement. However, as less than five participants had indicated 'strongly agree' across all four barriers, they were combined with the 'agree' responses to form a group based on similar opinion. For WSH barriers, the following three groups – 'strongly agree/agree', 'strongly disagree/disagree', 'neutral' were used for further statistical comparison. For each barrier, Kruskal-Willis tests revealed significant differences ($p < .001$) in WSH leadership scores among the three groups of participants. Table 2 shows the detailed Kruskal-Willis results. Further analyses with Mann-Whitney U tests revealed significant differences only between participants who indicated 'strongly/agree' and 'neutral', as well as 'strongly disagree/disagree' and 'neutral' ($p < .017$). Table 3 shows the detailed Mann-Whitney U results.

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Table 1. Distribution of participants' Likert ratings (*N* = 123)

	n (%)					
	N.A.	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
WSH Motivations						
Concern for employees wellbeing	28 (22.8%)	0	1 (0.8%)	5 (4.1%)	44 (35.8%)	45 (36.6%)
Accidents are costly to business	28 (22.8%)	1 (0.8%)	4 (3.3%)	7 (5.7%)	50 (40.7%)	33 (26.8%)
Compliance with legal requirements	28 (22.8%)	1 (0.8%)	10 (8.1%)	14 (11.4%)	48 (39.0%)	22 (17.9%)
Competitors are improving WSH	31 (25.2%)	5 (4.1%)	16 (13%)	13 (10.6%)	48 (39.0%)	10 (8.1%)
WSH Barriers						
Lack expertise in WSH	-		12 (9.8%)	33 (26.8%)	47 (38.2%)	29 (23.6%)	2 (1.6%)
Implementing WSH is costly	-		11 (8.9%)	40 (32.5%)	40 (32.5%)	30 (24.4%)	2 (1.6%)
Difficult to get employees to comply	-		8 (6.5%)	44 (35.8%)	42 (34.1%)	25 (20.3%)	4 (3.3%)
Tight time schedules	-		10 (8.1%)	47 (38.2%)	42 (34.1%)	23 (18.7%)	1 (0.8%)

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Table 2. Results of Kruskal-Wallis H Test for Independent Samples

	Mean Rank (Mean) of Involvement in WSH Leadership Behaviours				Kruskal-Wallis H Test (*p* value)
	N.A.	Strongly Disagree/ Disagree	Neutral	Strongly Agree/ Agree	
WSH Motivations					
Concern for employees wellbeing	39.14 (1.68)	94.50 (5.00)	61.50 (3.00)	68.85 (4.00)	17.70 (<.001)**
Accidents are costly to business	39.14 (1.68)	60.8 (3.60)	55.64 (3.00)	70.32 (4.06)	18.40 (<.001)**
Compliance with legal requirements	39.14 (1.68)	70.77 (4.27)	59.04 (3.29)	70.36 (4.04)	18.25 (< .001)**
Competitors are improving WSH	43.26 (1.97)	57.00 (3.52)	57.65 (3.31)	74.80 (4.22)	18.85 (<.001)**
WSH Barriers					
Lack expertise in WSH	-	74.70 (4.22)	43.27 (2.23)	71.97 (4.13)	23.90 (<.001)**
Implementing WSH is costly	-	70.57 (4.10)	43.93 (2.15)	70.94 (4.00)	17.25 (<.001)**
Difficult to get employees to comply	-	72.58 (4.15)	44.01 (2.14)	69.09 (4.03)	18.60 (<.001)**
Tight time schedules	-	72.42 (4.14)	45.27 (2.24)	66.52 (3.88)	16.42 (<.001)**

**Significant at the *p* < .001 level

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Table 3. Results of Mann-Whitney U Test for Independent Samples

	Mann-Whitney U Test (*p* value)					
	Neutral - N.A.	Strongly Disagree / Disagree - N.A.	Strongly Agree / Agree - N.A.	Strongly Disagree / Disagree - Neutral	Strongly Agree / Agree - Neutral	Strongly Disagree / Disagree – Strongly Agree / Agree
WSH Motivations						
Concern for employees wellbeing	51.50 (.277)	4.50 (.345)	634 (<.001)**	1.50 (.667)	202.50 (.716)	22.50 (.511)
Accidents are costly to business	69.50 (.181)	37.00 (.064)	583.50 (<.001)**	16.00 (.799)	219.00 (.242)	167 (.427)
Compliance with legal requirements	129.50 (.051)	76.50 (.009)	484.00 (<.001)**	61.00 (.355)	398.00 (.230)	382.00 (.964)
Competitors are improving WSH	143.50 (.107)	222.00 (.043)	479.50 (<.001)**	135.00 (.972)	264.00 (.060)	399.00 (.011)
WSH Barriers						
Lack expertise in WSH	-	-	-	520.00 (<.001**)	385.50 (<.001**)	663.50 (.685)
Implementing WSH is costly	-	-	-	562.50 (<.001**)	374.50 (.001**)	795.50 (.833)
Difficult to get employees to comply	-	-	-	585.50 (<.001**)	360.00 (.002**)	710.50 (.637)
Tight time schedules	-	-	-	672.00 (<.001**)	326.50 (.013**)	615.00 (.433)

**Significant at the *p* < .008 level, with Bonferroni correction for comparison of 6 groups for WSH motivations, and significant at the *p* < .017 level, with Bonferroni correction for comparison of 3 groups for WSH barriers

In terms of WSH risk awareness, 79.9% of participants indicated that they were aware of the WSH risks present in their companies. However, the counter-check question resulted in 12 participants being re-categorised as unaware, as they were unable to answer or provided a generic response such as "accidents". This resulted in 68.3% of SME business leaders in our study being aware of the WSH risks in their companies.

Mann-Whitney U tests revealed no significant differences in WSH leadership involvement between SME business leaders' who were aware of their WSH risks and those who were unaware. We conducted further analysis using Chi-square tests for independence to test if there was any difference in WSH risk awareness between SME business leaders who had some form of WSH motivation with those who had no motivation. This revealed a significant difference in WSH risk awareness between

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groups ($\chi 2$ (1, n=123) = 12.41, $p < .001$, $phi = .34$). In particular, 60.7% of SME business leaders in the unmotivated group were unaware of their WSH risks, whereas only 23.2% in the motivated group were unaware.

3.3 Size and Duration of Establishment

We also explored if there were any differences in SME business leaders' WSH leadership involvement based on the size and duration of their establishment. With larger establishment size, the mean rank of WSH leadership involvement was greater. The mean rank was 54.25 for micro enterprises, 64.41 for small enterprises, and 79.13 for medium enterprises. Kruskal-Willis tests revealed significant differences (H (2, n=119) = 7.01, $p = .030$) in WSH leadership involvement by establishment size, but further Mann-Whitney U comparisons found no significant differences. With longer establishment duration, the mean rank of WSH leadership behaviours was also greater. The mean rank was 51.66 for those existing up to 5 years, 56.17 for 6 to 10 years, 65.54 for 11 to 20 years, and 73.70 for more than 20 years. Kruskal-Willis tests revealed significant differences (H (3, n=120) = 7.99, $p = .046$) in WSH leadership involvement by establishment length, but further Mann-Whitney U comparisons found no significant differences.

4. Discussion

Our study found that SME business leaders were more likely to be participative, hands-on, and informal in their WSH leadership approach. Their common WSH leadership behaviours included communicating with their workers on WSH matters and personally conducting site inspections. In contrast, senior management of larger companies seldom conducted WSH site visits, probably due to the large establishment size and fragmented worksite locations. Unlike the employers of larger companies in an earlier study (WSHI, 2012a), SME owners were less likely to engage in oversight, strategic, and formal leadership roles such as setting the company's WSH policy and targets, and chairing WSH meetings. This form of WSH leadership style is likely similar to how SME owners run their businesses, more informal and participative, and less systematic than the management of larger organisations (Lancaster, Ward, Talbot, & Brazier, 2003).

In the present study, SME business leaders' most commonly cited WSH motivation was due to a concern for their employees' wellbeing. This was consistent with Wright et al. (2005) who explained that SME owners run their business like a family and know their workers on a personal basis. In contrast, previous studies with employers of larger companies found their main driver to be legal compliance (Gunningham, 1999; O'Dea & Flinn, 2003). However, this was only true for approximately half of the SME business leaders in our study. A reason could be that SMEs have poorer knowledge and understanding of how the WSH regulations apply to their business due to a lack of dedicated safety and health professionals (Hillage, Tyers, Davis, & Guppy, 2001). Another possibility is the rare likelihood for an SME to be inspected due to their sheer numbers (99.9% of businesses in Singapore are SMEs). Johnstone (2003) found that larger companies' management priorities shifted to comply with WSH regulations only after enforcement visits were conducted. Majority of SME leaders also indicated that the cost of accidents was a motivation for them to improve WSH in their companies. Although there has been conflicting evidence on the business case influencing employer action (Rundmo & Hale, 2000), it could be that our participants had a greater appreciation of an accident's business impact as majority were from the higher-risk industries. Business competitors' involvement in WSH was the least cited motivation by SME leaders. This was surprising given that SMEs are highly concerned with their competitors for business profitability and survival. It could be due to a perception that WSH does not provide a competitive business advantage, or the belief that many SME competitors do not sufficiently prioritise WSH, thus impeding change rather than motivating it. More importantly, 22.8% of participants were found to have no motivation to lead WSH in their companies. However, our study showed that as long as SME business leaders had internalised any form of motivation to improve WSH, they demonstrated greater involvement in WSH leadership behaviours than those who consistently cited no motivation in WSH. This means that there could be multiple pathways to motivate SME owners to take action, and it is crucial not to dismiss the effectiveness of any motivational factors that can influence behaviour. Rather, less cited motivational pathways should be enhanced to maximise their potential in effecting behavioural change.

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In general, SME business leaders uniformly attributed their WSH barriers to a lack of expertise, financial resources, time, as well as difficulties in encouraging employee compliance to WSH. Our findings echoed previous studies (e.g. Fairman & Yapp, 2005; MacEachen et al., 2008; Moore, 2009) that SMEs face many barriers in WSH implementation. However, we found that SME employers who knew their WSH barriers ('strongly agree/agree' or 'strongly disagree/disagree') had a significantly greater involvement in WSH leadership behaviours than those who were unsure ('neutral') about the WSH barriers they faced. This was surprising as we had anticipated that leaders who faced barriers would be less involved in WSH leadership behaviours. But it is plausible that these SME owners were already committed to improve WSH in their companies, and hence were facing challenges along their WSH journey. This finding highlights the importance for policy makers and WSH professionals to focus their efforts on engaging a group of SME business leaders who appear to be ambivalent towards the issue of WSH in terms of both their motivations and barriers, and thus less likely to lead WSH in their companies.

In our study, 68.3% of SME business leaders were aware of the WSH risks in their companies. This is similar to a study by Hillage et al. (2001) who found that 70% to 80% of employers were aware about WSH. We found no direct influence of WSH risk awareness on SME employers' level of WSH leadership involvement. However, we did find that SME business leaders who had no motivation were three times more likely to be unaware of their company's WSH risks. Moreover, these leaders without motivation were also significantly less involved in the WSH leadership of their enterprises. This significant finding is aligned to the general behavioural literature that a motivational process cannot be initiated until a certain awareness of the need to change has emerged (Renner & Schwarzer, 2005). Contrary to Wright et al.'s (2005) finding that awareness of WSH risks was a precursor to employer action even after motivations were internalised, we found that this awareness could even be the precursor for a leader's WSH motivation to exist. This raises the question of whether WSH risk awareness plays a moderating or mediating role between motivation and behavioural change. Nonetheless, it reiterates the importance of raising a business leader's awareness of WSH risks in his/her business operations if some form of change is to occur. Fairman and Yapp (2005) have also stressed that risk awareness does not refer to the mere knowledge of workplace hazards, but recognising and internalising that these hazards will pose serious consequences and outcomes if changes are not made. In relation, SMEs have been found to underestimate the seriousness of WSH risks, and hence take a laissez-faire approach in dealing with them (Lansdown, Deighan & Brotherton, 2007).

As expected, with increasing size and length of establishment, we found greater levels of WSH leadership involvement by SME business leaders. Consistently, Lancaster et al., (2003) found that larger organisation were more likely to implement the various components of an occupational safety and health management system. In contrast, micro and small have cited frustration with setting WSH performance targets and having a formal structure for performance updates to directors, attributed to the relative infrequency of incidents. A plausible reason for younger SMEs placing less priority on WSH could be attributed to their primary focus on business survival (Holmes, 1999). In Singapore, the survival rates of SMEs were 62% to 75% in their third year, and only 48% to 55% in their fifth year (SBF, 2012). This could result in younger SMEs shifting WSH to the backseat as benefits are usually long-term in nature and 'invisible' i.e., the absence of accidents and ill-health.

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4.1 Limitations

There are several limitations to this study. First, there is a high likelihood of social desirability in participant responses. This is to be expected for a moral issue that concerns workers' safety and health. However, we found that using a counter-check measure to determine participants' awareness of WSH risks was useful in mitigating social desirability to some extent. It may be necessary to develop more counter-check measures where possible or even a social desirability scale for future WSH studies. Second, most of our constructs were composed of one-item measures describing each type of motivation and barrier. This limits our ability to assess participants' level of motivation, and explore the relationship with corresponding WSH leadership involvement. The use of one-item Likert measures to assess our study's independent variables (WSH motivations, barriers, and risk awareness) also disallows the use of predictive techniques e.g. regression, on how these variables influence WSH leadership involvement. Wanous, Reichers, and Hudy (1997) have also cautioned on the use of one-item measures as they are less valid and reliable in measuring a construct. Nonetheless, there is a need to be mindful of SME leaders who are time constrained and may not participate in long questionnaires. Third, we did not explore the influence of supply chain pressure as a motivation for SME business leaders to improve WSH. This has been increasingly advocated and used effectively (James, Johnstone, Quinlan, & Walters, 2007). However, Singapore's bizSAFE programme already leverages on a supply chain mechanism and therefore we were focused on exploring the other WSH motivations of SME employers. The study's main strength is the focus on SME business leaders whom are rarely studied in WSH research, especially in the Asian context. Hence, this study is one of the first to provide insights into the factors that influence SME business leaders in their leadership of safety and health in their businesses. We elaborate on three key implications derived from our findings.

4.2 Implications

The first implication is a need to speak the SME's language in the types of WSH leadership behaviours that they can integrate into their everyday operations. SME owners and managers often have the opportunity to be on the shopfloor and observe their employees' work behaviours regularly (King, Lunn & Michaelis, 2010). Therefore WSH initiatives targeted at SME leaders should focus on encouraging participative leadership roles. This could involve acting as personal role models in WSH, communicating safe work procedures, and conducting site inspections to encourage safety behaviours. Such WSH leadership behaviours may be more useful to an SME than taking on strategic actions such as developing a policy statement which may be taken as a paper exercise. Future research could explore the types of WSH leadership behaviours that SME owners and managers can integrate into the way they conduct business on a regular basis.

   The second implication is to understand the presence of two groups of SME business leaders in WSH, the 'non-motivated' and 'motivated' that may require distinct interventions. Our study found that it may be crucial for SME leaders to internalise certain risk awareness before a motivational process can begin to influence behaviour. This is aligned with the Stages of Change Model (Prochaska & Norcross, 2001) where behaviour change starts with pre-awareness and occurs through a progression of five stages[5]. Similarly, Lansdown et al. (2007) simplified the model and identified two broad groups of SME leaders in their study, recommending different engagement strategies for each. The first 'pre-contemplation' group was not considering change and perceived the costs of WSH commitment to be high – similar to the 'non-motivated'. For this group, messages that highlighted the 'negative' impact of non-compliance (e.g. accident narratives) were more effective in raising risk awareness and motivation to change. The second 'maintenance' group was already engaged in the change – similar to the 'motivated'. For this group, it was recommended that messages highlighted the 'benefits' of WSH to sustain motivation, and resources (e.g. funds, collaterals) provided to overcome barriers and maintain behaviour change. Future research could explore further the effective kinds of WSH messaging to target SMEs at different stages of commitment.

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[5] The first stage is called the 'pre-contemplation' stage where change is not considered if one is not informed or under informed about the consequences of existing behaviour (unaware of risk). This leads to the stages of 'contemplation' and 'preparation' before taking 'action' to make the change. The final stage is the 'maintenance' stage, in which an individual is committed to the change, and efforts are taken to prevent a relapse to earlier stages.

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The third implication is to recognise that the size and duration of existence of an SME can be important factors influencing an SME's readiness to commit to WSH. In Lancaster et al.'s (2003) report, the United Kingdom estimated that WSH can cost £341 per employee for micro and small enterprises, but only £37 per employee for medium and large enterprises due to economies of scale. Newer enterprises also reported greater frustrations with implementing WSH due to a lack of financial and time resources, as well as accessible information and guidance, while trying to establish their business at the same time. Hence, there is a need for policy makers to allocate special attention and assistance to smaller and younger SMEs who may be facing a greater burden of WSH compliance. Future research could identify the different needs of SMEs according to size and duration of existence, and tailor WSH solutions accordingly.

In conclusion, it is our hope that the findings and recommendations of this study can be a start to improving WSH in small establishments through evidence-based insights and recommendations.

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Evaluation of a Singapore national programme on assisting Small and Medium Enterprises (SME) in building their workplace safety and health risk management capabilities

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Abstract
Reducing risk at source is one of the three key principles of Singapore's Workplace Safety and Health (WSH) framework. To help small and medium enterprises build their capability in managing safety and health risks, a national bizSAFE programme was launched in 2007. The objective of this study was to evaluate the impact of bizSAFE programme towards building SME's WSH risk management capability as well as the level of leadership commitment towards a safe and healthy workplace. The study also investigated the business value of companies having bizSAFE certification. Perception survey was conducted to 1390 company representatives (bizSAFE = 868; non-bizSAFE = 522), 273 workers, and 335 potential clients of SMEs. Overall, the results showed that bizSAFE companies scored higher than its non-bizSAFE cohort and the differences were significant. The findings suggested that bizSAFE programme had a positive influence on smaller companies (up to 50 employees) towards building WSH capability through raising risk awareness and management. There was also evidence that bizSAFE certification created business value for bizSAFE companies as clients would prefer to engage them because of their better management of WSH hazards.

1 Introduction

Reducing risk at source is one of three key principles of Singapore's Workplace Safety and Health (WSH) framework (Ministry of Manpower, 2008). The framework states that workplaces that create risks are responsible for managing the risks, working towards a safe and healthy outcome for their employees through the process of risk management.

According to the Department of Statistics Singapore (2009), there were 160,000 enterprises[6] in Singapore in 2007 and 99% of them were small and medium enterprises[7] (SMEs), which employed nearly 60% of the workforce. Hence it is important that SMEs take care of their employees.

In April 2007, the WSH Council launched a national bizSAFE programme to help SMEs build capability in managing safety and health risks (Lee, 2007). bizSAFE is a five-step programme (https://www.wshc.sg/bizSAFE) which progressively builds companies' capability in managing WSH risks (Fig. 1) through a certification system. Companies that embark on this bizSAFE journey are called bizSAFE Enterprises, which will begin from level 1 and proceed to the next level at their own pace till level Star (highest). At level 1, top management will attend a half day workshop to develop their company's WSH values. At level 2, the company will appoint a risk management (RM) Champion to attend a 2-day RM course and prepare their company's RM implementation plan. At level 3, the RM Champion will implement a RM programme, which will be audited by a certified WSH auditor to ensure that the RM programme is adequate. At level 4, the company will appoint a WSH Management System (WSHMS) Champion to attend a 4-day WSH management system course and develop a WSHMS implementation plan for their company. To achieve bizSAFE Star, which is the

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[6] Include companies, businesses, non-profit organisations, ministries and statutory boards.
[7] Small and medium enterprises (SMEs) were defined manufacturing enterprises with net fixed assets investment less than SGD15 million or non-manufacturing enterprises with employment size less than 200 workers. In April 2011, SPRING Singapore updated the definition of SMEs as enterprises with operating receipts not more than SGD100 million or employment size not more than 200 workers.

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highest level, the company needs to implement a WSHMS, which will be audited by a certified WSH auditor.

Those involved in bizSAFE programme included the companies which are called bizSAFE Enterprises, bizSAFE Mentors which were companies who could set a good example through their outstanding WSH management system and good WSH track records and bizSAFE Partners which were companies that were committed to bring in more companies to join bizSAFE through their business network.
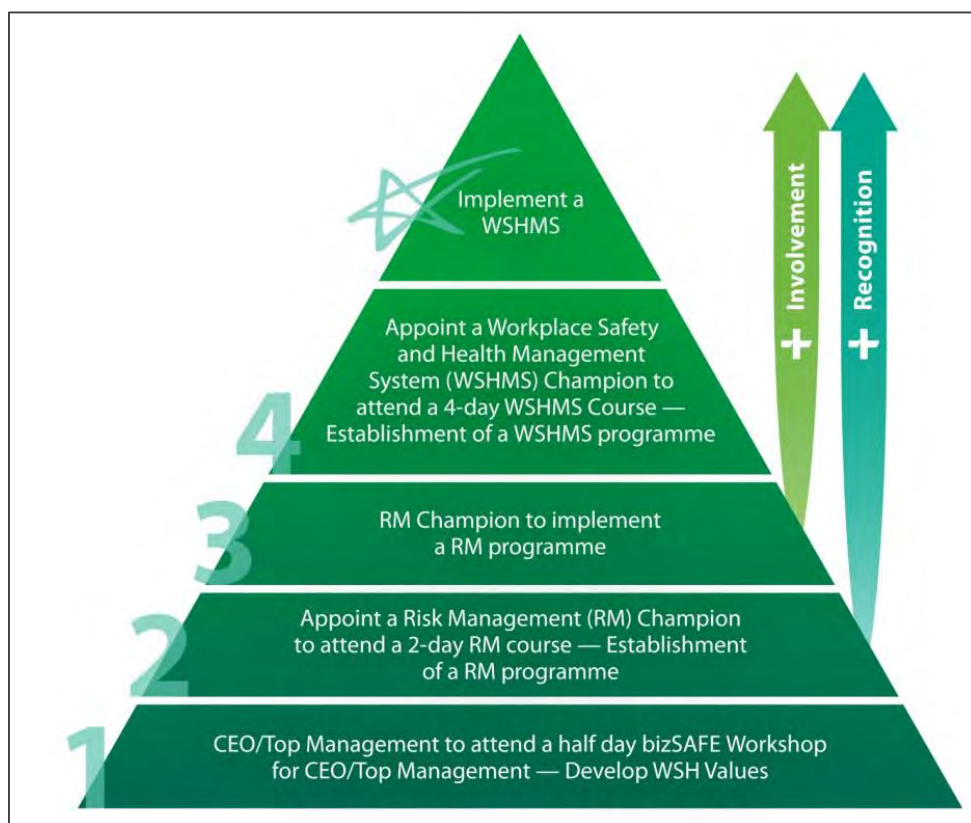
Fig. 1. The five-step bizSAFE programme
Source: Workplace Safety and Health Council

Based on the bizSAFE programme register, there were more than 11,700 companies in the programme between 2007 and 2012. About 70% were from the higher risk industries (i.e. construction, manufacturing, and marine). The programme also recognised bizSAFE companies who demonstrated outstanding achievements through annual bizSAFE awards. As the programme was into it's sixth year, it was timely to evaluate whether the bizSAFE programme was effective in meeting its objectives and remained relevant to the industry.

The objective of this study was to evaluate the impact of bizSAFE programme towards building SME's WSH risk management capability. The study also investigated the business value of bizSAFE certification to companies.

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2 Materials/Methods

2.1 Participants and procedure

The perception questionnaire survey was conducted between January and April 2013 to 1390 company representatives (bizSAFE = 868; non-bizSAFE = 522), 273 workers, and 335 potential clients of SMEs. A market research company was engaged to collect the survey data and to conduct the interviews in either English or Mandarin.

2.1.1 Main bizSAFE questionnaire survey

The main bizSAFE questionnaire survey was conducted with company representatives who provided insights on their perception of WSH awareness and management at their workplace. The targeted respondents for companies were management staff. The sampling frame was compiled using company information drawn from Ministry of Manpower's (MOM's) integrated Occupational Safety and Health (iOSH) system and WSH Council's bizSAFE database. In view of the recruitment focus of bizSAFE, a disproportionate stratified sampling was used to ensure that responses from the higher risk industry (70%) were better represented than those in the other industry sectors (30%). The main study defined bizSAFE companies as those with bizSAFE level 3 certification or higher because they should know what a WSH risk management was and would have conducted risk assessment. Non-bizSAFE companies refer to those not in the programme.

Company representatives from 1390 randomly identified companies were interviewed. A mix of methods (phone = 90%, on-site = 10%) was used. To facilitate data collection for workers' perception survey 140 companies were interviewed on-site (see 2.1.2 Worker's survey). Data collection was challenged by three main issues, i.e. difficulty in locating the contact person, outdated company information, and incorrect bizSAFE certification status. For each selected contact person, who did not respond to the invitation letter and phone calls, at least five phone calls were made before seeking an alternative representative from the company. Companies which indicated a different industry classification or bizSAFE certification status from the contact list were not interviewed and counted as no response.

2.1.2 Workers survey

In addition to the main survey, this study wanted to understand the type of WSH practises and programmes observed by workers (i.e. line employees/non-managerial staff involved in operations). However, we anticipated that it would be challenging to invite workers to the survey directly because we did not have their contact information; neither did we know their company's industry classification and bizSAFE certification status. To overcome this issue, the workers' survey was conducted on-site with companies which had agreed to have their company representative interviewed. Up to two workers were interviewed for each company. A total of 273 workers were interviewed and all were used for this study.

2.1.3 Potential clients survey

To study the business value of the bizSAFE programme, potential clients were asked whether bizSAFE certification made a difference. As the collection of clients' information from the main bizSAFE survey would deem sensitive, 1059 companies which did not participate in main survey were randomly invited to participate in this survey online and 32% (n = 335) responded. The online survey was hosted on the market research company's servers and respondents logged in via a web link to participate. To encourage a higher response rate, periodic reminder phone calls were made. We had assumed that companies with employment size of more than 50 employees would have engaged service(s) from another SME, hence making them potential clients of SMEs. 262 companies with more than 50 employees were eventually used in this study.

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2.2 Materials

Materials on findings presented in this paper are elaborated below.

2.2.1 Main bizSAFE survey

The questionnaire for the main survey included background information about the company like industry sector, bizSAFE certification status, size of company, as well as information about the respondent, i.e. designation of respondent. The size of company was based on average number of direct employees indicated by the respondent and post coded into micro enterprise (1 – 10 employees), small enterprise (11 – 50 employees), medium enterprise (51 – 200 employees) and large enterprise (> 200 employees).Designation of respondents were classified as top management, middle management, safety personnel and others.

Questions for all company representatives included if they were aware of the various safety and health risks present at their workplace, and whether their company conducted safety and health risk assessment to manage those risks. As a counter-check for the WSH awareness question, respondents were required to name a common hazard found at their workplace. Those who were unable to provide an example or gave general answer like "no risk" were re-categorised as unaware for the earlier question. The top management of companies were asked to indicate if they did any of the five behaviours (yes; no) to show their commitment to WSH. Respondents were allowed to pick more than one answer for this question.

2.2.2 Workers survey

The workers were asked if they knew what WSH risk assessment was and if they were involved in the risk assessment process (yes; no). The workers were also asked to indicate if their management display any of the seven behaviours (yes; no) pertaining to WSH practises. For this question, the respondents were allowed to pick more than one answer.

2.2.3 Potential client survey

The potential clients were asked if their company had engaged or worked with bizSAFE companies in the past. For those which had, they were further asked on their experience with the bizSAFE company, whether they would prefer to engage a bizSAFE company over a non-bizSAFE company and if they would be willing to pay a higher fee to engage a bizSAFE company (level 3 and above).

2.3 Data and analyses

Descriptive analyses were conducted using IBM SPSS Statistics 20. Differences between bizSAFE and non-bizSAFE companies were tested using χ^2 test. When testing for confounding factors, size of company was re-categorised to broader groups and found to have significant difference in some of the results discussed later.

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3 Results

3.1 Main bizSAFE survey

3.1.1 Demographics

In the main bizSAFE survey, there were 868 respondents from bizSAFE companies and 522 from non-bizSAFE companies. Their breakdown by demographic variables is presented in Table 1. Overall, most of the respondents were not from the top management level, but executives at various levels and departments. The majority of the companies were smaller companies (up to 50 employees). Within each group, the bizSAFE group had a higher proportion of top management (41%), whereas the non-bizSAFE group had a higher proportion of executives (49%) in office administration, human resource and the sales department. Both groups had similar representation for size of company.

Table 1. Demographics of respondents in the main bizSAFE survey

Demographics	bizSAFE n (%)	Non-bizSAFE n (%)	Total n (%)
1. Designation of Respondent			
– Top management	357 (41%)	127 (24%)	484 (35%)
– Middle management	215 (25%)	98 (19%)	313 (22%)
– Safety personnel	28 (3%)	39 (8%)	67 (5%)
– Others (mainly administrative executive, HR executive, sales executive)	268 (31%)	258 (49%)	526 (38%)
2. Size of Company			
– <= 50 employees	709 (82%)	428 (84%)	1137 (83%)
– > 50 employees	157 (18%)	82 (16%)	239 (17%)

3.1.2 WSH Risk Management

To understand if bizSAFE companies had better risk management in WSH, this study looked at hazard awareness and if risk assessment were conducted (Table 2). About nine out of ten bizSAFE companies were aware of hazards at their workplaces as compared to seven out of ten in the non-bizSAFE group. Further analysis revealed that company size was a confounding factor to the awareness of hazards at workplace. The difference between the two groups remained significant for smaller companies (up to 50 employees), but not significant for medium-sized companies (more than 50 employees).
For risk assessment, nearly all bizSAFE companies (99%) conducted WSH risk assessment, as compared to non-bizSAFE companies (72%). As part of the programme requirement for bizSAFE level 3 certification, all bizSAFE companies would have conducted WSH risk assessment. Upon further investigation, the remaining 1% of bizSAFE companies explained that their company were dormant, changing processes or in the transition of moving premises. The latter group added that they would be conducting risk assessment when their new workplace is ready.

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Table 2. Characteristics of WSH risk management

WSH Risk Management	bizSAFE n (%)	Non-bizSAFE n (%)	p-Value
1. Aware of hazards at workplace	776 (89%)	377 (72%)	<0.001
1.1. By company size			
1.1.1. <= 50 employees	632 (89%)	297 (69%)	<0.001
1.1.2. > 50 employees	142 (90%)	74 (90%)	ns
2. Conduct WSH risk assessment	860 (99%)	378 (72%)	<0.001

ns = not significant. χ^2 tests were used to test differences between bizSAFE and non-bizSAFE companies.

3.1.3 Top Management's Commitment in WSH

To understand top management's commitment in WSH, five items on their behaviour from 484 companies were compared (Table 3). The data showed that bizSAFE companies exhibited greater level of leadership commitment towards WSH as opposed to non-bizSAFE companies. Nine out of ten bizSAFE companies were likely to see their top management communicating and getting feedback on WSH matters, monitoring company's WSH performance, and conducting regular WSH inspections, as compared to about three out of four in non-bizSAFE companies.

Further analysis showed that company size could be a confounding factor to the five behaviours (Table 4). The results showed that difference between bizSAFE companies and non-bizSAFE companies remained significant for smaller companies (n = 433) for all five behaviours of top management's, but not significant for the medium-sized companies (n = 46). However, we should note that the sample size for medium-sized companies was statistically small to draw any conclusion.

Table 3. Top management's involvement in WSH

Involvement in WSH	bizSAFE n (%)	Non-bizSAFE n (%)	p-Value
1. Communicate and get feedback on WSH matters	327 (92%)	99 (78%)	<0.001
2. Monitor company's WSH performance	325 (91%)	93 (73%)	<0.001
3. Conduct regular WSH inspections	322 (90%)	97 (76%)	<0.001
4. Attend WSH committees and meetings	298 (83%)	67 (53%)	<0.001
5. Set WSH performance targets	260 (73%)	74 (58%)	0.003

χ^2 tests were used to test differences between bizSAFE and non-bizSAFE companies.

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Table 4. Top management's involvement in WSH in smaller companies

Involvement in WSH	bizSAFE n (%)	Non-bizSAFE n (%)	p-Value
1. Communicate and get feedback on WSH matters	288 (91%)	89 (77%)	<0.001
2. Monitor company's WSH performance	287 (91%)	83 (72%)	<0.001
3. Conduct regular WSH inspections	284 (90%)	87 (75%)	<0.001
4. Attend WSH committees and meetings	259 (82%)	57 (49%)	<0.001
5. Set WSH performance targets	227 (72%)	65 (56%)	0.003

χ^2 tests were used to test differences between bizSAFE and non-bizSAFE companies.

3.2 Workers survey

3.2.1 Demographics

Among 273 workers interviewed, 161 were from bizSAFE companies and 112 from non-bizSAFE companies. Overall, more than half were less than three years with their companies (53%), 15% for three to almost five years, 19% for five to almost ten years and 14% for ten years or longer.

3.2.2 WSH practises and programmes

To understand the WSH practises and programmes in place, seven behaviours observed by the workers were compared (Table 5). About nine out of ten bizSAFE workers knew what risk assessment was, as opposed to eight out of ten in non-bizSAFE group. For those who knew what risk assessment was, three in five bizSAFE workers were involved in risk assessment, as compared to two in five in non-bizSAFE group. Almost all workers from bizSAFE and non-bizSAFE groups indicated that their company conducted regular safety inspection, communicated and sought feedback from them on WSH issues, and provided them with adequate safety equipment and personal protective equipment (PPE).

The data showed that non-bizSAFE workers (28%) were 4 times more likely to be rushed to complete their job than bizSAFE workers (7%). The data also suggested that bizSAFE companies were more likely to have preventive programmes in place than non-bizSAFE group, for rewarding workers for good WSH performance and punishing them for working unsafely. Information on the reward and penalty programmes in placed was not collected. Hence there was no further analysis on the common types of preventive programme and if they contributed towards building workers' capability in WSH risk management.

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Table 5. Workers' perception of companies' WSH practises and programmes in placed

Practises and Programmes	bizSAFE n (%)	Non-bizSAFE n (%)	p-Value
1. Workers knew what risk assessment was	143 (89%)	88 (79%)	0.033
1.1. Workers involved in risk assessment	87 (61%)	34 (39%)	0.002
2. Conduct regular safety inspection	159 (99%)	107 (96%)	ns
3. Communicate and seek feedback from workers on WSH issues	160 (99%)	107 (96%)	ns
4. Provide adequate safety equipment and PPE to workers	161 (100%)	105 (94%)	ns
5. Do not rush workers to complete their job	149 (93%)	81 (72%)	<0.001
6. Reward workers for good WSH performance	123 (76%)	52 (46%)	<0.001
7. Punish workers for working unsafely	123 (76%)	48 (43%)	<0.001

ns = not significant. χ^2 tests were used to test differences between bizSAFE and non-bizSAFE group.

3.3 Potential client survey

3.3.1 Demographics

Broadly, there were two types of potential clients interviewed, those involved in bizSAFE programme and those outside the programme. Table 6 shows the cross tabulation for type of potential client and those engaged bizSAFE before. Out of the 262 potential clients used in this study, 59% (n=154) had engaged bizSAFE companies before and were mostly those involved in bizSAFE programme.

Table 6. Demographics of respondents for potential client survey

Type of potential client	Engaged bizSAFE company before n (%)	Have yet engaged bizSAFEcompany n (%)	Total n (%)
- Involved in bizSAFE programme	100 (65%)	7 (6%)	107 (41%)
- Outside bizSAFE programme	54 (35%)	101 (94%)	155 (59%)

3.3.2 Experience when engaging bizSAFE companies

Those that had engaged bizSAFE company before will be referred as clients in this study. Among the 107 clients, majority indicated that bizSAFE companies displayed good WSH management (Table 7). About nine out of ten clients (89%) found bizSAFE companies managed WSH better, and four out of five said that bizSAFE workers had better attitude towards WSHthan non-bizSAFE companies. If all things were equal, nearly nine out of ten clients would prefer to engage a bizSAFE company over non-bizSAFE company, the remaining one client had no preference. For those who preferred bizSAFE company, three out of five clients would be willing to pay a higher fee for their services.

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Table 7. Business value of bizSAFE certification through clients' perspective and those in bizSAFE

Business value of bizSAFE	Agree n (%)
1. Clients' experience in engaging bizSAFE companies	
1.1. Manage WSH better	134 (87%)
1.2. Workers with better attitude towards WSH	125 (81%)
2. Clients' preference to engage bizSAFE companies over non-bizSAFE ones	137 (89%)
2.1. Willingness to pay more to engage bizSAFE companies	85 (62%)

4 Discussion

The study found that company size was a confounding factor to hazard awareness, and top management's involvement in WSH. The results suggested that bizSAFE would make significant difference to smaller companies (up to 50 employees) and little / no influence to medium-sized companies (more than 50 employees). To stay competitive and achieve productivity, medium-sized companies in Singapore might already have incorporated management of WSH risks into their business processes. Globally, the World Economic Forum report (2012) illustrated the burden of poor WSH and a healthy and safe workforce is important to a country's competitiveness and long-term productivity. In Singapore, the total cost of work-related injuries and ill-health in 2011 was estimated to be SGD 2.62 billion (excluding lifetime costs), with employers bearing 88% of the cost (Loke et al., 2013). It would only make business sense for companies to minimise this burden and integrate WSH into their business model (American Industrial Hygiene Association, 2001, European Agency for Safety and Health at Work, 2008). These reports hinted that medium-sized companies were likely to be aware of the cost of accidents and ill-health, and had incorporated their own measures to manage WSH risks. When implementing such measures, these companies would have to build their own capability and knowledge in managing the risks, better still if they decided to embark on WSH culture too. If so, then bizSAFE programme would have little / no influence in helping medium-sized companies to kick start and build their capability in managing WSH risks.

For smaller companies, the study found that bizSAFE companies were likely to be savvier in managing WSH risks as compared to those not in the programme. Results showed that nine out of ten bizSAFE companies were aware of hazards at their workplaces and conducted WSH risk assessment, whereas only seven out of ten from non-bizSAFE group would do the same. The differences between bizSAFE and non-bizSAFE companies (14% to 33%) were also significant for top management's involvement in WSH. Top management in bizSAFE companies were more likely to be seen communicating and getting feedback on WSH matters, monitoring company's WSH performance, and conducting regular WSH inspections. These findings suggest that audit risk management programme implementation at bizSAFE level 3 and involve top management at the beginning of bizSAFE certification made a difference. In addition, such leadership behaviours are aligned to some of the success factors, like strong motivation by employer, support from top management, and involvement of workers in risk assessment process, identified by Lißner et al.'s (2009) study in reducing occupational risk. For our study, due to the lack of quantitative data on risk assessment and management, the effectiveness of bizSAFE in risk reduction could not be determined. Nevertheless, these findings suggest that bizSAFE programme can help to build up WSH risk management capabilities in smaller companies.

Several articles wrote about the return of investment in safety and health (American Society of Safety Engineers, 2002; Herriot, 2013; Morrison, 2014; Shaw, 2012), attempting to convert those who believed such an investment would be costly. However, smaller companies felt that the cost of investment in WSH outweighed the perceived benefits because their low incident rate was not

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deemed as a heavy expense to their business (Haefeli et al., 2005). To show how good WSH management/performance could lead to increased business competitiveness, Winkler's (2006) study found evidence that poor WSH will lose contracts and it has an impact on the company's reputation. One of HSE (2013) guide book also highlighted the consequences of poor WSH in a series of case studies on managing contractors. Locally and recently, one of the bizSAFE award recipients shared that they faced challenges in securing business contracts when they did not have a proper WSH management in place (WSH Council, 2015). These findings support why the study found clients preferred to engage bizSAFE companies over non-bizSAFE ones and appreciated the better contracting experience when working with them. This indicates that bizSAFE certification can bring value to the company.

4.1 Limitations

There are three main limitations in this study. Firstly the two data sources used for the sampling frame was not representative of the total population of SME enterprises in Singapore. Our sampling frame only included companies in the MOM iOSH database and from the bizSAFE register. Companies not registered with either database would be the non-bizSAFE ones, which the study was unable to sample. Furthermore, we could not validate if data from this missing group would make a difference in the findings.
Secondly, we were aware that the data was likely to be skewed as respondents tend to give politically / socially desirable answer knowing that we and our working partners are concerned with workers' safety and health.

Thirdly, this study did not include questions on risk reduction. It would be interesting to explore if bizSAFE could influence reduction in WSH risks after companies join the programme. Such findings could build a strong case to show the effectiveness of bizSAFE programme and would be more meaningful to decision makers on the bizSAFE programme and owners of smaller companies. Nonetheless, this is the first bizSAFE evaluation conducted and the findings provided good insights which will serve as baseline information on the effectiveness and business value of bizSAFE to SMEs.

5 Conclusion

The findings suggested that the bizSAFE programme had a positive influence on smaller companies and had successfully improved the risk management capability of SME leaders and workers raising risk awareness and management of risks. There was also evidence that bizSAFE certification created business value for bizSAFE companies as clients would prefer to engage them because of their better management of WSH hazards.

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Lowlands Sociotechnical Design Theory and Lean Production

Jac Christis en Erik Soepenberg

Introduction

Lean Production (LP) can be regarded as a design approach in search of a theoretical foundation. In this paper we show that Lowlands' Sociotechnical Design Theory (STSL) could function as such a foundation. To reach this goal, we first describe STSL as a system theoretical reformulation of Original Sociotechnical Theory (OSTS). Then, we introduce the Toyota Production System as the origin of LP and the challenge it poses for the academic field of organization design. This academic field should (1) assess LP's success, (2) generalize it by embedding it in more abstract concepts and theories in order to be able to (3) re-specify it for different manufacturing and non-manufacturing contexts. Next, we give an exposition of STSL as a structural design approach based on developments in system theory. At last, we reformulate lean production in STSL terms and so show that LP is a subcase within the more general theory of STSL. We discuss the merits of both approaches and clarify some misunderstandings of lean both outside and inside the lean community. Embedding LP in the more general language of STSL should enable us to discover similarities and differences, to start a process of mutual learning, to integrate diverse design approaches in a theory of organizational design and to add content to redesign proposals of for example the health care system as proposed by Porter and Teisberg (2006) and Christensen et al. (2009). We quote extensively from the lean literature (to convince our sociotechnical friends) and embed both STSL and LP in the broader literature on organization design. We hope this adds a new perspective to the one given in the Operations Management literature on LP. Again, mutual learning is the goal.

1 Original and Lowlands Sociotechnical Design Theory

Original Sociotechnical Theory
STS originated in the coalmines of Durham. The story is a familiar one. In the pre-mechanized phase, cross-functional teams worked at the coal-face. The introduction of coal cutting machines and mechanical conveyers made it possible to work on a single long face instead of a series of shorter faces. In order to reap economies of scale, management organized work in three shifts. Each shift was responsible for one phase in the process of coal-getting: the cutting, the ripping or the filling shift. This way of organizing is called the long wall method. By placing interdependent activities in separate shifts, it wrought havoc on both productivity and morale. When, after an accident, it was impossible to work at a long face, the workers proposed to reintroduce the old way of working: cross-functional teams working at short faces. This is called the composite or short wall method. By placing interdependent activities back again in the same organizational units (shifts), this way of working improved both productivity and morale.

The theory: joint optimization of technical and social subsystems
Reflecting on the Durham case, OSTS proposed to define an organization as a system with two subsystems, a social and technical subsystem. Design should be aimed at the joint optimization of both subsystems. An important design tool was the variance matrix, in which the distance between disturbances and their control was measured.
The conceptualization of an organization as a sociotechnical system and the notion of joint optimization were questioned from the start. What are, for example, the elements (and structures) of both subsystems? A transformation process or primary process is a system of interrelated operations that are partly carried out with the help of artefacts (tools, machines, and so on). If you take the artefacts from this system and put them together, you do not create a technical subsystem but an aggregate without an internal structure. It is just a whole that is composed of similar things (these things are all artefacts). In this way you lose insight in the role these artefacts play in the transformation process. The same applies to the so-called social subsystem. Both are at best nominal systems of similar things (artefacts and people) and not real systems with an internal structure (and external environment).
And in the Durham case no joint optimization took place. Instead, in the short wall method the same

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technology was used as in the long wall method, but now combined with a different work organization. That means that the Durham case was an example, not of joint optimization, but of organizational choice (the title of the book the Tavistock researchers subsequently wrote). With the Durham case, technological determinism was refuted and the existence of organizational choice proven (a mayor feat indeed).

The origin of STSL

STSL was developed in the Netherlands by Ulbo de Sitter (see chapter 6). In the opinion of De Sitter, OSTS was correct in its practice. Instead of adapting workers to existing, Tayloristic structures, it aimed at the transformation of that structure itself. Because the structure of the division of labour is at the same time a structure of power relations, it stroke at the heart of the organization, its power structure. However, De Sitter was dissatisfied with both the concepts and design tools of OSTS. So, he set himself the task of a system theoretical reformulation of OSTS. On the conceptual level he considered the distinction between technical and social subsystems to be a reification of what in fact are interconnected aspects of the same system (or aspect systems). An organization as a system has many aspects such as costs, quality, time, safety, health and so on. Those diverse aspects could be grouped roughly in 'technical' and 'social' aspects. However, by reifying them into separate subsystems, you tear apart what in fact is interrelated and so, make the actual relations between those aspects within systems and subsystems invisible. Those aspects are emergent system properties and the way they are interconnected is determined, as we will see, by the structure of the system. Redesign should be aimed, not at the joint optimization of so-called social and technical subsystems, but at integral design. The organizational structure should be designed in such a way that all aspects are improved simultaneously, both the quality of the organization (in terms of costs, quality and time), the quality of work (in terms of stress risks and learning opportunities) and the quality of labour relations (in terms of cooperation and shared decision-making).

Practical critique of original theory: the causes of uncontrolled variances

With respect to the variance matrix, De Sitter stresses the need for a theory that can explain the level of disturbances and the lack of local control. Without such a theory, organization redesign lacks a point of direction. The basic idea is this. Because all organizations are characterized by a certain level of functional or horizontal and hierarchical or vertical division of labour, their primary process can be defined as a network of functional interdependencies with workplaces as their nodes. When disturbances occur, these are either absorbed at the node (which requires local control opportunities) or passed on to the next node and propagated through the whole network which, then, will be out of equilibrium. The network can be analysed at the level of the nodes and at the level of the network as a whole (figure 19. 1).
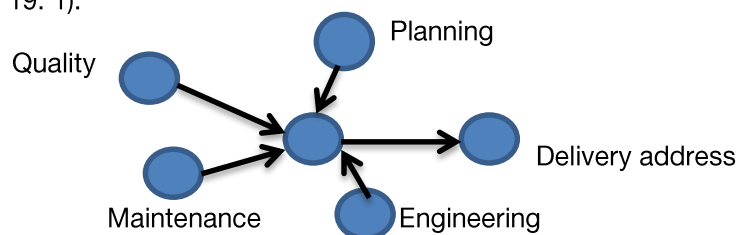
Figure 1. Primary process: a network of functional interdependencies. Source: De Sitter 1994: 82.

An inventory of uncontrolled disturbances at the nodes gives a measure of both work stress and efficiency problems at the job level. Uncontrolled problems at the job level cause work-life-frustrations that can be used to start a process of improvement. Lean concurs: Frustration relief is a potent avenue for process improvement. If you think about it, on-the-job frustrations are likely also to be serious performance shortcomings for the company. … Such frustrations add up and sink morale. A work-centre team's priority-ordered list of frustrations tends also to be a rather sound priority list of opportunities for improvement for the company (Schonberger 2008: 63-64).

The level of the network as a whole is used to explain the occurrence of uncontrolled disturbances. It is the complexity of the network (the number, variability and predictability of its interfaces) that explains both the probability of disturbances and the lack of local control opportunities. Redesign of the network should, therefore, be aimed at the reduction of the complexity of the production structure of the network (in order to decrease the probability of disturbances) as a precondition for the decentralization

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of its control structure (in order to enable local control). Without these structural insights, no proper use can be made of the variance matrix. And, with these structural insights, you do not need the variance matrix (or the network analysis), although it can be helpful from a change perspective.

STSL: a system theoretical reformulation of OSTS
So, De Sitter set himself the task of a system theoretical reformulation of OSTS. He did so in different publications. Most famous is his densely written book 'Synergetisch produceren (De Sitter 1994), a book of 418 pages in length. The book contains a set of conceptual tools, design rules and tools that enable designers (including the frontline workers themselves) to analyse existing structures in an integral way (that is, on all aspects) and to redesign them in an integral way (in order to improve the organization simultaneously on all aspects). It does so in a detailed way and differentiates for example between high volume/low variety situations (to which lean is applicable) and low volume/high variety situations (to which Quick Response Manufacturing is applicable). So, STSL is not a quality of work approach, although it encompasses quality of work as an important aspect of organizational analysis and redesign. In fact, it did so in an innovative way (see Christis, 1998).

Some preliminary definitions
The object of STSL is 'the organization of the organization (Luhmann).' An organization (in the institutional meaning of the word 'organization') has an organization (in the instrumental meaning of the word) or a work organization. So, STSL studies the work organization of organizations and as such it does not belong to the field of Organization Theory, but to the field of Organization Design. It has as its object the way organizations organize their primary process, that is, their work organization. The work organization is an instrument, used by organizations to reach their different and changing goals. If they do so in the wrong way, they will meet with difficulties in reaching their goals. The meta-question that is answered by STSL is 'what do work organizational structures have to look like in order to enable organizations to reach different and changing goals simultaneously?' Because goals are system-environment relations, this is of course a re-formulation of the general notion of adaptive systems, applied to organizations.

De Sitter defines the primary process of an organization (its manufacturing process, educational process, care delivery process, service delivery process, and so on) as a norm-based transformation process with performance and control operations as it elements. Note that operations or actions, not persons, are defined as the elements of the system. As already pointed out by Barnard (1938) and Simon (1997), if persons are defined as the elements of an organization, each shift change would amount to a total change of the organization. That would be nonsensical. With each shift change, the organization remains the same in so far as it operations (elements) and their interrelations (structure) remain the same.

In a next step, De Sitter replaces the distinction between social and technical subsystems by the distinction between subsystems and aspect systems. A subsystem is a selection or subset out of all operations with preservation of all interrelated aspects. Organizational units such as a quality department would be an example of an organizational subsystem. An aspect system is a selection of one out of all aspects, applied to all elements of the system. A quality system would be an example of such an aspect system. In it, all elements of the primary process are analysed from only a quality perspective. The same would be true of a cost accounting system. Obviously, all elements of the quality department could be analysed from both a quality and cost perspective. But these aspects are interrelated and therefore we need an integral assessment of the performance of the quality department. This requires insight in the structure of the quality department and its place in the overall structure of the organization. It is the structure of the system that explains the way different aspects are related.

The primary process has a production structure (the grouping and coupling of performance operations) and a control structure (the grouping and coupling of control operations). De Sitter developed a set of design parameters to analyse and redesign the production and control structures of organizations. We will use those parameters to re-describe lean in system theoretical terms and in this way show that Lean is a subcase of STSL as the more general theory. But, first, we will introduce Lean Production.

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2 Lean Production

The origin of Lean: the Toyota Production System

The Toyota Production System (TPS), now known as Lean Production (LP) or Lean Thinking (LT) was developed by the Toyota Motor Company as an answer to two problems it met after WW II. First, a small home market for different types of cars necessitated a flexible way of producing cars: "Toyota did not have the resources or the market to support many plants, and the product mix was too eclectic to justify dedicated plants" (Standard, Davis 1999: 60). Second, because of shortages on the capital market, it needed short cycle times (as the sum of processing time and waiting time). The time between purchasing raw materials and being paid by the customer had to be as short as possible. The result of years of experimenting with solutions to those problems was the TPS, a system that differed in essential ways from the mass production systems of Ford and General Motors: *So, why didn't Toyoda [after his visit of the Ford Rouge plant] take the Ford production system from the Rouge plant back to Toyota? There was too much material, floor space, time, and investment tied up for too long. Instead, the Toyota executives developed a completely different way of thinking about manufacturing* (Standard & Davis, 1999:61).

According to Hopp and Spearman, what was so revolutionary about the TPS was the fact that they did not take the existing production system with its functional structure, large batches, long setup times and high levels of inventories as given. Instead, they simplified the production system by introducing a flow system of just-in-time (JIT) production that necessitated small batches, short set-up times and continuous process improvement. This, in its turn, enabled them to install greatly simplified planning systems (pull systems such as KANBAN) and cost accounting systems (known as lean accounting): *The JIT ideals suggest an aspect of the Japanese production techniques that is truly revolutionary: the extent to which the Japanese have regarded the production environment as a control. Rather than simply reacting to such things as machine setup times, vendor deliveries, quality problems, production schedules, and so forth, they have worked proactively to shape the environment. By doing this, they have consciously made their manufacturing systems easier to manage* (Hopp, Spearman 2008:158).

Lean and organization design

According to Standard and Davis, lean is a design approach in search of a scientific foundation. The science of organization design should (1) assess its success, (2) generalize it by embedding it in more abstract concepts and theories in order to be able to (3) re-specify it for different manufacturing and non-manufacturing contexts. Lean is a success story (Schonberger 2008) and we will concentrate in this paper on embedding Lean in a more general theory. Within the field of operations management Hopp and Spearman's theory of Factory Physics (2008 third edition) has been called the science of lean (as in Standard, Davis 1999). It explains in a scientific way the success of lean and clears up some (self-)misunderstandings of Lean. You could say that lean kicked operations management out of its dogmatic slumbers and that Factory Physics is the, in our opinion, outstanding result of the awakening process. However, it concentrateson manufacturing and within manufacturing on discrete parts production on disconnected flow lines (Hopp &Spearman, 2008:11). Others try to embed lean in Goldratt's theory of constraints (Levinson & Rerick 2002; Levinson, 2007). In this chapter we offer STSL as a non-competing but complementary scientific foundation of Lean. It offers a general system language that encompasses applications of lean in other contexts such as high variety/low volume manufacturing (Suri, 1998; 2010), service organizations (Seddon, 2005), construction (Ballard, 2008) and public organizations (Seddon, 2008). It enables us to discover both general similarities and context specific differences, to start a process of mutual learning, to integrate all these insights in a theory of organizational design and to add content to redesign proposals of for example the health care system as proposed by Porter and Teisberg (2006) and Christensen et al. (2009).

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3 STSL as a structural design theory

STSL is a design theory, not a change theory. And it is a theory that focuses on work organizational structures. So, first, we will look at lean from a design perspective, not from a change management perspective. We are interested in the 'what' of the change, not in the 'how' and just note that the 'what' and 'how' should be aligned. And, second, we look at lean from a structural perspective. All primary processes have a structure. To contrast structure and process is committing a logical fallacy. A process is a non-arbitrary sequence of events. What makes the sequence non-arbitrary is its structure: without a structure there would not be a process. Compare this with a melody. A melody is a non-arbitrary, that is, structured sequences of tones. Without such a structure, it would be just noise. So, we look at the way lean structures or organizes its primary process and we do so in the language of STSL.

The language of STSL is a system theoretical language based on the work of Ashby, Beer, Simon and Thompson (see for an introduction Achterbergh, Vriens 2009). STSL is based on Ashby (1958) and his law of requisite variety: the variety of the regulator of a system should equal the variety of its disturbances. According to Beer (1979) that means that the management of variety combines two strategies: the reduction or attenuation of the variety of disturbances and amplification of the variety of the regulator. According to Simon (1996), you reduce the variety of disturbances by decomposing your system into subsystems with high internal and low external interdependencies. The high frequency interactions should be contained within the subsystems, leaving the low frequency interactions to higher system levels. In such a modular, hierarchic or 'nearly decomposable system,' you can make the modules self-regulating within higher level system constraints. According to Thompson (1976), you design such a modular structure by placing sequential or reciprocal interdependent positions into the same organizational unit, as was done in the composite wall method in the Durham case. In this way you create 'local, conditionally autonomous units' and substitute intra-unit coordination for costly inter-unit coordination. When interdependencies cannot be contained at this level, you move at the next higher level: *When reciprocal interdependencies cannot be confined to intragroup activities, organizations subject to rationality norms seek to link the groups involved into a second-order group, as localized and conditionally autonomous as possible...We have now introduced the first step in a hierarchy ... Each level ... is a more inclusive clustering, or combination of interdependent groups, to handle those aspects of coordination which are beyond the scope of any of its components* (Thompson 1976:59).

According to De Sitter (1994), you do so, not bottom up (as suggested by Thompson) but top down, starting at the macro level. If you design a system, whether a product, organization or paper, you don't start at the micro level (which words do belong to which sentences, working upwards to paragraphs and chapters and in the end discovering what your paper is about). Instead you start at the macro level (what is the topic of the paper, what should be its chapters) and work your way downwards. Of course, if you meet with difficulties in the process, that can be a reason to restructure your paper at higher levels: writing a paper is an iteration between top down and bottom up processes. It is a process of reshuffling until you feel satisfied with the structure of your paper. The same applies to the design of organizational structures. So, in order to get units at the micro level with high internal interdependencies, you have to start at the macro level with higher order units that are characterized by pooled interdependencies (figure 2).

	Macro	Meso	Micro
Pooled	X	X	
Sequential		X	
Reciprocal			X

Figure 2. Levels of design. Source: De Sitter 1981:122

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A note on hierarchy and heterarchy

A 'nearly decomposable system' is called a hierarchical system: a system that is decomposed in subsystems with high internal and low external interdependencies. We call this 'hierarchy' in the technical meaning of the word. In this sense, our body is a hierarchical system and many products are designed as hierarchical or modular systems. That is why Simon in his famous paper on hierarchical systems referred mainly to examples of natural (physical and biological) systems in order to defend his thesis that all complex systems are hierarchical. Now, all organizations are decomposed in subsystems (divisions, business units, departments, teams) and all those units have someone who is in charge, that is, someone who has authority over his or her subordinates. These organizations are also called hierarchies, but now because authority is organized in a hierarchical way. We can call this hierarchies in the social meaning of the word. But note that not all organizations are hierarchical in the technical meaning. Take the functional structure in its most simple form as an example. At the first level, the organization is decomposed in three functional subsystems: preparation (such as sales, engineering, planning work preparation and procurement), production and support units (such as quality, maintenance, safety and health and personnel). At the second level, production is decomposed in functional subsystems such as cutting, bending, welding, painting and assembly. As a result, you get the neat boxes of the organogram with a manager within each box. But such a hierarchy in the social sense (hierarchy of authority) is not a hierarchy in the technical sense (a nearly decomposable system). If you fill in the interdependencies between the units, its structure is shown to be that of a heterarchy or network, in which all subsystems and their operations are connected to each other (figure 19.3).
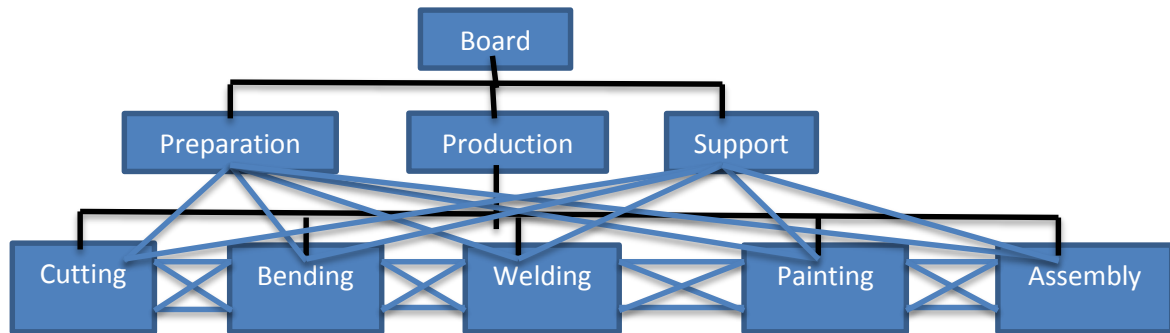
Figure 3. The functional structure as a heterarchy

In this structure, all units are interconnected and interdependent, because all functionally specialized operations are – potentially or actually – coupled to all customer orders. According to both LP and STSL, in a complex and dynamic environment, such a heterarchical structure should be transformed in a hierarchic, that is, nearly decomposable or modular structure that consists of subsystems in which different and interdependent operations are carried out on a subset of similar order types.

STSL: an overview

STSL is a design theory that can be summarized until so far in the following way:

- Design object: the primary process as an instrument to reach different and changing organizational goals.
- Design goal: requisite variety or controllability as a generic structural capacity that enables organizations to reach different and changing goals simultaneously.
- Functional design requirements or criteria: quality of organization (cost, quality and time), of work (stress risks and learning opportunities) and of labor relations (cooperation and shared decision-making).
- Design strategy: reduction of the complexity of the production structure as a precondition for the decentralization of the control structure.
- Sequence rules: design your production structure top down (and then your control structure bottom up) and start design of the production structure with the making function and then align your preparation and support functions.
- Design parameters: as Mintzberg says, these are the knobs a designer turns to reach design goals and criteria. These design parameters will be discussed in the next section.

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4 Design parameters

In this paragraph we shall describe the design parameters that will then be used to reformulate Lean in STSL concepts. To enable understanding of the STSL design parameters by non-Lowlands readers, we start with the way Mintzberg introduced the concept of design parameters.

Mintzberg on design parameters

Mintzberg (1983) introduced four groups of design parameters in his book 'Structure in fives': design of positions, design of superstructure, design of lateral linkages and design of decision-making system. It is not difficult to recognize the first two groups as the design of the production structure and the last two groups as the design of the control structure (and Mintzberg correctly notes that the design of the decision-making structure should ante cede the design of lateral linkages). According to Mintzberg, unit grouping (a parameter of the super structure) is the strongest parameter of all. As we will see, it is an enabling constraint both 'downwards' with respect to the design of positions (job design) and 'upwards' with respect to the design of the control structure (decision-making system and lateral linkages).

Unit grouping: functional and market-based

We owe Mintzberg the insight that all bases or criteria for grouping can be reduced to two: functional and market grouping. To quote him extensively: *In fact, we shall comprise all the bases for grouping discussed above to two essential ones: market grouping, comprising the bases of output, client and place, and functional grouping, comprising the basis of knowledge, skill, work process, and function. … In effect, we have the fundamental distinction between grouping activities by ends, by the characteristics of the ultimate markets served by the organization – the products and services it markets, the customers it supplies, the places where it supplies them – or by the means, the functions (including work processes, skills, and knowledge) it uses to produce its products and services* (Mintzberg, 1983: 53-54).

The same distinction is used in STSL, although in a different terminology. A primary process has as its end the transformation of a requested order (a customer, client or patient with a wish) in a delivered order. And the activities or operations carried out in the primary process are the means to reach that end. So, you can group on means. You then look inside the organization in search of similar activities/operations that are grouped together into the same functionally specialized unit. In STSL this is called operations-based grouping. In an operations based structure all operations are potentially or actually coupled to all customer orders. That is what makes them heterarchical or network structures. And that is why these structures are so complex and prone to disturbances.

You can also group on ends. You then look outside your organization at the market environment in search of similar order types. The different and interdependent operations that are needed for the production of a restricted set of similar orders are then placed together in the same organizational unit. In this way you create independent or pooled streams around similar orders. That is why this is called stream-based grouping in STSL and value streams in lean. According to Mintzberg, you will find market grouping at the higher and functional grouping at the lower levels of organizations as in the divisionalized form. Both STSL and lean propose to apply market grouping 'all the way down' till you reach the level of cross-functional teams or cells as the lowest level building blocks of your organization. This is one of the reasons you will not find this kind of organizations in Mintzberg's configurations (see also Sabel, 2006). In general, by stream-based grouping, you try to reduce variability in input, process or output. Because an order is a customer/client with a wish (for a product or service), stream-based or market grouping can be:

- Product-based: similar wishes for different customers (as often in manufacturing);
- Customer-based: similar customers with different wishes (as often in services).8;
- Project-based: similar projects in which unique wishes of customers are handled (as in architect bureaus).

The functional and market structures have different 'downward' and 'upward' effects. A functional structure enables job specialization or function differentiation at the job level and constrains the possibilities of job enlargement, job enrichment and cross-functional teamwork. The opposite is the

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[8] The local cross-functional district teams of Buurtzorg Nederland and the local branches of Svenska Handelsbanken are examples of customer-based groupings (see the respective case studies).

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case with market grouping. Also the functional structure leads to both a centralization of decision-making and a proliferation of lateral linkages. The opposite is the case with market grouping: *In effect, the functional structure lacks a built-in mechanism for coordinating the work flow. Unlike the market structures that contain the work-flow interdependencies within single units, functional structures impede both mutual adjustment among different specialists and direct supervision at the unit level by the management. The structure is incomplete; additional means of coordination must be found. The natural tendency is to let coordination problems rise to higher-level units in the hierarchy, until they arrive at a level where the different functions in question meet. The trouble with this, however, is that the level may be too far removed from the problem (Mintzberg, 1983: 59).*

The design parameters of STSL

In this paragraph we present the parameters that will be used in the next paragraph to reformulate lean in terms of STSL's parameters. The parameters refer to the production structure (the grouping and coupling of performance operations), the separation of performance and control and the control structure (the grouping and coupling of control operations). The performance operations are subdivided in preparatory, making and support operations. The preparatory functions include quoting, engineering, order processing and procurement. The support functions include quality control, maintenance, logistics, accounting and control and personnel). For reasons of space, we concentrate on the parameters of the production structure including the parameter of separation/integration of performance and control:

- Functional concentration versus de-concentration. This parameter refers to the way of grouping of making functions: functional versus market grouping;
- Functional specialization versus de-specialization. This parameter refers to the centralization versus decentralization of preparatory and support functions;
- Functional differentiation versus integration. This parameter refers to the level of division of labour or job specialization within the preparatory, making and support functions;
- Separation versus integration of performance and control. This parameter refers to the separation versus integration of conception and execution.

Note that the three parameters of the production structure refer to the same phenomenon (functional or market grouping) applied both to different parts and to different levels of the primary process. The parameters are used in both a descriptive and a normative way: in complex and dynamic environments the combination of functional de-concentration, de-specialization and integration enhances both the quality of the organization, work and labour relations.

Functional structure: economies and diseconomies of scale

A typical functionally concentrated, specialized and differentiated organization with separation of performance and control would look like figure 19.4 (and note that in Mintzberg's divisionalized form this is the internal structure of the divisions and/or business units it is composed of).
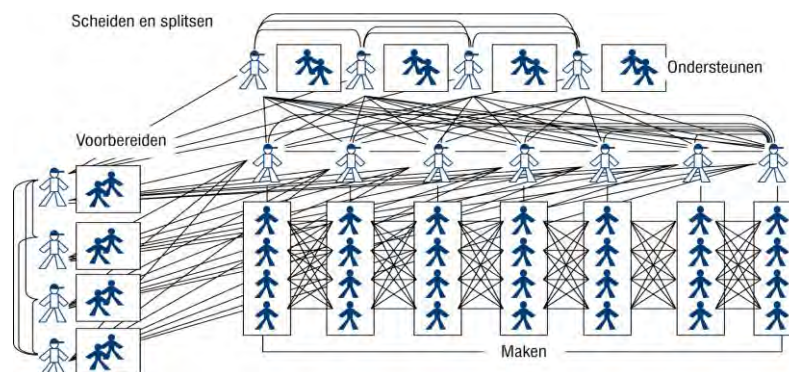
Figure 4. A complex organization with simple jobs. Source: De Sitter 1983: 138).

The underlying idea of such an organizational structure is that cost reductions can be best achieved by exploiting economies of scale. At the same time the diseconomies of scale that are created in this way are accepted and even made invisible. The idea of cost reduction by economies of scale not only informs the design of organizational structure, but also the design of incentive and reward structures.

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As such, the functional structure is entrenched and difficult to change: you have to change both taken for granted ways of thinking (cultural change) and of doing (structural change).

In a nutshell, the idea tells you that in order to reduce costs, you should group in a functional way and you should optimize the functionally specialized parts or segments of the organization by aiming at job specialization (in order to economize on wage costs), maximal capacity utilization (in order to avoid idle capacity) and large batch production (in order to amortize set-up times). Paradoxically, this leads to a sub-optimization of the whole: it disrupts the order flow, creates excessive inventories with negative effects on costs, quality, cycle time and flexibility and increases coordination costs immensely which necessitates high staff levels and the instalment of complex planning and cost accounting systems. Overhead costs will rise and the paradox result of cost reduction in this way is a worsening of performance in both quality, time/speed **and costs**. The system dynamics are shown in figure 5.

Minimize costs → Break into simple (specialized) steps → Low skills Low wages

Minimize resources maximize efficiency ← Managers: minimize cost ← Functional departments

Ensure backlog batching → Long feedback loops backtracking, expediting → Poor quality Long lead times and OOOPS! High Costs
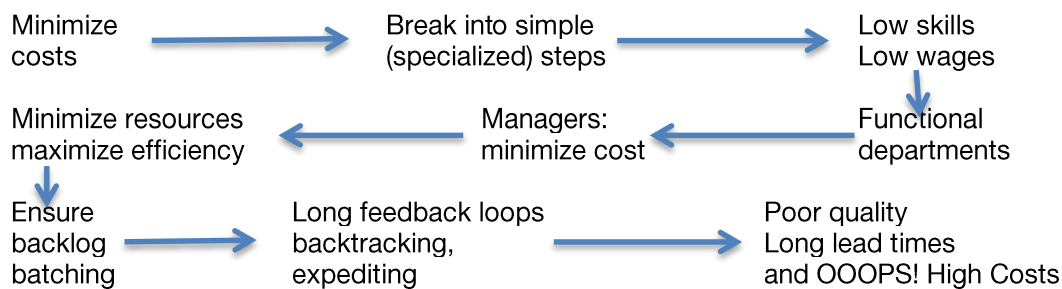
Figure 5. Diseconomies of scale. Adapted from Suri, 2010:45.

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5 A system theoretical reformulation of lean

How not to characterize lean

For some, lean is about waste reduction (the seven forms of muda) and/or continuous process improvement. This is a misleading characterization of lean. First, waste reduction is neither a goal nor a manufacturing strategy: *Is losing weight the definition of a good diet? No; it is better health, increased capabilities, longer life. So it must be for lean. More fittingly, lean employs a large set of concepts and tools to reduce delays and quicken response in all processes. That is fundamental lean, with time compression as its main focus* (Schonberger 2008:45). Standard and Davis concur: *If eliminating waste is the central theme of an improvement effort, the benefits will be superficial. … System improvement focusses on improving how material and information flow through the plant. Its objective is to minimize cycle time* (Standard, Davis 1999:134). So does Suri (2010): it's about time.

Second, if all important forms of waste are caused by functional batch-and-queue production, it isn't helpful to try to reduce waste within that structure. Improvement within those structures is called kamikaze kaizen by Womack and paintball kaizen by Standard and Davis (1999: 134). The most important gain is in substituting 'organizing with the flow' for 'organizing across the flow.'

The lean strategy: flow production with capacity buffers

According to Hopp and Spearman (2008), in an ideal world without variability, demand and transformation can be perfectly aligned. However, the real world with variability necessitates buffers. Variability comes in two forms: demand and process or transformation variability. And buffers can only take three forms: time (when demand waits for products/parts), inventory (when product is finished before demand) and capacity (which reduces the need for the other two buffers). For traditional bureaucratic organizations, idle capacity is the main waste. The guiding idea for organizing production is maximum resource utilization which idea is best realized in a functional structure (Modig & Ahlstrom, 2012). But such a manufacturing strategy necessarily produces waste in the form of time and/or inventory buffers (and, according to De Sitter, adds internal variability to demand variability). In contrast, the lean strategy is aimed at flow efficiency (Modig, Ahlstrom 2012). The most important wastes are time end inventory buffers. To reduce those buffers, lean introduces a flow structure, installs a pull planning system and then starts a process of continuous improvement to further reduce process variability. But such a manufacturing strategy **necessitates capacity buffers**: *Toyota exploited its understanding of the science of operations by using a 30 percent capacity buffer to support its strategy to drive consistent, low cycle times. Most Lean practitioners would label such a capacity buffer as non-value-added and try to eliminate it … Toyota chose to pay for inventory reduction, low cycle times, and continuous improvement efforts with its capacity buffer. The cost of the capacity buffer was outweighed by the ability it provided Toyota for buffering against variability to achieve lower inventories, reduced scrap, and better response time. This was the right choice for Toyota and was reflected in its financial statements* (Pound, Bell & Spearman, 2014: 175-176).

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Flow production: functional de-concentration or market-based grouping

The evil-doer for both lean and STSL is functional batch-and-queue production and both turn over the production structure from a functional to a market-based one (functional de-concentration). In lean, market-based groupings are called value streams: *The best way to think about a value stream is as a business segment focused on a product family, or sometimes, customer family. There is probably nothing more effective, in process improvement, than breaking up the functional silo's and realigning the processes by the work flow in a product family. The work cell is a microcosm of this realignment. The focused factory and plants-in-a-plant are enlarged variants. Linking a focused factory to a supply chain or customer chain extends the scheme further* (Schonberger, 2008: 106).

Lean is based on both a different way of thinking (the idea of economies of flow or flow efficiency) and of doing (designing organizational structures and reward and incentive systems that are informed by this idea). To create a flow, you take a restricted set of similar orders (for example all titanium bicycles, as in Womack & Jones, 2003), determine the operations/machines you need to produce this subset of orders, unfasten them from the floor and place them together in a cross-functional value stream and/or manufacturing cell. The advantages are many. First, you reduce the complexity of the production structure by placing interdependent activities in the same unit. This reduces coordination needs and enables you to install immensely simplified planning and cost accounting systems. Both planning and cost accounting are directed at the higher levels of value streams and manufacturing cells and not at individual levels of machines and operations as in traditional planning and cost accounting systems. In terms of costs, you reduce overhead costs, decrease the number of lateral linkages and introduce performance criteria that are targeted at the optimization of the process as a whole.

Second, by introducing flow production, you lower inventories with positive effects on costs (less capital tied up in inventories, smaller storage space, less material handling, less risk of obsolescence), quality (early discovery of defects, less scrap and rework and improvement of root cause analysis), cycle time (shorter cycle times and less variability of cycle times) and flexibility (shorter cycle times postpones committing resources to production and so enables adaptation to changes in customer orders). Instead of pitting costs against quality and time, lean stresses the cost aspects of quality and time. By concentrating on improvements in quality and speed, costs will be reduced as a consequence and new business will be generated.

Note that the same idea ('hospitals within hospitals') is applied by Porter and Christensen to the organization of the health care system. According to Porter: *In health care, the traditional functional structure must radically shift to a structure that medically integrates the care of patients with particular medical conditions. We term such a structure the integrated practice unit [IPU] structure. IPU's are defined around medical conditions, not particular services, treatments, or tests. … Ultimately, the IPU model lends itself to the notion of hospitals within hospitals and practices within practices, rather than monolithic, functionally structured entities* (Porter, Teisenberg 2004:168, 171). And according to Christensen, the all-purpose, general hospital should be reorganized along three different business models: the value added chain, the facilitated network and the solution shop. Each business model is characterized by a different value proposition, different technological and human resources, a different process organization and a different profit formula. A star case would be the introduction of team-based medicine in Kaiser Permanente (see Lawrence 2002).

Flow production: functional de-specialization or decentralization of preparation and support functions

Functional de-specialization is the same as functional de-concentration but now applied to the preparatory and support functions. It means that formerly centralized preparatory and support functions are decentralized to the different value streams (as in the Bromont case, in which each cross-functional product unit has its own support unit). The same in lean/QRM: *Notice that each cluster (focused factory) has its own staff of engineering (manufacturing, quality, design), maintenance and material support* (Nicholas, Soni 2006: 195). In QRM this is called an office cell. In QRM, shop floor and office cells are always designed around a Focused Target Market Segment (FTMS). An office cell is based on the same design principles as applied to a shop floor cell and it is defined as *"a closed-loop, collocated, dedicated, multifunctional, cross-trained team responsible for the office processing of all jobs belonging to a specific FTMS. The team has complete ownership of the cell's operation and the primary goal of the team is reduction of the cell's [cycle time]* "(Suri, 2010: 14). Former overhead is now contained within the value streams and/or cells which greatly simplifies both planning and cost accounting.

Functional de-specialization corresponds to Mintzberg's horizontal and vertical decentralization or

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decentralization of staff and line functions as in the divisionalized form. According to Mintzberg, decentralization can be selective and parallel. This corresponds to STSL's distinction between aspectual and integral control. Parallel decentralization or integral control is logically associated with market-based grouping: *Each unit or division is decoupled from the others and given the power necessary to make all those decisions that affect its own products, services, or geographical areas. In other words, parallel vertical decentralization is the only way to grant market-based units the power they need to function in a quasi-autonomous manner* (Mintzberg, 1983: 102). Note that in Mintzberg's divisionalized form, market-based grouping and parallel decentralization stop at the divisional level, while in both STSL and lean they are applied 'all the way down' to the level of cross-functional teams or cells. That is one of the reasons why sociotechnical and lean organizations do not fit any of Mintzberg's five configurations.9

Flow production: functional integration and cross training

Independent streams take the environment as given and segments or cells within the stream take the stream as given. Designing segments is the same as determining the external structure of the segments (interdependencies between the segments within a stream should be pooled or sequential). Functional de-concentration can now be applied to the internal structure of the segments. In each segment, different and interrelated operations are carried out on a restricted set of similar orders. The result is cross-functional teams that contrast with the functional teams of the functional structure. Application of cross training makes the team members multi-skill and the team a flexible one. To record the level of cross training, the flex matrix is used by both STSL and lean. The vertical axis of the matrix contains all direct and indirect team tasks, the horizontal axis all team members and within the matrix you can see who is able to carry out which task. You can replace the indications within the matrix with skill or competence levels (beginner, competent and expert). To this, two rules can be added. The first one states that work is not top sport: you cannot be an expert in all team tasks (see Benner, 1984). Therefore, the aspiration is to make as many team members competent in as many team tasks as possible. The next rule states that professionalization should be in the hands of the professionals themselves. Therefore, the experts at a task coaches the beginners at the same task to the level of competent task performance. In this way you have created a simple competence management tool that enables workers to help each other in getting better at their work. It does so without having to define competences and to operationalize them in behavioural criteria as in standard forms of competence management.10 According to Mintzberg, there is a trade-off between efficiency and quality of work: *job enlargement pays to the extent that the gains from better-motivated workers in a particular job offset the losses from less than optimal technical specialization* (Mintzberg, 1983: 31). Against this, both lean and STSL can explain why organization and job design have direct and simultaneous effects on both efficiency and quality of work. They both point to the necessary macro and meso level preconditions for job enlargement and enrichment in conditionally autonomous teams at the job level. In this way they create simple organizations with complex jobs and so improve both the quality of the organization and the quality of work.

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9 And because he thinks that the distinction between functional and market grouping is irrelevant for professional bureaucracies he misses the innovations that actually take place in health care and education, see Christis, 2011.

10 For the tool, see Christis et al. (2013) and for the theoretical background Christis, Fruytier (2006).

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Flow production: integration of performance and control

According to Lazonick (2005), functional and hierarchical integration is one of the characteristics of the innovative enterprise (the other two being strategic control and financial commitment). All organizations have a certain level of functional or horizontal and hierarchical or vertical specialization (fs and hs respectively in the triangle):
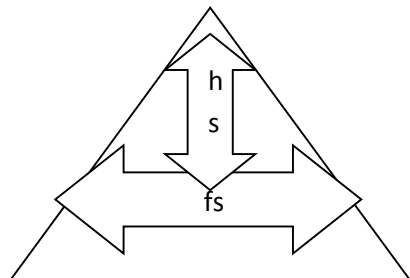
Figure 5. Functional and hierarchical specialization. Adapted from Lazonick 2005.

Most organizations apply a deep level of division of labour. By functional differentiation and segmentation, they stretch the triangle in a horizontal direction. This increases coordination needs and necessitates a stretching of the triangle in the vertical direction (hierarchical differentiation and segmentation), resulting in one huge triangle that has all the marks of a bureaucratic, complex organizations with simple jobs (as in figures 3 and 4). A small vanguard of innovative organizations introduce functional and hierarchical integration in their organization. They do so by designing an organization that is composed of smaller triangles (the principle of modularity). They, then, make these triangles or modules conditionally autonomous by delegating control tasks to those modules: *Operators in work cells typically have autonomy to make decisions and perform their own basic equipment maintenance, changeover, quality control, and job-scheduling (and) also engage in continuous improvement efforts, data collection and performance management, and even materials procurement from vendors* (Nicholas & Soni, 2006: 79). See figure 19.6.

	Cost-based	Time-based
Organization:	Functional	Cellular (cross-functional manufacturing and office cells)
Management:	Top-down control	Team ownership
Team members:	Narrow, specialized	Cross-trained
Mind-set:	Efficiency and utilization goals	Relentless focus on cycle time reduction

Figure 6. Key transformations. Adapted from Suri, 2010: 46

Continuous improvement

Most of the advantages of LP are a consequence of its JIT flow system with shorter cycle times and lower inventory levels. At the same time, this makes them extremely vulnerable to disruptions of the flow. First, inventories act as safety buffers. Lowering them means lowering the safety buffers. Second, by limiting the number of possible routings the system becomes more rigid. To elucidate the situation, the metaphor of the river is often used. The water level of the river stands for the inventory level, the boats on the river represent the orders and the rocks at the bottom symbolize possible disruptions of the progress of the boats/orders. High inventory levels buffer against the rocks, but as a consequence more boats/orders are on the river which will result in congestion problems. LP lowers the inventory level and by this reduces the number of boats/orders on the river and concomitant congestion problems. But, now, the risk of boats hitting the rocks at the bottom is increased. If the rocks are not removed, the progress of the boats will be disrupted. So, introducing LP, at the same time makes the rocks visible (by lowering inventory levels), creates the urgency to remove them (to prevent disruption of the flow) and creates the possibilities to do so (by multi-skilled workers who have an overview of the interrelated operations of the process).
Note that the design sequence is this: first install flow production (value streams and cells) and pull planning systems and only then start the process of continuous improvement. Without continuous

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improvement on the process level, the system would fall apart. And without the introduction of flow and pull at the system level, process improvement makes little sense: *Process improvement alone cannot produce system wide advantages and system improvement requires that specific processes within the system be modified* (Standard & Davis, 1999: 127). Process improvement without changes at the system level is also called kamikaze kaizen (Womack) or paint ball kaizen (Standard & Davis). This is the top down design approached that is proposed in for example Womack & Jones (2003), Nicholas & Soni (2006), Suri (2010) and Standard & Davis (1999). Top down in design (from macro to micro) should not be confused with top down in change (without worker participation): you can and should design top down in a participative way.

A note on routines: lean organizations as high reliability organizations

Routines and standard work are an essential part of the process of continuous improvement. In this, lean organizations resemble so-called High Reliability Organizations (HRO's). HRO's have a primary process that is a high risk system with a high catastrophe potential: if something goes wrong, the consequences for people and environment can be severe. Yet, in HRO's, no or less accidents occur then in comparable high risk organizations. Their success in preventing accidents is explained by the introduction of a set of mindful practices (Weick & Sutcliff, 2007). Central to those mindful practices is the ambivalent attitude to routines and standards. In HRO's everything is formalized. If the best way to do something is discovered, it is turned into a standard, routine or standard operating procedure. At the same time, these routines are distrusted. Using them in slightly different contexts could have disastrous effects. These routines are, therefore, critically reviewed and updated permanently by the frontline workers themselves. The level of formalization explains why HRO's don't fit Mintzberg's adhocracies. The described ambivalent attitude to routines applies literally to the lean process of continuous improvement (Christis, 2010). First, by lowering inventory buffers, LP creates an internal catastrophe potential and so creates the urgency and motivating force to install those mindful practices (see Sabel 2005). It shows that 'normal' organizations can learn from HRO's (pace Roberts, 1991), but only by creating an internal catastrophe potential (pace Weick & Sutcliff, 2007). Second, in the lean literature a distinction is made between work standards and standard work. The former refers to the standards formulated by Mintzberg's techno-structure and imposed on the workers. It is an example of the separation of conception and execution. Standard work refers to standards that are developed, reviewed and updated by the workers themselves. It is an example of the integration of conception and execution: *Whereas the former [standard work] relies mostly on the efforts of shop floor teams to develop standards, the latter [work standards] imposes standards that are developed by staff specialists and engineers. … Another difference between traditional work standards and standard work is that the former are considered semi-permanent; the latter, provisional. Work standards, first conceived by Frederick Taylor around 100 years ago, represent the "one best way" to do something; they leave no opening or incentive for improvement. Standard work, however, represents the best way known at the moment; if a problem occurs while the standard work is being performed, the standard work is considered a contributor to the problem and in need of revision to prevent the problem from reoccurring. … Standard work represents the best ideas a team can generate at the time; it is the current 'gold standard'* (Nicholas & Soni, 2006: 163-164). This practice was introduced by Ohno early in the development of the TPS: *"One of Taiichi Ohno's first assignments at Toyota was to prepare job descriptions, and he found the experience invaluable. Only through preparing their own job descriptions, he concluded, could workers comprehend the details of their work and know why they should have to do things that way, and only then would they be capable of pondering other, better ways to do it – the basis for kaizen. Ever since, shop-floor teams at Toyota have prepared their own work instructions and standard work descriptions for their work areas"* (Nicholas & Soni , 2006: 163).

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Discussion and conclusion

Commonalities

We showed that lean corresponds to the prescriptive STSL parameters: lean combines functional de-concentration, functional de-specialization, functional integration and integration of performance and control functions. And it does so for the same reasons: to reduce internal variability and cope with the remaining variability. In the language of Ashby: to reduce the variety of disturbances and to enhance the variety of the regulator. Both STSL and lean regard cross-functional teams or cells as the basic building blocks of the organization. The advantages of the shift from functional to cross-functional units as the building blocks of the organization are many:

- Cells eliminates inventory (and so frees cash flow);
- Cells shortens cycle time (and so creates cash flow);
- Cells draws interrelated processes together in time and place (and so enables continuous improvement of quality, speed and costs);
- Cells eliminates overhead costs (by simplifying planning and cost accounting systems);
- Because cells are the first customer of product engineering, they enable design for manufacturing.

However, designing value streams and/or cells can be a difficult affair: there are many ways of grouping similar orders and finding the right one can be a hard nut to crack. Designing streams and/or segments within streams can take different forms according to the situation you start with. To simplify matters, De Sitter distinguishes three different design contexts or start situations: criss cross or spaghetti streams, latent streams and one single stream (figure 19.7). These are called heterogeneous, semi-homogeneous and homogeneous streams in Kuipers, Van Amelsfoort (1990).

Crisscross stream	Latent streams	One stream
Many different products/variants	Mainly product-variants	One product with different designs
Many differences in operational combinations and sequences	Differences in operational combinations but less in sequences	Identical operations and fixed sequences
Hundreds of routings	Tens of routings	One routing
Example: part supplier	Example: producer of furniture	Example: assembly of mass product

Figure 7. Design situations. Source: De Sitter 1994:245

These correspond to Hopp and Spearman's distinction (based on Hayes & Wheelwright 1979) between the jumbled flow (job shop), the disconnected line flow (batch production), and the connected line flow (assembly line).

Design principles and contexts in manufacturing

We can first use these different design contexts to resolve a debate that is raging in the lean community: is QRM the same as or totally different from lean? Lean in its classical, Toyota, form was developed for high volume/low variety production. It then moved on to the different design situations of semi-homogeneous and heterogeneous streams. In the way it had to invent new tools because tools such as value stream mapping, KANBAN and levelled production make no sense in the high variety/low volume situation (crisscross streams). QRM was developed by Suri to meet the high variety/low volume situation. In this way, he developed tools that are applicable in the other design situations. So, both apply the same higher level principles to different lower level design contexts. And both are extensively covered in De Sitter 1987 and 1994. De Sitter offers a set of analytical tools for introducing flow production in these different situations that are broader than and partly overlap with the tools offered

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in the lean/QRM literature. At the other hand, STSL was never as creative as lean in developing simplified planning and cost accounting systems and visual control systems.

The discussion between STSL and lean seems to focus on the design of the assembly line. The general idea of De Sitter is to redesign the assembly line into parallel flows with less stations in which less people carry out more interdependent tasks in longer 'takt' or work cycle times. This can take the form of phase groups, mini-lines, dock groups, pre-assembly in module groups and can cumulate in assembly groups in which the complete product is made in a few phases by one or a few groups (as in the Volvo Uddevalla plant in Sweden). Apart from the effect on the quality of work this would drastically reduce system losses: takt time is inversely related to system losses of the line structure such as stochastic losses, balancing losses, and so on. In Womack, Jones and Roos (1990) the assembly groups of Uddevalla are presented as a naïve return to a lost time of craft production. At the other hand, the average Japanese takt time was 90 seconds which is long when compared to European firms (32 seconds for the Fiesta in Belgium and 40 seconds for the Peugeot in France, according to De Sitter). This explains at least part of the Japanese success. Moreover, when confronted with a tight labour market, Toyota started to experiment with 'Scandinavian' forms of work restructuring at the assembly line (Pill & Fujimoto, 2007).

Design principles and contexts in health care
Functional structures, based on a flawed notion of cost reduction by resource efficiency, still dominate the health care sector. In manufacturing this leads to fragmented production and in health care to fragmented care. So, the first step in reaching integrated care is the introduction of so-called clinical or care path's. In such a path the routing of similar patients through the different functional silo's is traced. This is the same as value stream mapping in manufacturing. And the results are similar: waiting time as percentage of cycle time is at least 90%, quality and safety are poor and costs are high. Of course, care delivery as a primary process differs fundamentally from manufacturing. But the question then is 'if care delivery is so different, why do we organize it as a functional manufacturing plant?

So, in a next step, clinical or care path managers are appointed to optimize the care path from the viewpoint of the patients. We now have the nightmare of a matrix organization in which unit managers, responsible for resource efficiency fight with care path managers, responsible for flow efficiency. The way out of this situation is to organize healthcare along care paths for similar patients (as proposed, among others by Porter, Christensen and Lawrence). These can be:

- Product-based: grouped around patients/clients with the same medical/care conditions as in a migraine centre, asthma centre, cancer centre, hip street, cataract street, and so on.
- Customer-based: grouped around similar patients/clients with different medical/care conditions as in the district teams of Buurtzorg Nederland and the social district teams many Dutch municipalities are experimenting with.

Evidence is growing that these forms of integrated care deliver higher quality care against lower costs as was to be expected from the manufacturing experience. To be successful, health care organizations with team-based medicine should substitute capacity buffers for time buffers (in health care there are no inventory buffers; instead, patients have to wait). To start with, they should follow Toyota and work with a capacity buffer of 30% and use it to absorb fluctuations in the patient flow and to give frontline workers the time for continuous improvement in order to further reduce process variability and enhance quality and safety of care. Next, they should install pull planning systems to put a cap on waiting time. And of course, they will meet the same problems as in manufacturing: how to make cells within a value stream, what to do with shared capacities (such as operating theatres), and so on.

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Lean and mean

At last, the sociotechnical community should shed its prejudices on lean. The first one is that lean concentrates on process improvement and neglects organizational design. As we showed, this is an absurd accusation. A second one is that lean neglects quality of work. Bromont is a star case of lean/six sigma within General Electric. Those who visited the plant and spoke with the workers and team leaders know, again, that this is an absurd accusation. Its structure, with cross-functional manufacturing and support cells can be called sociotechnical and we all admired the way frontline workers are involved in the continuous process of improvement and innovation of the plant. Long ago, lean added the under-utilization of human capacities as a form of waste and the spirit of lean is well captured by Schonberger: *lean is hard on processes and soft on people.*

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Diffusion of an integrated approach to health, safety, and wellness for smaller businesses: Perspectives from intermediary organizations.

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Abstract. The National Institute for Occupational Safety and Health (NIOSH) Total Worker Health[TM] (TWH) Program considers the fact that both work-related factors and factors beyond the workplace contribute to the health of workers and their families. The Program conducts research on the effects of combining occupational safety and health (work-related factors – OSH) and workplace health promotion (lifestyle factors – WHP) at the worksite in order to achieve synergy that increases effectiveness and efficiency. There is no data available on the prevalence of TWH programs in smaller organizations. What is known about smaller organizations is divided into information about health protection and health promotion activities. Smaller organizations engage in fewer safety activities and fewer health promotion activities than larger organizations, and firm size is the best predictor of both safety and health promotion activities in each respective stream of research. Efforts to encourage and assist smaller organizations with workplace health protection activities have used an initiator-intermediary-small organization model. The model presumes initiator organizations such as public health agencies lack the resources to affect appreciable numbers of small organizations that need assistance, and community organizations that already have relationships with smaller enterprises may deliver employee health protection information, goods, and services as part of the value they offer those organizations. The current project is conducting parallel community-based activities in southwestern Ohio and northern Kentucky. It will collect and analyze data about the perceived cost/benefits of the TWH approach using a two-level (community organizations and employers), pre-test/post-test measurement (one year apart) method. Data is being collected from community organizations that work with or serve small businesses about their perceptions of the TWH approach as a potential product or service for them to offer small firms. Community organizations are collecting and analyzing data about the perceived cost/benefits of TWH as perceived by small businesses in the respective geographic areas. Sample TWH information and services will be used to incentivize employer participation. Perception data will be collected and analyzed in both geographic areas and at both the community organization and small business level after approximately one year. The project will use these analyses to develop a model for TWH diffusion to small businesses. The community organizations will then engage in diffusion activities to encourage the use of the model by national, regional, state and other local organizations serving small firms. While data collection is still in process, preliminary results will be presented from our interactions with community organizations and their initial interactions with small businesses.

1 Introduction
1.1 The Total Worker Health[TM] Idea and Program

The National Institute for Occupational Safety and Health's (NIOSH) Total Worker Health[TM] (TWH) Program (NIOSH, 2014) considers the fact that both work-related factors and factors beyond the workplace contribute to the health of workers and their families. The Program conducts intra- and extramural research on the effects of combining narrower, traditional approaches to worker health – occupational safety and health (work-related factors – OSH) and workplace health promotion (lifestyle

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factors – WHP) at the worksite with the objectives of increasing their effectiveness and efficiency. The first strategic goal (of two) of the program is:

Strategic Goal 1: Reduce worker disease and injury risk through the increased adoption of workplace programs that address health risk from both the work environment (physical and organizational) and individual behavior (NIOSH, 2015).

Achieving the adoption of something new like TWH is a common challenge for innovating individuals and organizations, a challenge that has not yet been addressed by research or practice in the TWH arena, no doubt inspiring this strategic goal. Nevertheless, there is a substantial body of relevant research and practice from marketing, persuasion, communications, psychology, and sociology that may guide the diffusion of the TWH idea to employers.

1.2 Small Businesses

About 90% of U.S. employer organizations have fewer than 20 employees, and 62% have less than five (U.S. Census Bureau, 2011). Eighteen percent of all U.S. employees work for firms that have less than 20 employees. In addition, more than 21 million U.S. firms have zero employees, meaning that, although they are not counted as employees, the owner is also the worker (U.S. Census Bureau, 2011). Workers in smaller organizations endure a disproportionate share of the burden of occupational injuries, illnesses, and fatalities (Mendeloff, Nelson, Ko, & Haviland, 2006).

There is no data available on the prevalence of TWH programs in smaller organizations. What is known about smaller organizations is divided into information about health protection and health promotion activities. Overall, smaller firms deliver fewer workplace health promotion (WHP) and occupational safety and health (OSH) activities (Linnan et al., 2004; Sims, 2008). Smaller organizations engage in fewer safety activities than larger organizations. A national survey of U.S. firms with fewer than 250 employees found that 87% of the firms did not have a safety committee, 39% did not include safety awareness information in new employee orientation, 45% did not have written safety rules or policies, and 87% had not used a safety consultant in the past 5 years (Dennis & William, 2002). The smallest firms (< 10 employees) reported being engaged in safety activities less than somewhat larger firms (10–19 employees), which reported less engagement than even larger firms (20–249 employees).

Such organization size-based differences extend to engagement in WHP activities as well. The 2004 National Workplace Health Promotion Survey found that every type of WHP activity measured (25 total) was offered more often in larger businesses than smaller ones and that firm size was the best predictor of involvement with WHP (Linnan et al., 2008). The reasons for this are not clear, but sometimes public health promotion efforts targeting smaller firms slip their focus to include larger, easier-to-work-with firms (O'Donnell, 2012).

Another reason for these differences by size is that smaller organizations have limitations that larger ones do not have. In smaller organizations, there are greater overall demands on management staff time that limit time available for nonproduction-related activities such as employee health. Financial resources are similarly limited, making the use of contract services for employee health less likely. Similarly, smaller organizations are unlikely to employ OSH and WHP specialists. Managers of smaller organizations tend to be more isolated from peer networks through which employee health and other good business practices are diffused (Hasle & Limborg, 2006). In addition, the social systems in which smaller organizations function are often ill-suited to assist them (Eakin et al., 2010). Taken together, these factors represent a substantial challenge to the public health objective of ensuring the well-being of all workers.

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1.3 An Innovative Approach

This project focuses Total Worker Health™ (TWH) adoption research on small businesses with a called-for but neglected approach. Researchers have noted the need for an ecological approach and multiple levels of intervention to support WHP efforts, including the community level, (Faghri et al., 2010; Baker et al., 1996; DeJoy & Southern, 1993) but research has yet to address TWH diffusion from either the ecological or the business size perspectives. Reaching smaller firms with health protection or promotion models is a difficult enterprise, one with which other public health organizations are also struggling. As noted already, sometimes public health efforts targeting smaller firms slip their focus to include larger, easier-to-work-with firms. Lamenting this, the editor of American Journal of Health Promotion suggested a better approach might be to work with a local business council in a more limited geographic area (O'Donnell, 2012). He also noted it would make sense to test several outreach approaches and then focus future efforts on the most successful approach.

Adoption of TWH by small firms depends not only on financial cost/benefit ratio. A broader assessment of cost/benefit takes place that includes (for example) personal effort required, time commitment, compatibility with existing systems and behaviors, and expected outcomes (Rogers, 2003; Page et al., 2009). The "business case" for adoption of TWH must include this kind of evidence if it is to persuade small firm owner/operators and their employees (Rogers, 2003; Maddux, 1999).

The ecological perspective for TWH is also new and needed. Since community-, employer-, and employee-level factors all affect the TWH adoption decision by small firms, they must be studied together. The community-level perspective is common to WHP efforts. WHP has long been the province of community healthcare providers, public health departments, and local wellness vendors. However, the community-level perspective is often neglected when it comes to OSH activities which are traditionally seen as solely the responsibility of employers.

Efforts to encourage and assist smaller organizations with workplace health protection activities have used an intitiator-intermediary-small organization model (Sinclair & Cunningham, 2013). This same approach is being used in the current study. The model presumes that initiator organizations such as public health agencies lack the resources to affect appreciable numbers of small organizations that need assistance. It postulates that other organizations, community organizations that already have relationships with smaller enterprises, may be enlisted and motivated to deliver employee health protection information, goods, and services as part of the value they offer those organizations. Occupational health clinics, insurance companies, and chambers of commerce are examples of such organizations. The model advises that these intermediary organizations must be thought of and investigated as adopters of innovations as much as the small organizations they serve. This two-stage diffusion model has been tested with some success in Denmark, New Zealand, and the U.S. (Hasle & Limborg, 2006; Olsen et al., 2012; Cunningham & Sinclair, 2014). This stream of research on organizational adoption behavior is particularly relevant to the TWH strategic goal and to this project which seeks to understand how smaller organizations react to TWH ideas and how those ideas can best be diffused to those organizations. This kind of knowledge can currently be best-described as in its infancy.

Preliminary studies and activities: Over the last three years, the principal investigators built relationships with Cincinnati and Northern Kentucky organizations that provide goods and services to local small businesses. They did so to create a community-level laboratory for research. Evidence shows such "intermediary" organizations are a realistic way to affect OSH awareness and activities in small firms (Hasle & Limborg, 2006; Olsen et al., 2012; Cunningham & Sinclair, 2014). This project will make use of that community laboratory to develop a TWH diffusion model and promote it with influential national, regional, state, and local organizations.

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1.4 Research Questions

This study is addressing research questions that bridge TWH diffusion issues and the health protection and promotion needs of smaller organizations:

- To what extent do managers and employees of smaller organizations engage in health protection and promotion activities?
- What do small organization managers and employees perceive to be the costs and benefits of employee health protection, promotion, and TWH?
- How should TWH be positioned to increase its adoption by smaller organizations?
- Which community organizations (intermediaries) do managers of smaller organizations perceive to be the most appropriate and effective sources for TWH information?
- What do community organizations (intermediaries) perceive to be the costs and benefits of providing TWH information and assistance to smaller organizations they serve?
- What model is appropriate for the diffusion of TWH to smaller organizations?

2   Method

This project is conducting parallel community-based activities in southwestern Ohio and northern Kentucky. It includes the collection and analysis of data about the perceived cost/benefits of the TWH approach using a two-level (community organizations and employers), pre-test/post-test measurement (one year apart) method. Baseline data were collected from community organizations that work with or serve small businesses about their perceptions of the TWH approach as a potential product or service for them to offer small firms (level 1). Community organizations were solicited to assist the project. Those organizations are currently collecting and analyzing data about the perceived cost/benefits of TWH as perceived by small businesses (employers - level 2) in the respective Ohio and Kentucky geographic areas. Sample TWH information and services are being used to incentivize employer participation. That is, employers will receive sample TWH information and services for approximately one year. Perception data will then be collected and analyzed again in both geographic areas and at both levels to detect any changes in perceptions regarding the TWH approach.

2.1 Phase 1: Recruiting Community Organizations; Time 1 Data Collection from Community Organizations; Outreach Planning.

The investigators have recruited two groups of community organizations to work on the project- one group in southwestern Ohio and one in northern Kentucky. The groups include occupational health clinics, public health departments, WHP and OSH organizations, and chambers of commerce. A key person has been identified within each organization who will act as the communications point between the organization and the principal investigators. The recruited organizations act as a research group in each state. The investigators have begun collecting Time 1 information from the managers and staff of these organizations about perceptions about a) the suitability and practicality of TWH approaches for small businesses, b) the availability of WHP and OSH services and expertise within the community, c) the cost/benefits of their organization offering TWH information and services to small businesses, and d) the compatibility of TWH approaches with existing services the organization offers to small firms. These data are being collected over a series of open discussion meetings. Investigators are also working with the community organizations to plan outreach efforts to small, local firms from various sectors for Phase 2. Specifically, project investigators are facilitating meetings with the community organizations to plan recruitment activities, sectors to target for sampling, and qualitative interview data collection content and procedures. Community organizations are developing data collection content and procedures to ensure that employer perception data not only add value to the project but also to the community organizations' small business outreach efforts.

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Phase 2: Recruiting Employers; Time 1 Data Collection from Employers; Provide TWH Information and Services.

Public health departments are currently recruiting 20-25 small (5 to 50 employees) firms in each geographic location to participate in the project. They are being provided with resources from the project (incentives for the small businesses and payment for staff time) to accomplish this. Firms are being recruited from various sectors to maximize participation and to compare perceptions across sectors. A representative of each firm will be asked by health department personnel to answer questions about their perceptions of a) current WHP and OSH activities, b) the costs/benefits of TWH activities to the firm and to themselves, c) the resources that the firm would be willing to commit to TWH activities, d) the availability of WHP and OSH resources in the community, e) the compatibility of TWH approaches with existing systems in the firm, and f) assessment of their employees' health status. The health departments will recruit a person from each firm who knows how workforce issues are managed in the organization. Each interview will be recorded. The recordings will be shared with the research group (including community partners) in that state as soon as possible. The research group will provide feedback to the interviewers to assure data quality and consistent methodology throughout the study. Interviewers will also be familiar with industry-specific activities for each respondent so that safety and wellness activities probed for will be relevant to the respondents' business. Qualitative interview methods will be used, such that the interviewer will use their judgment during the interview to decide which content areas to address during approximately one-hour interview sessions.

In exchange for supplying this information, the firms will be offered sample TWH information and/or services over a one-year trial period. Services will be customized to the needs of participating firms while balancing WHP and OSH objectives. Community organizations will conduct focus groups with participating employers to further refine the customization of service offerings. Examples include blood pressure screenings, ergonomics training, nutrition counselling, and hazard recognition training. Specific intervention components delivered to participant businesses by community organizations will be documented so that intervention dose data can be included with analyses of Time 2 data. Sample recruitment materials include the following messages:

EXAMPLE OUTREACH MESSAGES
- We will partner with you to:
    - Develop mission and vision for your wellness and safety program.
    - Develop goals and objectives for a customized wellness and safety plan.
    - Implement the wellness and safety plan.
    - Provide aggregate data reports for screening if there are over 20 participants at your company.
    - Support you in applying for the safety and wellness grants.
- Free services may include:
    - Access to consultant expertise for wellness and safety
        - 2-3 hours over 2-3 visits, as well as communication via phone or email.
    - Wellness/safety assessment
    - Wellness/safety strategic plan
    - Creative suggestions for enhancing your wellness and safety programs and culture
    - Participation in Wellness days for your employees to include:
        - Blood Pressure screening day with Health risk assessment
        - Education day: topic to be determined (know your numbers or taking care of your Heart)

Phase 3: Time 2 Data Collection; Analysis; Model Development; Model Diffusion.
NIOSH investigators will collect Time 2 data from the staff and managers of the partnering community organizations approximately one year after the Phase 1 data collection from that group. Similarly, Time 2 data will be collected from the participating small firm owner/operators, managers, and employees approximately one year after Phase 1 collection. While the small firms may be incentivized to participate by the services they received over the previous year, a monetary incentive will be offered to the small firms to participate in this second round of data collection. Time 2 data will be compared with Time 1 data on a case-by-case basis to assess changes in attitudes, knowledge, and reported behaviors.

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Impacts include changes in perceptions of the community organizations and the small firms about a) their own capacity to engage in TWH activities and the nature of those activities, b) the availability of community TWH resources, c) perceptions of the costs/benefits of TWH activities for small firms, d) the compatibility of TWH with existing small firm systems, and e) employees' health status. Time 2 data collection discussion and interview items will be similar to Time 1 data collection items, with some minor alterations. Data will be analyzed using qualitative analysis methods to identify components of a model of diffusion of TWH to community organizations and small firms. While this project will not allow a large enough sample to adequately test such a model, the project will diffuse the proposed model to national, regional, state and local public health and other organizations for their consideration.

3 Preliminary Results

Following a series of several discussions with intermediary participants, the following responses emerged from notes recorded during these discussions. Selected intermediary responses are organized around thematic questions that were included in discussions with each group of intermediaries.

What is your reaction to TWH? Does it make sense?
- Our organization thinks about it in terms of preventive health maintenance and post-injury care. (Healthcare Provider B)

How compatible is the "TWH for small businesses idea" with the past experiences, existing range of program products, and strategic directions of this organization?
- Our organization thinks it seems fairly compatible since they are already doing some similar activities in both domains of WHP and OSH. (Healthcare Provider B)
- Currently, there are no programs at the HD that deal with TWH that include OSH. There are specific work life programs that are geared towards employees for the city conducted by a health care provider. (Health Dept A)

How difficult would it be for your organization to try delivering TWH ideas and services to small businesses?
- A barrier is that if something is not in job responsibility, you can't get people to do it. (Health Dept B)
- The main difficulty is a low number of employees per business – business may not be able to afford services. (Healthcare Provider B)

Compared to other business improvement ideas that your organization offers to small businesses, how difficult is the TWH idea to understand for people in your organization?
- Some might think of it as work vs. outside of work while others might think of preventive health maintenance vs. post-injury care. (Healthcare Provider B)

Would a subsidy make a difference in the willingness of your organization to offer TWH information and/or services to small businesses? If so, how would different subsidy levels make a difference?
- Money makes a difference; $17,000 seems like enough to contact, recruit, and interview about 20-25 businesses over a year. (Health Dept B)
- Money makes a difference. Offering approximately 30 businesses something small about 4 times per year seems doable for the roughly $20,000 available for a year of project funding. (Healthcare Provider B)
- Worker safety and health in the work place vs. tax credits or incentives; when small businesses have an opportunity to receive a financial reward, the option for financial incentives becomes the benefit most preferred by small businesses. (Health Dept A)

4 Discussion

Although this project is currently only partially completed, the results have yielded a number of valuable early conclusions. Smaller firms are difficult subjects for researchers because they are hard to identify, often short-lived, and frequently unmotivated to engage in activities not related to their core functions.

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As a result, they are studied less often. For example, the most recent analysis of the national survey of WHP omitted all firms with less than 50 employees (Linnan et al., 2008). This project addresses this deficiency by partnering with community organizations that are able to effectively reach smaller firms. In some cases a monetary recruitment incentive is not adequate to easily attract some businesses, particularly in industries such as construction. This is important for intermediaries to be aware of as they consider engaging smaller businesses in outreach efforts. Some smaller businesses may not be aware of or value engagement on both health promotion and occupational safety and health issues, and a greater economic incentive, or a stronger connection to their immediate business concerns may be needed to initiate a relationship between an intermediary and a smaller business.

In discussions with the participating intermediaries, we have found that the language used to describe a TWH approach is important to consider. In most cases it is easier for those new to the concept of TWH to use terms such as "workplace safety and wellness" instead of "health promotion and occupational safety and health".

Additionally, we found at an early stage of this project that intermediary participants which have primarily been focused on safety are likely to disengage if there is no top level support for providing wellness/health promotion assistance. Intermediary partners must have top level support, individual interest that adds to their motivation, and a desire to work with small businesses. Likewise, we found that healthcare organizations that are already engaged in offering wellness services are receptive to considering the integration of their service offerings with those of occupational safety and health service providers.

Preliminary results have also suggested the need for initial subsidization of TWH outreach efforts to small businesses, not only for the businesses in the target audience but also for the community organizations which are identified as strong potential intermediaries. The intermediaries may be open to trying out new or added assistance for small businesses, and they may see such new service offerings as compatible with their existing practices, but without assistance from the initiator to begin testing a new service offering they are unlikely to try new approaches to assisting smaller businesses. In early discussions with intermediary partners we have also found that they are highly interested in finding ways to pool resources among small businesses to create greater potential value as a client for health promotion and health protection service vendors. Intermediaries currently involved with the project have begun to explore ways to create collaborative groups of small businesses within neighborhoods or within sectors of industries to make providing TWH assistance more feasible.

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4.1 Future Plans

Future project activities will include collecting data regarding perceptions about TWH activities and their value to small business participants after 1 year of services and assistance has been provided. We will also collect final data at the intermediary organization level regarding changes in perceptions about TWH.

It is expected that this project will yield new information about the value and optimum content of TWH activities in smaller firms, and perceptions of owner/operators about the costs and benefits of TWH for themselves and for the business. It will also yield information about the perceived costs/benefits to community organizations of adding TWH for smaller firms to their information and program offerings. Future project activities will include using multiple channels to communicate with intermediary organizations to encourage them to help their networks learn about and use TWH activities as value-added to their relationships with small businesses.

The community organizations that are participating in this project will also be dissemination partners. Their participation in the research will give them credibility for the dissemination effort. New information will be packaged to reach state and local health departments, local chambers of commerce, healthcare providers, trade associations, insurance companies, and safety organizations. The goal of the dissemination effort is to increase the promotion of small firm TWH concepts and activities by chambers, health departments, and healthcare providers by providing a model for intervention.

Based on this research, NIOSH will work with community organizations and small businesses to design a model for implementation of TWH services and programs that takes into account the motivations and resources of both small businesses and community organizations. NIOSH will also evaluate shifts in perceptions over time as exposure to TWH approaches accumulates during the project.

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Three Dutch tools for online risk assessment of physical workload

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Abstract. In 2009 the Dutch Ministry of Social affairs and employment started a research program to accommodate Dutch companies in their obligation to protect employees from health and safety risks. As part of this program TNO developed three tools for the online assessment of work related risks of musculoskeletal disorders: the checklist for physical load, the Hand Arm Risk assessment Method (HARM) and the Working Posture Risk Assessment tool (WRAP). This paper describes the three tools and their development process.

1 Introduction

Musculoskeletal disorders (MSD's) are a major cause of sick leave in the working population. In the Netherlands, around 38% of work-related sick leave days in the Netherlands are caused by MSD's (NEA, 2013). Epidemiological evidence points to a strong and consistent association between occupational risk factors and musculoskeletal disorders (Harkness et al., 2003; Punnett and Wegman, 2004; National Research Council and Institute of Medicine, 2001). Despite decades of measures targeted at the prevention and management of work-related musculoskeletal disorders, these disorders remain a major cause of work-related poor health (Eurostat, 2010). In a European survey (Eurostat, 2010), 61% of the workers indicated that they experienced musculoskeletal problems.

To tackle musculoskeletal health problems at the workplace, occupational health and safety practitioners need suitable risk assessment tools. Whilst there are a number of methods available users are often reluctant to apply them due to their complexity, or a general lack of knowledge about the most appropriate tools to use (Takala et al., 2010).

Thus, especially for SME's, these tools need to be able to identify harmful work tasks but also be quick and easy to use without specific knowledge or training. Starting in 2007, we developed three tools meeting these criteria:

- a Checklist for physical load, for a level I general risk assessment on physical load, to distinguish between safe (green) and possible harmful (red) work tasks. In case of a red assessment, a level II risk assessment is recommended;
- the Hand Arm Risk assessment Method (HARM; level II) to identify hand-arm related tasks that cause a risk for arm, neck or shoulder complaints;
- the Working Posture Risk Assessment tool (WRAP, level II) to identify harmful working postures and movements.

In 2011, the complete set of instruments has been made available for free on:
https://www.fysiekebelastingbeoordelen.tno.nl/en/ (the paper based Hand Arm Risk assessment Method (HARM 1.0) is available since 2009).

In this paper, we describe the development of these three tools and present their main features. For more detailed information we refer to the website, where not only the tools but also publications on the development and the validity of the tools can be found.

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2 Checklist for physical load (level I risk assessment)

2.1 Development of the Checklist for physical load

The major goal of developing the checklist was to meet the companies need for a 'level I' quick scan for physical load. The need for such a tool was a result from a field evaluation of HARM (level II) that showed that the use of the method was still quite complex in practice, especially within SME's. This raised the need to develop a simple and quick checklist which can give the confirmation that HARM - or other level II assessment tools - really need to be applied.

The development started with defining criteria that should be met. The target group consisted of the ones responsible for a company's working conditions, e.g. injury prevention officers, health and safety coordinators, personnel officers, human resource managers or, in small companies, the manager. Most of all the checklist should be easy to use, should take all relevant load aspects as indicated in figure 1 into account, should give a rough indication of possible risk factors and give a recommendation to perform a more detailed risk assessment on load aspects that appear to be hazardous. Therefore, the appropriate level II instruments were defined, as listed in figure 1. The level II tools were selected based on free availability (in Dutch) and the general familiarity with the tool.

We did not find a complete checklist, covering all aspects of physical load. Therefore we developed a new checklist, with the advantage that we could develop it in such a way that the results are in line with the level II methods. To achieve this, the checklist questions are simplifications of the follow up instruments. In order to keep it simple, we used 'yes/no' questions. Furthermore, it was decided to use a 'green-red'-traffic light. Reason for omitting the amber light was a combination of underlying goals of the checklist and the low distinctive power. Users of the checklist are believed to be primarily interested in a first indication of possible risks and the necessity to perform level II assessments. Regarding this goal, green would mean no additional assessment, amber and red would mean a need for additional assessment(s). The second reason is based on practical considerations; the distinctive power between the three categories (green-amber-red) is reduced due to the simplification in questions. Therefore it is more reliable to use only two categories. The threshold between green and red was chosen in an expert group. The main criteria for these decisions were somewhat contradictory: the checklist had to be protective for workers and thus be able to detect risks (reddish-ambers). On the other hand, a main purpose is to make the assessment process easier and more effective for companies. Consequently, the checklist should not be 'too protective' in suggesting a level II assessment for risks that are 'barely amber'.

After developing the first version of the checklist and thresholds, tests were done comparing the results of the checklist with the corresponding level II instruments (for five to ten tasks per aspect). Based on the results of this comparison, the checklist was adjusted.

Level I		Level II
aspects in checklist:		*follow up instruments:*
lifting and carrying	⟶	NIOSH (lift) and KIM (carrying)
pushing and pulling	⟶	KIM pushing/ pulling
hand- arm tasks	⟶	HARM
working postures	⟶	WRAP
work with display units	⟶	checklist VDU work (in Dutch)
vibrations (hand arm and whole body)	⟶	Vibration Calculators HSE
energetic over load	⟶	no follow up tool, advice in text
energetic under load	⟶	no follow up tool, advice in text
presence of physical complaints	⟶	no follow up tool, advice in text

Fig. 1. The structure of the assessment process: companies start by applying the checklist. If this results in a red traffic light, a risk may be present and a level II assessment should be done. For green

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lights the level II assessment is not required. If a specific risk is presumed, employers can also directly perform a level II assessment (without applying the checklist first).

Fig. 2. Example of a step in the checklist. By clicking on the 'i' additional information such as additional descriptions or pictures are shown.

In order to resolve the 'red aspects', the user is recommended to apply a level II assessment tool. For a more detailed assessment of hand arm tasks we refer to HARM and for working postures we refer to WRAP. For subjects on which there were no tools available that met these criteria, a written recommendation is given. For example, this is the case for energetic over- and under load.

2.2 Description of the Checklist of physical load

The 'level I' checklist consists of nine steps, covering the 9 aspects of physical load that were mentioned in figure 1. The checklist is to be used on task level. The questions to be answered in each step consist of 'yes' and 'no' answer categories.
For assessing a task, the user needs to answer the questions of all steps. If certain aspects are not relevant for the task, the more detailed questions on this aspect will be omitted. For example, if the question: "Are work tasks performed in which especially arms and hands are active while legs and body are inactive, for at least 30 minutes a day?" is answered with 'no', the more detailed questions on hand-arm tasks will not appear and do not need to be filled out. If aspects are relevant for the assessed task, the user is requested to fill in the more detailed questions.

After answering all questions, a traffic light per step shows if an increased risk of musculoskeletal symptoms is present (red traffic light) or absent (green traffic light). In case of a red traffic light, it is recommended that a specific level II assessment tool is used to perform a more detailed risk analysis. Obviously, the user can also decide to use another tool, for example a sector specific tool.

3 The Hand Arm Risk assessment Method (HARM)

3.1 Development of HARM

To illustrate the development process of HARM a summary of this process is given below for HARM2.0.

3.1.1 Establishment of a scientific committee

A scientific committee with five Dutch researchers on the topic of musculoskeletal disorders and two experts on musculoskeletal load from the Dutch Labour Inspectorate (central government body

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responsible for monitoring and supervising compliance with labour legislation) was established to discuss major issues and take decisions.

3.1.2 Defining criteria

The development phase was initiated by defining a set of criteria that the method had to comply with. The scope of the method and requirements on the content and applicability were defined and agreed upon by the scientific committee. These requirements are described in Table 1. The requirements focus on the need of companies, specifically SME's, for a tool that can distinguish between high and low risk tasks, is easy to use, is not time consuming and presents feedback on relevant risk factors that need to be addressed.

Table 1 Summary of criteria and starting points for the tool

Field of application	The tool is targeted at companies, e.g. occupational health practitioners or ergonomists (not employees) The tool is applicable in all branches and for all tasks The tool is applicable for risk assessment of the adult working population (ages 18-65), irrespective of gender
Usability	The information needed for a risk evaluation is easy and quick to collect The tool is easy to use for employers without a training The results are easy to understand, using a traffic light model The tool gives feedback on risk factors that are present and most prominent
Quality	All relevant risk factors are taken into account; the selection and weighting of risk factors is predominantly evidence based The tool can distinguish between high and low risk tasks (reliability and validity)

3.1.3 Literature search

To identify the relevant risk factors for musculoskeletal disorders in hand arm tasks (for HARM) a literature study was performed. We mainly searched for recent reviews and additional studies. The result of the literature study for the development of HARM was presented earlier in Douwes & de Kraker (2014). Based on this literature and the opinion of the scientific committee, the relevant risk factors were defined to be:

- static force exertion
- hand-arm vibration when using powered tools
- deviation from a neutral wrist position (all directions)
- repetitive force exertion
- movement frequency of arm/hand
- elevation (anteflexion/abduction) of the shoulder/upper arm > 20°
- noticeable neck flexion or extension
- elbow flexion > 90°

The literature review was also used during the development of the algorithms as one of the sources for assigning weights to the different risk factors in the method (see 2.1.6).

3.1.4 Evaluation of existing methods

The next step in the development was to study the extent to which existing methods fitted the criteria listed in Table 1. The results of this review are presented in Douwes & de Kraker (2014). The methods that were evaluated are: the Strain Index (SI), the Occupational Repetitive Actions (OCRA), the Hand Activity Level (HAL), the Rapid Upper Limb Assessment (RULA), the Key Indicator Method Manual Handling Operations (KIM MHO) and the Health & Safety Executive (HSE) upper limb risk assessment method. The results of this study showed that the KIM MHO fitted our criteria best. Especially the

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facts that the KIM MHO 1) takes most of the relevant risk factors into account, 2) assesses the risk of neck-shoulder as well as upper limb symptoms, 3) is easy to use for practitioners without prior training and 4) has been extensively tested in practice, were judged to be important features. However, on some aspects the KIM did not meet our criteria and was therefore adjusted.

These adjustments concerned:

- a simplification of the force section: some categories of force magnitude were combined because there was little difference between them, and they were expected to be difficult to distinguish by the users of the method;
- an elaboration of the postural section of the tool: all postures that were found to be a risk were described separately and duration categories of postures were added;
- adding the use of vibrating hand tools as a separate risk factor;
- adding some 'other factors' that were found to be relevant;
- adjusting the relative weights of the risk factors to the 'relative risks' found in literature and from expert opinions.

N.B. When HARM was developed the KIM MHO had not yet been validated.

3.1.5 Ranking of risk factors using the paired equations method

To rank the different risk factors the 'in pairs equations' method (Dieën and Hildebrandt, 1991) was used. Participants were 21 Dutch experts in the field of musculoskeletal disorders. All predefined risk factors were presented to the experts in pairs. The experts were asked to indicate which risk factor in each pair contributes most to the possible development of arm, neck or shoulder symptoms. Using these scores, frequency proportions and z-values (relative position with regard to the average) were calculated. The z-values were subsequently converted to calibration units, using a standard conversion table (Swanborn, 1982) and finally to assess relative weight factors. The weights of the different factors varied from 0.9 for 'elbow flexion with more than 90 degrees' to 2.3 for 'static force exertion for 15-30 seconds per minute'.

3.1.6 Developing the algorithm and prototype

The KIM MHO weighing factors were copied unless they differed strongly from the results of the literature study and the paired equations method. In that case, weighing factors were adjusted, based on a discussion with the scientific committee.

For the new risk factors (the comprehensive postural step, the use of vibrating tools and the 'other factors') new weighing factors were assigned. For example, because of a strong association between vibrating tools and musculoskeletal disorders found in literature the weight factor is relatively high. The criterion for sufficient breaks was based on a study on breaks and recovery in office work (Commissaris et al., 2006).

The algorithm to calculate the overall risk score of the task and the evaluation method (traffic light model) were copied from those used in KIM. The only exception made is that HARM uses three result categories (green, amber, red) instead of four; leaving out the category for workers who are less resilient.

A manual was written to explain each step of the assessment. With this information a paper version of the method was finalized. The resulting paper prototype of the tool was tested by ten companies, ranging from car industry to catering and from a hospital to a plant breeding station. This test yielded valuable information on the usability and face validity of the prototype. The companies' feedback was used to improve the prototype and develop a web based tool, HARM1.0. This tool was made publically available in 2012 on https://www.fysiekebelastingbeoordelen.tno.nl/en/.

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3.1.7 Reliability and validity studies

A reliability and concurrent validity study of HARM was performed, of which the results were presented in Douwes & de Kraker (2014). The results of these studies show a fair to good agreement in the risk evaluation (green/amber/red) between practitioners and expert-users (gold standard) on different tasks. On average, the total risk scores show good agreement between practitioners and expert users as well. On individual level, however, some practitioners made large over- and underestimations. Moreover, concurrent validity and reliability results were poor for some risk factors, especially for lower arm/wrist posture and force exertion. Using the results of the reliability and validity study adjustments were made, e.g. force frequency and duration were reduced from four to three categories, three arm elevation categories were reduced to two, illustrating pictures of postures were improved, a drawing of a 20° angle was added as a helping device for estimating neck and upper arm angles, the help text and manual were improved.

A study on the predictive validity of the improved HARM1.0 was performed. The results of this study are described in Douwes et al. (2014). In this study data from a three year prospective cohort Study on Musculoskeletal disorders, Absenteeism and Health (SMASH) were used. Structured observations of video recordings using HARM were made of 88 participants performing hand arm tasks. These video recordings were made at baseline of the SMASH study, whereas self-reported musculoskeletal symptoms were assessed both at baseline and during a three year follow-up. The results showed that employees with a HARM score of 50 or more (considered a high risk) had a significantly higher risk of upper limb symptoms than those with a HARM score of less than 50 at baseline (OR = 5.31; 95%CI: 2.10-13.39) and 3 year follow-up (OR = 5.11; (95%CI: 1.61-16.27). Thus it was concluded that HARM can be used to discriminate between tasks that pose a high or low risk of neck or upper limb symptoms.

With the results of these studies and using the experiences of users, the tool was improved again. The adjustments that were made concerned the reduction of the weight of task duration (step 1), simplification of force categories (step 3), clarification of two factors within 'other factors' and some changes in instructions and the manual. A description of HARM2.0 in its present form is given below. There is also a paper version of the tool, which contains an extra step for the calculation of the risk score.

3.2 Description of HARM2.0

The method is intended for the assessment of tasks involving the hands and arms, where lower leg and torso activity is minimal, e.g., assembly tasks, sorting products or sanding tasks. The method should only be used on task level, for:

- tasks that take longer than 1 hour per day in total and force exertions are applied. If awkward working postures without force exertions are present, WRAP is more appropriate;
- tasks involving one handed force exertions of less than 6 kg/60 N and
- all hand and arm tasks other than computer work.

It is recommended to use video recordings of the task for the evaluation. The risk assessment takes about 15-30 minutes and can vary with the complexity of the task and experience of the user. The risk assessment consists of 6 steps, which are explained below.

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Step 1: Task duration and breaks

In this first step, the average duration of the task needs to be estimated. The risk score for task duration is calculated by: task duration 1 hour. One point is also subtracted if the task is being performed for less than 3 days a week. In addition, if regular breaks are taken (i.e. if breaks of at least 7.5 min are taken every 1.5 h) the risk score is again reduced by 1 h. For example, an assembly task which is performed for 6 h a day, for 4 days a week, with sufficient breaks, would yield a score of 6 - 1- 0 - 1 = 4.

Step 2: Most active hand/arm

The second step aims at defining which hand/arm is most active and thus, needs to be the focus of the risk assessment. If it is not clear which hand/arm is the most active one, both sides need to be assessed and the highest risk score will be used for the risk evaluation of the task.

Step 3: Force exertion

For force exertion, a table is being used in which the level of force, frequency of force exertion and duration of force exertion are combined (see Fig. 3). Force level in HARM2.0 is

Fig. 3. Screenshot of the force exertion step. For each distinguished force exertion, the amount of force, the duration of force exertion (in seconds per minute) and the frequency (number of force exertions per minute) should be entered.

divided in three categories: forces up to 1 kg, 1-6 kg and peak force, e.g. hitting with a hammer. The duration of force exertion in seconds per minute is scored as <4, 4-30 and ≥ 30 s per minute. The frequency of force exertion is also divided in three categories: 1-4, 4-30 and ≥ 30 times a minute. To determine the total score for this step, the level, duration and frequency of all force exertions that are performed during the task need to be assessed. Each combination of the level and duration of the force exertion and each combination of the level and frequency of the force exertion yields a score. The maximum of these scores is the force score. The risk score for this step is equal to the maximum of these scores.

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Step 4: Postures

There are two categories for awkward postures that need to be assessed: 1) neck/shoulder and 2) lower arm/wrist postures (examples shown in figure 4). The neck/shoulder postures concern bending of the head (forward, backward, sideward), rotating of the head, a forward position of the head, an unsupported elevated upper arm (>20°) and shoulder elevation. The lower arm/wrist postures include extreme elbow flexion or extension, rotation of the lower arm and wrist movements in two directions. The relative duration of each posture needs to be estimated in three categories: 0-10%, 10-50%, ≥50% of the task duration. These categories are based on the literature and expert opinions. If two risk postures on one row occur within a task, the posture with the highest score should be scored. This step results in two risk scores, i.e. the maximum score for 1) all neck/upper arm postures and 2) all lower arm/wrist postures.
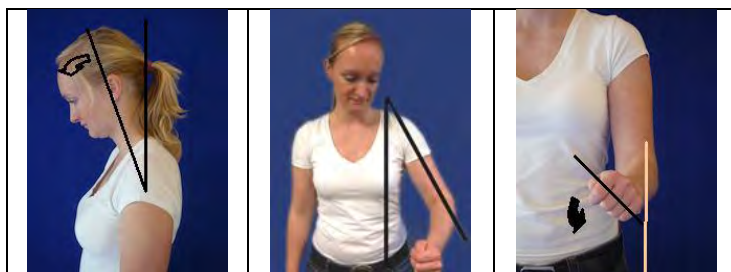
Fig. 4. Examples of awkward postures that are assessed when applying HARM.

Step 5: Using vibrating tools

The vibration levels that should be distinguished were defined using the Directive 2002/44/EC on the minimum health and safety requirements regarding vibration (0-2.5 m/s^2; 2.5-5 m/s^2, 5-10 m/s^2 and >10 m/s^2). Since practitioners will often not be able to measure the level of vibration at the workplace, a simple alternative was developed. This alternative consists of descriptions of perceivable characteristics, which indicate the different levels of vibration. For example, 2.5-5 m/s^2 is indicated by: 'vibration not visible for the observer but perceivable by the user of the hand tool'. The observer needs to choose one of these descriptions by making observations, interviewing the worker and holding the arm of the worker to compare the vibrations with the descriptions of HARM. Based on literature and expert opinions risk scores were assigned to the combination of level and duration of the vibration.

Step 6: Other factors

Five other possible risk factors are included, for which the scientific evidence was limited or conflicting but experts indicated their relevancy. These include: not being able to take autonomous breaks, working with cold or wet materials without gloves, the occurrence of disruptions in tasks that require a high level of concentration, bad gripping conditions which increase the grip force (e.g. because of gloves) and high precision demands of the hands or fingers. The risk score for this step depends on the number of factors present, i.e. 0.5 point for each factor present.

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Step 7: Risk evaluation

To evaluate the total risk, the sum of all factor scores is multiplied with the 'task duration score' of step 1. The resulting risk score is evaluated using a traffic light model. In this model, green means that there is no increased risk (<30 points), amber means that there is an increased risk (30-50 points) and red means that a seriously increased risk is present (≥50 points). If work related complaints already exist, measures should be taken irrespective of the risk evaluation. Apart from this result the tool also shows:

- main causes of the risk: to identify the dominant risk factors - i.e. the factors with the highest weight or 'risk score' resulting from the risk assessment - this is important to enable occupational safety and health practitioners to target their preventative action;
- a short description of a stepwise approach: the steps to be taken to reduce the risk of developing upper limb symptoms;
- general recommendations for risk reduction: for each of the risk factors a few examples of measures that may reduce the risk are given, e.g. improving the layout of the workstation to reduce arm elevation while reaching for products to be handled.

4 The Working Postures Risk Assessment tool (WRAP)

4.1 Development of WRAP
The development process of WRAP was comparable with that of HARM. However, since the WRAP does not include an overall risk assessment there was no need to rank risk factors. The development started with a review of epidemiological literature on risk factors (body angles), time factors (duration, frequencies and recovery times of risk factors) and assessment factors (thresholds, relative weights, scoring). Already existing methods and experimental literature were also consulted. Very few results on time factors and recovery times, were found in literature. Moreover, results were sometimes difficult to compare because studies used different angles and cut off points for duration. Because the literature review did not provide a thorough basis for further development, an expert session was organized to fill in the gaps. In this consensus meeting, the thresholds were based on the literature and expert opinion on the health risk but the practical usability was also considered, i.e. the descriptions of the threshold body angles should be unambiguous, easy to understand and observable for all users.

After the literature review and expert session, five (categories of) risk factors were included in the first version of the tool. For each risk factor it was determined which time factors need to be known in order to assess the risks (steps are described in section 4.2). All postures are described in text and illustrated by photographs. For postures that are expected to occur with a high frequency a help form can be consulted, with which the user, step by step, is guided to calculate the total duration per day.

A first test with six users in six different companies was performed. The results showed a good practical usability and the users found the output relevant, usable and clear. Some textual adjustments were made based on these test results. A validation study has been performed, of which a publication is submitted (Coenen et al., submitted).

4.2 Description of WRAP
The WRAP risk assessment involves six successive steps, in which the user indicates how long a variety of unfavourable working postures are maintained in the course of the task under investigation. The information needed is collected by close observation of the posture and movements of the employees performing the task. The outcome, that is, the risk of musculoskeletal symptoms, is given as a traffic light colour (green, amber, red) for each posture.

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Step 1: Task description and duration

In this step the task description has to be given with the duration in hours per average working day and duration in number of days per week.

Step 2: Kneeling, squatting and standing

For each of the three positions, the continuous duration and the total duration per working day has to be chosen. The latter is calculated as the sum of all continuous durations on the day in question. In this context, 'continuous duration' means the time that an employee spends working without interruption in the given posture. The categories of continuous duration for kneeling and squatting are: 0-15, 15-30 and >30 minutes. For the continuous duration of standing the categories are longer: 0-1, 1-2 and >2 hours. For the total duration per day for kneeling and standing the user can choose between 0-30, 30-60 and >60 minutes per day. For standing these categories are 0-4, 4-6 and >6 hours a day.

Step 3:Awkward and twisted positions of the trunk

In this step the total duration of the working day in which workers have to work with a clearly visible awkward trunk position (making an angle of more than 30 degrees with the vertical) has to be estimated. The categories are 0-60 minutes, 60 minutes to 4 hours and >4 hours a day. It should also be indicated whether the position is static (usually maintained for more than 1 minute at a time) or repetitive (usually occurring more than twice a minute).

The same has to be done for a clearly visible rotated position (of the trunk). Categories for this position are 0-30 minutes, 30 minutes to 2 hours and >2 hours. The indication for the static or repetitive character of the task has to be given with the same descriptions as the awkward trunk position.

Step 4 Bending and twisting of the neck

Step 4 is similar to step 3, but instead of trunk positions, it regards positions of the neck. If workers have to work with the neck visibly bent – forwards OR backwards – (so as to make an angle of more than 20 degrees with the neutral position), the user has to determine the total duration per day by selecting one of these three categories: 0-4 hours, 4-6 hours or >6 hours a day.

If a visible twisted and at the same time bent – forwards OR backwards – (so as to make an angle of more than 20 degrees with the neutral position) is present during the task, the total duration has to be given by choosing between 0-60 minutes, 60 minutes – 4 hours and >4 hours a day.

Step 5:Upper arm elevation

For upper arm elevation in step 5 the total duration of work with a clearly visible elevated upper arm (elevated by more than 30 degrees to the front or the side, and without support for the upper arm)

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has to be determined. Categories to choose from are 0-30 minutes, 30 minutes – 2 hours and >2 hours a day.

Step 6:Extreme positions of the wrist (and some other extreme postures)

For clearly visible extreme positions of the wrist (bent by more than 30 degrees to the front or the side, and without support for the upper arm) the total duration per day (by adding all the periods spent in this particular position in the course of the working day) has to be given by choosing between four categories: 0-10 minutes, 10-30 minutes, 30 minutes – 2 hours and >2 hours.

Besides, it has to be indicated whether the positions are static (usually maintained for more than 1 minute) or repetitive (usually occurring more than 15 times a minute).

In this last step four other extreme postures are assessed as well. These are: backward bending of trunk, elevation of the upper arm by more than 60 degrees, maximum bending of the elbow and maximum extension of the elbow. For each of these postures the user has to determine how many times these extreme positions occur. Categories to choose from are: never or hardly ever, sometimes but never for a long period or very frequent, regularly: for a long period or very frequent, regularly: for a long period of time or very frequent and often or almost all the time.

Fig. 5 Screenshot of step 3: twisted position of the trunk. Examples of the position to be assessed are given. The user has to select the most appropriate options.

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The Corporate Sustainability Performance – Financial Performance Link Revisited

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Abstract. Ever since the mid-1970s a multitude of studies linking corporate sustainability performance (CSP) measures and financial performance measures have been conducted. Until today a plethora of corporate sustainability performance measures have been developed. A universally accepted CSP definition of construct does not (yet) exist. Since we don't exactly know what CSP entails, CSP measures should (at least) be considered conceptually flawed for that matter. These measures may measure CSP, but it cannot be excluded that other (overarching) phenomena are measured. There are leads suggesting that CSP measures are reflections or representations of corporate culture, suggesting that corporate culture drives FP. If so, managers should not focus on increasing CSP to boost FP, but create a high culture for sustainability. If corporate culture drives financial performance, the investment community can also benefit through improving its decision making processes by including CSP measures that reflect corporate culture.

1 Introduction

Today the business-society relationship ranks high on corporate agenda's. The reasons why business(es) are interested in this relationship can be manifold. Companies may interested because of risk-management purposes, or because external stakeholders expect them to. Reciprocity may be another reason, meaning that companies allegedly owe something to the communities they are part of. But also guilt about reaping rewards without compensating others fairly may be a reason for articulating the business - society relationship (Margolis et al., 2007).

Yet another reason for business may also articulate the business-society relationship is the assumption that pays off to do so. This is at least what some surveys are suggesting. A point in case is MIT Sloan Management report "Sustainability: The 'Embracers'Seize Advantage"[11]. In this report, that was published in 2010, the researchers claim that companies that are really into sustainability outperform companies that are just slightly supportive to the sustainability concept. This result may be an incentive for companies to boost their financial performance by improving their sustainability performance. But to what extent are claims made by organizations like MIT supported by scientific research. Does articulating the business society relationship always pay off?

Research on the CSP-FP[12] link first started in the mid nineteen seventies. One of the first to research the relationship was Milton Moskowitz. Many researcher followed suit and until now probably hundreds of studies articulating the CSP-FP link have been carried out.
In the year that followed also review studies were conducted. Margolis et al. (2007) counted 16 of these review studies. Overall, these studies show that corporate misdeeds are costly to companies, and that CSP does not systematically destroy shareholder value, suggesting that increasing FP would be an unlikely rationale for pursuing CSP.

In 2003 Margolish and Walsh published an overview study covering the 1970-2002 period. Of the sample of 109 studies using CSP measures as independent variables, 7 studies (almost 6.5 percent) indicate that CSP has a negative impact on FP. Of the other 102 studies, 54 resulted in a positive relationship (49.5 percent). The other 48 studies showed a non-significant (28, or 25.7 percent) relationship and 20 (18.3 percent) showed mixed results.

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[11] Source: http://sloanreview.mit.edu/reports/sustainability-advantage/
[12] In literature the business-society relationship is expressed in a variety of concepts and constructs. In this paper the term *corporate sustainability performance* will be used to generically denote the business-society relationship

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In the same year Orlitzky (2003) meta-analyzed 52 studies linking CSP (independent variable) and FP (dependent variable) and found that overall CSP and FP are positively linked, suggesting that companies that show superior CSP also show superior financial performance.

Overall, the conclusion should be that there is no evidence that articulating the business-society relationship pays off. The results are inconclusive and ambiguous at best. According to Ullmann (1985), one the main reasons for finding inconsistent results is a lack in theory, meaning that the findings are not backed by robust theoretical frameworks. He states that

'What should be looked for is the missing element that, when included in the model would help explain the varying nature of the relationships among social disclosure and social and economic performance, thereby making it possible to forecast the circumstances under which correlations and their directions can be expected. This missing element is strategy' (p. 551/2)

Referring to Ullmann, strategy might be the missing link, suggesting that a successful CSP strategy is likely to result in improved or superior financial performance. Consequently, an unsuccessful CSP strategy is likely to result in decreased or inferior financial performance. But simply correlating CSP and FP measures is not very helpful, since it does not contribute to understanding the CSP_FP relationship.

Todate a variety of CSP measures exist that claim to capture the CSP concept. However, there are some doubts as to whether these CSP measures truly reflect or represent corporate sustainability performance.
This paper is of an exploratory nature. It takes the reader en route to explore what CSP measures may (be inclined to) measure. The idea is that there may be a hidden message behind the measures that have been used thus far. If so, what is that message and what are the implications for managers, and the investment community?

Therefore the research question guiding this paper is: What do CSP measures signal, and how can the CSP-FP relationship be explained?

This paper is organized as follows. In section 2, constructs articulating the business-society relationship will be explored. In the third section, some CSP measures will be discussed and examined. In section 4 the topic of what CSP measures might be measuring will be dwelled upon. The link between culture and financial performance be explained in section 5. In section 6 some (tentative) conclusions will be drawn and in section 7 some implications for managers and investors discussed.

2 What is Corporate Sustainability Performance about[13]?
Todate a variety of constructs articulating the business-society relationship exist. Figure 1 presents a classification of 12 of these business-society constructs.

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[13] This section is largely based on Dommerholt (2009), pages 46-49.

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Figure 1: Classification of business-society constructs

Constructs	Categorization	Level of analysis
Corporate Social Responsibility	Normative (Instrumental)	Organizational
Corporate Social Responsiveness	(Normative) Instrumental	Individual Organizational
Social Issues Management	Descriptive	Organizational
Corporate Social Performance	Normative (Descriptive)	Institutional Organizational Individual
Sustainable Development	Normative	Institutional
Corporate Sustainability	Descriptive Normative	Organizational
Business Ethics	Normative	Individual Organizational
Corporate Social Policy Process	Descriptive	Individual Organizational
Sustainable Corporate Performance	Descriptive	Organizational
Stakeholder Management, Consultation and Dialogue	Descriptive Normative Instrumental	Individual Organizational
Corporate Citizenship	Normative	Organizational
Triple Bottom Line	Normative (descriptive)	Organizational

Source: Dommerholt (2009)

In the first column of figure 1 the various constructs are mentioned. These range from constructs that are relatively well known, such as Corporate Social Responsibility, Corporate Sustainability, Business Ethics and Triple Bottom Line. Other constructs, such as Corporate Policy Process and Sustainable Corporate Performance are less well known. Most of these constructs have in common is that they are divergent, indicating that various definitions exist of one and the same construct and that these are interpreted differently by different scholars.

Furthermore, all constructs are multi-dimensional implying that (combinations of) social, environmental and economic issues are focal. Besides, many of the constructs are also multi-faceted, meaning that these are about including and balancing interests of multiple stakeholders. This is confirmed by Dahlsrud (2008), who analyzed 37 definitions of corporate social responsibility and found that between 80-88 percent of the definitions include a stakeholder dimension, a social dimension, an economic dimension and a voluntariness dimension; 59 percent of the definitions cover an environmental dimension. Furthermore, 97 percent of the definitions comprise three or more dimensions.
However, it is not clear beforehand if the multitude of constructs of a definitional chaos or an evolutionary process. Signs of both have be observed.

In the second column the categorization of the constructs is mentioned. Construct classification refers to the classification of constructs based on Donaldson and Preston's (1995) typology. According to this typology a construct can be categorized as
- Descriptive (these constructs tend to describe and/or explain business behavior)
- normative (constructs tend to focus on the moral rightness/wrongness of actions: do (don't do) this because it is the right (wrong) thing to do).
- instrumental (constructs are aimed at reaching certain goals)

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Judged by their nature, most of the constructs can be classified as either instrumental or descriptive.

The third columns represents the levels of analysis: individual, organizational and institutional. The individual level focuses on individual managers managing stakeholder issues. The organizational level articulates the relationship between the company and its stakeholders, whereas the institutional level accentuates the relationship between business and society in general. As can be seen, most of the constructs focus at the organizational level.

Summarizing, it can be said that there is quite some variety in business society constructs and that a single universally agreed upon construct does not (yet) exist. Moreover, business-society constructs appear to be complex in the sense that they cover multiple dimensions.
Also the focus of the most business society constructs does not seem to be on how business can contribute to the good of society. Instead the constructs show how managing societal influences can contribute to the good of the company.

3 How is Corporate Sustainability Performance measured?
Corporate sustainability performance measures can be divided into two categories (Dommerholt 2009): uni-dimensional and multi-dimensional measures. Uni-dimensional measures usually comprise no more than one attribute to measure CSP. Examples of uni-dimensional measures are: pollution control (e.g. Spicer, 1978), CO_2-emissions (e.g. Saka and Oshika, 2014), product recalls (e.g. Bromley and Marcus, 1989), signing of the Sullivan Principles (Patten (1990), code of ethics (e.g. Webley and More, (2004), etc.

As was mentioned earlier, CSP constructs are complex constructs encompassing multiple dimensions and stakeholder interests (Carroll, 2000; Rowley and Berman, 2000). Therefore, uni-dimensional measures lack the necessary rigor to fully reflect CSP and must be considered conceptually flawed for that matter.

Multi-dimensional measures cover more than one attribute to measure CSP. Examples of such measures are reputational scales, screening instruments of sustainability rating agencies and content analysis classification schemes. These measures will now be briefly discussed.

Reputational scales

Reputational scales, measure a company's CSP reputation. Reputation is all about perception. These measures measure how companies' sustainability performance is perceived. However, performance perception not necessarily coincides with factual performance per se, implying that reputational scales not necessarily measure sustainability performance.

The Fortune Survey is an example of a reputational scale.

This survey covers the 8 attributes: Overall quality of management; Quality of products and services; Financial soundness; Value as long term investment; Use of corporate assets; Innovativeness; Ability to attract, develop and keep talented people and Community or Environmental Responsibility.

Reputational scales have been criticized for their lack of theoretical underpinning in the selection of attributes. Also attributes are considered equally important, although a theoretical underpinning is lacking here as well (Wood and Jones, 1995).

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Screening instruments of Sustainability Rating Agencies (SRAs)

Sustainability Rating Agencies have been active in the sustainability arena since the mid-1990s. Many of these SRAs started as a non-governmental organization, religious organizations, part of a bank department, etc (Shäfer, 2005).. Assessing companies' sustainability performance is the core activity of SRAs. The obtained information is usually passed on to a variety of stakeholders, particularly the financial community (Shäfer, 2005). Some of these SRAs have even gone beyond providing information and have launched ethical and sustainability indexes, like Sustainable Asset Management (SAM) and Kinder, Domini and Lydenberg (KLD[14]). SAM launched and still maintain the Dow Jones Sustainability Index family. The KLD methodology lies at the basis of various products and indexes, such as the SOCRATES-database and the MSCI KLD 400Social Index.

The KLD screen comprises the following social issues: Community, Corporate Governance, Diversity, Employee Relations, Environment, Human Rights and Product. The screen also includes a number of controversial business issues: Abortion, Adult entertainment, Alcohol, Contraceptives, Firearms, Gambling, Military, Nuclear Power and Tobacco. To enter the Index, companies first have to pass an ethical screening. Companies that are involved in controversial business issues will not be included in the index. Companies that are eligible to be included in the index will subsequently be scored on the social issues mentioned.

The SAM screen includes a questionnaire that companies have to fill in. This questionnaire comprises some 85 social, environmental and economic (mainly corporate governance related) criteria (Dommerholt, 2009). Although, SAM does provide some information on how the collected information is processed, the assessment procedure remains fairly obscure. We don't know how the scoring against criteria takes place, we also don't know how the various criteria are weighted opposite to each other. Furthermore, a theoretical underpinning of the contents of the screen as well as on how the data is processed cannot be discerned. However, this also applies to the KLD screening instrument (Dommerholt, 2009).

Content Analysis classification schemes

Content analysis can be described as a technique for gathering data that consists of codifying qualitative information in anecdotal and literary form into categories in order to derive quantitative scales of varying levels of complexity (abbot and Monsen, 1979). This methodology is mainly, although not exclusively used for analyzing social and environmental disclosures in annual reports (Dommerholt, 2009). The methodology involves two activities: (1) the construction of a classification scheme, and (2) devising a set of rules about 'what'and 'how' to code (Milne and Adler, 1999).

Ever since the mid-1970s we have seen a variety of classification schemes have been developed. Bowman and Hair (1975) used prose devoted to social responsibility in annual reports as a classification scheme. Wiseman (1982) used a list of 18 information items for analyzing annual

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[14] KLD Research & Analytics is part of MSCI, Inc.

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reports. She classified the attributes in four categories: Economic factors; Environmental Litigation; Pollution Abatement; Other Environmentally related information.

Patton (1995) used a classification scheme that had been developed by Ernst & Ernst, the forerunner of the Ernst & Young accountancy firm. This scheme encompasses seven categories: Environment; Energy; Fair Business Practice; Human Resources; Community Involvement; Products; Other Disclosures.

For content analysis classification schemes theoretical foundations of the contents of these schemes as well as the scoring procedure cannot be discerned. (Dommerholt, 2009).

Although multi-dimensional measures seem to be more rigorous than uni-dimensional measures, they should nevertheless be considered as conceptually flawed. The reason is that, since a universally accepted CSP construct does not exist, it is consequently not possible to produce a generally agreed upon CSP measure.

Furthermore, multi-dimensional performance is often measured by calculating overall instrument scores. The higher the instrument scores, the better CSP is considered to be.

Multi-dimensional performance measures usually comprise a variety of attributes on which companies are scored. However, in most cases the scoring procedures are the very hallmark of sustainability rating agencies, implying that it is not clear how the rating process (including scoring procedure) takes place (Van den Brink, 2002, Dommerholt, 2009). Apart from that, the outcomes of the rating process may not be reliable (Chatterji and Levine, 2006).

Summarizing, we can say that an all-encompassing and universally accepted definition and operationalization is still lacking. Since we don't exactly know what CSP is, consequently each CSP measure must be considered conceptually flawed. This causes a serious problem, because if we don't exactly know what CSP entails, then how to measure it? But also, if the currently existing CSP measures must be considered conceptually flawed, what then do they measure?

4 What do CSP measures measure?
To answer this question is quite a challenge. We do have some guidance in trying to find a possible answer. Ullmann (1985) states that the missing link in the CSP-FP discussion is 'strategy'. What he means is that when CSP is an integrative part of a company's strategy aimed at gaining a competitive advantage, CSP will have a positive impact on corporate financial performance. However, is whether 'strategy' really the missing link? Or are CSP measures reflections of a company's strategy?

The assumption in this paper is that not 'strategy' is the missing link, but 'corporate culture'.

As regular corporate strategy textbooks teach, corporate culture and strategy are very much related concepts. Corporate strategy is embedded in a company's culture, implying that culture can be seen as a driver for corporate strategy.

Corporate or organizational culture is about the taken-for-granted assumptions and behaviors that make sense of peoples' organizational context. (Johnson et al., 2011). These taken-for-granted assumptions and behaviors reflect the values and beliefs an organization endorses. These values and

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beliefs should be part and parcel of an organization's mission and/or vision statements. Since values and beliefs drives corporate culture, these also indirectly drive corporate strategy. However, this does not necessarily mean that a strategy always reflects the true values and beliefs a company allegedly endorses. A point in case is Enron, the US-based energy giant that went bankrupt in 2001 because of fraudulent activities causing financial distress to many of its shareholders and employees. The company was widely respected for its corporate social responsibility: it was ranked one of the 100 best companies to work for; received several environmental awards; issued a triple-bottom-line report; established a social responsibility task force; developed codes of conduct covering security, corruption and human rights supported progressive climate change policies; and was known for its generous philanthropic contributions (Vogel, 2006;38).

In the Enron case, the visible or conveyed values clearly were not the factual strategy drivers. This is something to be aware of when discussing the CSP-FP link.

Below the assumption that culture and not strategy is the missing link will be explained.

Graves and Waddock (1999) and McWilliams and Siegel (2000)

Samuel Graves and Sandra Waddock, and Abagail McWilliams and Donald Siegel produced a number of papers articulating the CSP-FP relationship. The papers that will be used to elucidate that 'culture' might be the missing link are 'A Look at the Financial-Social Performance Nexus when Quality of Management is Held Constant' by Graves and Waddock (1999) and 'Corporate Social responsibility and Financial Performance: Correlation or Misspecification?' by McWilliams and Siegel (2000).

Graves and Waddock (1999) measured CSP by taking the community, product and employee and diversity attributes of the KLD measure discussed above. They particularly selected these attributes, because they considered these to be direct evaluations of stakeholder groups (i.e. community, customers and emplyees). Subsequently, these measures were averaged into a single unweighted CSP index.

For financial performance traditional accounting measures : ten-year total return to shareholders, as return on assets (ROA) and return on sales (ROS) were used. As control variables, they used the debt-to-asset ratio as a proxy for firm risk, total assets as a measure for firm size, and 'quality of management' attribute of the Fortune survey.

The results show a strong correlation between the CSP index and all three financial performance variables.

However, if regressions are run, the 'quality of management' as an independent control variable strongly and positively relates to all three financial performance variables, whereas the impact of the independent CSP variable on financial performance variables is negligible. Interestingly, the CSP index and the quality of management index highly correlate, suggesting that CSP measure is measuring the quality of management.

McWilliams and Siegel (2000) took as a measure of CSP a dummy variable, with a value of 1 if a firm is included in the Domini Social 400 Index (DSI 400) and 0 in case it is not. The DSI is an ethical index based on the KLD screening methodology mentioned above. When regressions are run using CSP as the independent and FP as the dependent variable, a strong and positive relationship appears to exist. However, if an R&D intensity variable (defined as R&D expenditures/sales) is inserted into the relationship, this results in a strong and positive relationship between the R&D variable and financial performance and the CSP variable has a neutral impact on FP. Interestingly, the CSP variable and the R&D variable appear to highly correlate, suggesting that the CSP measure measures R&D intensity.

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When comparing the results of both studies, we see that both CSP measures that are rooted in the same KLD screening methodology, measure 'quality of management' as well as 'R&D intensity'. If a company is guided and governed well by high quality managers, it makes sense to suggest that this will impact its competitive edge and ultimately its financial performance. Because well trained and highly committed managers, are able to make a difference in developing differentiation strategies and/or low cost strategies.

It also makes sense to suggest that highly innovative companies outperform the competitors by developing new product-market combinations which may ultimately result in a competitive advantage and improved financial performance. Innovations may also result in more efficient production methods and material use, ultimately resulting in a lower cost profile.

If similar CSP measures measure quality of management as well as R&D intensity, then obviously the CSP measures measure an overarching phenomenon that includes both concepts. If CSP correlates highly with quality of management as well as R&D intensity, it makes sense to suggest that quality of management correlates positively with R&D intensity, implying that a high quality of management levels come with high R&D intensity levels, and vice versa.

If indeed quality of management and R&D intensity are both tokens of the same overarching phenomenon, could this phenomenon then be corporate culture? If so, then it is not quality of management or R&D intensity drive financial performance, but corporate culture.

But do we have any prove that corporate culture indeed drives financial performance? The answer is 'yes'. The prove is provided by a study conducted by Eccles et al. (2011). This study will be discussed in the next section.

5 The link between culture and financial performance
In their study Eccles et al. (2011) distinguish between high sustainability and low sustainability companies. High (low) sustainability companies are companies that have voluntarily adopted a substantial number of social and environmental policies for a significant number of years. Low sustainability companies have adopted almost none of these policies (p.5). The idea behind these measures is that companies that voluntarily adopted a substantial number of social and/or environmental policies can be considered to have a high culture for sustainability. The means that companies that can be qualified as early and long-lasting sustainability embracers are very much value driven.

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The findings show that high sustainability companies are more likely to outperformance low sustainability companies in a number of domains[15]. In figure 2 an overview of some of the key findings are included:

Figure 2: Some of the key findings by Eccles et al. (2011)

Domain	Results
Governance	• most of the high sustainability companies have assigned formal responsibility around sustainability to the board • Senior executive incentives are more likely to be aligned with sustainability (perception) metrics.
Stakeholder engagement	• adopt practices of stakeholder engagement • Identify stakeholders for long term success • come to a common understanding with their stakeholders on relevant issues
Time horizon	• adopt a long time-horizon in communication with key capital market participants • attract dedicated rather than transient investors • have more long-term investors in their investor base
Employees	• More concerned about skills and working conditions • Are likely to have greater commitment towards employees
Customers	• Differences between 'high' and 'low' sustainability cultures are not very pronounced
Suppliers	• High sustainability performers are more likely to select and evaluate suppliers on environmental and social standards
Performance	• Investing $1 in the beginning of 1993 would have grown to $22.6 ($15.4) for high (low) sustainability companies • Annual abnormal performance is higher by almost 5% • Stock price volatility of high sustainability companies is lower (risk is lower) • Investing $1 in the beginning of 1993 would have grown to $22.6 ($15.4) for high (low) sustainability companies • Annual abnormal performance is higher by almost 5% • Stock price volatility of high sustainability companies is lower (risk is lower)

Figure 2 tells us that compared to their less sustainable counterparts, high sustainability companies show higher financial performance in terms of market as well as accounting rates of returns.

However, there is more. Not only do companies with a high sustainability culture financially outperform low sustainability companies, they also outperform the less sustainable counterparts in many other dimensions as well. For companies with a high culture for sustainability, sustainability is a core governance issue and they take their stakeholders seriously by involving them in decision making processes. These companies also have a long time horizon (less short-termism); they treat their employees better; and they set higher demands on their suppliers' sustainability performance.

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[15] In this paper an overview of key findings is presented.

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Treating employees and stakeholders well may very well be the explanation for the high sustainability culture companies to financial outperformance their less sustainable counterparts. Treating employees well, may result in higher productivity rates, lower absentee rates, etcetera, thus driving down costs. Treating suppliers well, may result in innovative collaboration creating win-win situations for suppliers and their customers.

The study by Eccless et al. included only a limited number of domains. Had the number be extended to for example ethical codes of conduct, carbon emissions, energy efficiency, how would in the light of the above companies with a high sustainability culture distinguish themselves from their less sustainable counterparts?

Although this is very much a hypothetical question, it would make sense to suggest that value driven companies that care about their employees, suppliers, investors and other stakeholders also care about the natural environment as well? This would mean that high sustainability companies are likely to be more energy efficient and display greater sympathy for renewable energies. This in turn would also imply that high sustainability companies also display lower carbon emissions levels.

Saka and Osika (2014) find that corporate carbon emissions have a negative impact on the market value of equity, suggesting that there is a causal link between carbon emissions and financial performance. However, could this be a misspecification? Of course it is possible that somehow lower carbon levels directly influence a company's cost level, but could it also be that lower carbon levels and higher financial performance are traits of companies with high a sustainability culture. If so, then these two variables are correlated, but not causally linked.

Companies with a high sustainability culture obviously are more, or more explicitly value driven than their less sustainable counterparts. Doesn't it then make sense to suggest that highly value driven companies also have ethical codes or corporate codes of conduct in place? If companies with high sustainability cultures also display superior financial performance as the study by Eccles et al. (2012) suggests, then it also makes sense to believe that companies with ethical codes, or corporate codes of conduct in place display superior financial performance. This is exactly what Webley and More (2003) found. However, an causal link between have a corporate code of conduct in place and financial performance is highly unlikely, because cannot simply state that drawing up a code of conduct will ultimately result in superior financial performance. This is supported by Verschoor (2003). He also finds that having a corporate code of conduct in place and financial performance are positive associated, and comments that the 'cause of superior performance relates to the nature of the values that management and the board of the board of directors have infused into an organization over time. The resulting code of conduct is merely a reflection of these values'(p.44).

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6 Conclusion

This paper seeks to find an answer to the question: what do CSP measures signal, and how can the CSP-FP relationship be explained?

Todate a plethora of CSP definitions and constructs exist, some of these constructs are overlapping, sometimes an evolutionary process can be distinguished. However, a universally accepted construct does not exist.

In order to measure CSP a variety of uni- and multidimensional measures, that are only limitedly grounded in CSP concepts, have been developed. Since we don't (exacly) know what CSP is, measures of CSP cannot be valid for that matter.

What CSP measures truly measure is difficult to establish. This paper suggests that CSP measures are likely to display corporate culture, or can be seen as reflections of corporate culture. If so, the CSP-FP relationship is very much value-driven and that causal relationships between CSP measures and FP measures may be inherently misspecified.

7 Discussion

In the mid nineteen eighties Ullmann (1985) already noted that the CSP-FP relationship is quite problematic in some ways. First of all, he sensed a lack in theory. There no such thing as a CSP theory that can help us explain the relationship. Secondly, he also found that key terms were inappropriately defined. He suggested that strategy might be the missing element. This paper suggest that not strategy is the missing link, but corporate culture. It is obvious that these two are closely linked, where culture drives strategy. A strategy that is not rooted in high moral values may be perceived as value driven, but does not necessarily have to be rooted in values. Point in case is a company like Enron. This company was perceived as socially committed, but in the end it went bankrupt due to financial malversations. It is astonishing to see that Enron ended up in the Forbes top 100 of most admired companies. This also uncovers a severe weakness of the screening instruments used to rank these companies.

If indeed corporate culture drives financial performance, then managers should start working on improving corporate culture to boost financial performance. This of course is easier said than done. What entails a high or strong culture for sustainability. What are critical success factors in this case? What this paper suggests is that simply focusing on CSP measures like energy-intensity, CO_2-emissions etc may not work. Because, unless CO_2 reduction is the fruit of a high culture for sustainability, it may ultimately result in higher costs.

Investors are struggling to include non-financial CSP indicators, in their portfolio decision making processes. They do want to include CSP information as long as it is fundamental to a company's market value (Hummels and Wood, 2005). However, one of the major issues is that investors performance information should be provided in a 'language' that investors understand (Descano, 2001). One of the criteria for investors is that a performance indicator must be a predictor of future financial success (Dommerholt, 2009), meaning that indicators must be 'leading' (Kaplan and Norton, 1992).

Ernst & Young (1997) examined 330 reports of sell- and buy side analysts and concluded that analysts rely on a broad range of non-financial criteria and identified 39 indicators (see Appendix for an overview). The five highest ranking indicators are: *Execution of Corporate Strategy; Management Credibility; Quality of Corporate Strategy; Innovativeness and Ability to Attract and Retain Talented People. The Environment and Social Policies* indicator ranks 37th.

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Based on the low ranking of social and environment policies indicator, one might conclude that investors do not really care about sustainability information. Obviously, CSP information is a poor indicator of a future corporate financial success. However, this conclusion may not be correct. The five highest ranking indicators, are all very much corporate culture related indicators.

If CO2 emissions, energy intensity, carbon emissions and having a corporate code of conduct in place are indeed tokens of a culture for sustainability and a high culture for sustainability comes with superior financial performance, then there may very be a predictive value in CSP related indicators. Simply because, these indicators are proxies of leading indicators investors cherish most. If that is the case, then there is enormous hidden value in CSP related indicators.

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Appendix 1:Non-financial performance indicators used by sell-side analysts

QUALITY OF MANAGEMENT	RANK
Execution of Corporate strategy	1
Quality of Corporate strategy	3
Management Experience.	7
Quality of Organizational Vision	16
CEO Leadership Style	24
EFFECTIVENESS OF NEW PRODUCT DEVELOPMENT	
Research Leadership	9
New Product Development Efficiency	14
New Product Development Cycle Time	17
Percentage of Revenues Derived from New Products	20
STRENGTH OF MARKET POSITION	
Innovativeness	4
Market Share	6
Brand Image	13
Strength of Marketing and Advertising	21
Global Capacity	22
STRENGTH OF CORPORATE CULTURE	
Ability to Attract and Retain Talented People	5
Quality of Workforce	18
Quality of Incentive Performance Systems	23
Quality of Employee Training	28
Employee Turnover Rates	30
Environment and Social Policies	37
Use of Employee Teams	38

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EFFECTIVENESS OF EXECUTIVE COMPENSATION POLICIES	
Alignment of Compensation with Shareholder interests	8
Performance-based Compensation policies	12
Ratio of CEO Compensation to Workforce Compensation	39
QUALITY OF INVESTOR COMMUNICATIONS	
Management Credibility	2
Accessibility of Management	26
Quality of Guidance	29
Knowledge and Experience of Investors Relations Contact	31
Quality of Published Materials	34
QUALITY OF PRODUCTS AND SERVICES	
Quality of Major Business Processes	10
Customer Perceived Quality	15
Product Defect Rates-Service Failure Rates	25
Product Durability	27
Product Quality Awards	35
Process Quality Awards	36
LEVELS OF CUSTOMER SATISFACTION	
Customer Satisfaction Level	11
Repeat Sales Level	19
Number of Customer Complaints	32
Quality of Customer Service Department	33

Source: Ernst & Young, Measures That Matter, 1997. Available at:
www.corporatesunshine.org/measuresthatmatter.pdf

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Developing a viable business model for community owned solar farms in the Netherlands

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Abstract.
Purpose
The energy industry is experiencing a tremendous growth in the number of energy cooperatives in Europe. These energy cooperatives are spear heading the transition to a sustainable energy system. The energy cooperatives aim to satisfy the consumers demand for sustainable energy and related services. Grunneger power is such a cooperative in the north of the Netherlands. They aim to setup and exploit community owned solar farms in the north of the Netherlands. In order to successfully setup and exploit community owned solar farms, Grunneger power needs a viable business model. However, existing literature treats the business models of energy cooperatives superficially. In particular, there is not much information on the business model of community owned solar farms. Designing a viable business model for community owned solar farms is a complex task because it spans several organisations. This implies that the business model has to be able to deal with the competing interests of the organisations. In addition, they have to be able to facilitate value capture by each of the participating organisations such that they are committed to the business model. Additionally, the literature on business model design is missing a comprehensive artefact that can facilitate the design of viable business models in a business ecosystem setting. Therefore, the goal of this paper is twofold: i) to design a viable business model for community owned solar farms that will be setup in the north of the Netherlands. ii) To present the findings from this case study, and to propose generalisations that are relevant for the development of artefacts that can be used to facilitate the design of viable business models in a business ecosystem setting.

Design/methodology/approach
The design science research approach is best suited for designing artefacts, and drawing generalisations from the design process. Since our goal is to design an artefact and draw generalisations from the lessons learnt, we frame this research as a design science research problem. Additionally, we have used business model ontologies to design the business model. Business model ontologies are languages use to conceptualise and communicate business models.

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Findings

It was hard to design a viable business model for community owned solar farms, due to the competing interests of different organisations. It was necessary to have a clear business service concept before starting the business model design. Furthermore, in order to design a viable business model it was necessary to conceptualise the business model from Grunneger power's perspective as well as from a business ecosystem perspective. In addition, to arrive at a viable business model, we had to eliminate the traditional energy retailers from the business ecosystem because they were not adding sufficient value. Further, the role of traditional energy retailers and the associated value creation activities, value streams, and captured value had to be reallocated to a different stakeholder within the business ecosystem. Moreover, the viability of the designed business model is sensitive to several factors, such as availability of subsidy, the assumed operational costs of the solar farm, wholesale price of electricity, cost of capital, etc.

Originality/Value

Without much guidance from literature, firms such as Grunneger power rely on trial and error methods for finding viable business models. These trial and error methods of finding a viable business model are risky, expensive, and time consuming. Therefore, this research addresses the above-mentioned gap by designing a viable business model to exploit the community owned solar farms that is directly implementable by cooperatives such as Grunneger power. In addition, several generalisations, relevant to the development of business model design artefacts are drawn from this research, for example it is crucial for firms operating in business ecosystem setting to approach business model design from the perspective of the focal firm as well as from the perspective of a business ecosystem.

1. Introduction

The traditional energy industry is highly centralised. This industry largely generates electricity using large-scale power generation units that mainly use fossil fuels. The electricity is then retailed to passive consumers through a network of wholesalers, and retailers. However, in recent times affordable decentralised renewable energy generation technologies are penetrating the market. These technologies coupled with changing customer needs, liberalisation of the energy market, growing environmental concerns, and government action is putting increasing pressure to transition to a sustainable energy system. Several initiatives are taken to transition to a sustainable energy system. One of these initiatives has been gaining momentum at the grassroots level namely the energy cooperatives. The consumers are organising themselves into energy cooperatives. These energy cooperatives are socio-economic organisations that are positioning themselves in the sustainable energy and related products/services market (Schreuer & Weismeier-Sammer, 2010). As of February 2014, approximately 500 energy cooperatives were active in the Netherlands (Avelino et al., 2014). These cooperatives are seen as crucial agents of change and innovation that are spearheading the transition to a sustainable energy system (Asmus, 2008; Schreuer & Weismeier-Sammer, 2010).

Grunneger Power (GP) is one such organisation in the city of Groningen, The Netherlands. Their long-term goal is to transition to a sustainable energy system that produces and consumes sustainable energy on a local scale. In addition, they want to stimulate the local economy by creating local jobs in the energy sector, and to serve their customers with sustainable products and service at a fair price. Furthermore, they invest their profits in local sustainable energy projects.

GP intends to setup and operate community owned solar farms in the city of Groningen. Residents living in close proximity own a typical community owned solar farm in the Netherlands. A community owned solar farm allows its members to purchase individual shares in a solar farm. This is done to create economies of scale, ease of use, and cater to customer segments ignored by current market offering (Asmus, 2008). In order to successfully setup and operate community owned solar farms,

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GP needs a viable business model. However, existing literature treats the business models of energy cooperatives superficially. In particular there is not much information on community owned solar farm business model, despite the fact that scholars have categorised it as a high-potential business model (Asmus, 2008; Huijben & Verbong, 2013). In addition, there are several stakeholders involved in a community owned solar farm business model, such as the *prosumers*, service providers, distribution system operators (*DSOs*), and local municipalities. Therefore, if the business model is to be viable the stakeholders should be able to capture sufficient value such that they are committed to the business model. However, ensuring the viability of each stakeholder is particularly hard because of his or her competing interests (Chesbrough, Vanhaverbeke, & West, 2006; Huijben & Verbong, 2013).Furthermore, the business model design literature is missing a comprehensive artefact that can be used to design viable business models in a business ecosystem setting (D'Souza, Beest, Huitema, Wortmann, & Velthuijsen, 2014). Hence, there is a need for a viable business model design for community owned solar farms that can be directly implemented by cooperatives such as GP. A viable business model that is directly implementable will help cooperatives such as GP to avoid risk and losses, and save time. In addition, important generalisations can be drawn from the design activity that are relevant to the business model design domain. These generalisations can be used to develop comprehensive artefacts that can be used to design viable business models in a business ecosystem setting. Therefore, the goal of this paper is twofold: i) one is to design a viable business model for community owned solar farms that will be setup and operated in the north of the Netherlands. ii) To present the findings from this case study, and to propose generalisations that are relevant for the development of artefacts that can be used to facilitate the design of viable business models in a business ecosystem setting.

The related work section reviews work related to business models, services, business model ontologies, and community owned solar farms. The methodology section elaborates on the methods and techniques used to design a viable business model for community owned solar farms. The following section presents the process of designing the business model, the viable business model deign, the sensitivity analysis, and the derived generalisations. Finally, the paper ends with a conclusion section.

2. Related Work

Scholars still do not agree on a common definition of a business model (Zott, Amit, & Massa, 2011). However, based on the common ground among found among stakeholders D'Souza et al. (2014) define business models as a description of the underlying logic of how value is created, exchanged, and captured from a focal organisations perspective as well as from a business ecosystem perspective. It includes a description of the stakeholders involved, their value proposition for other stakeholders, and their roles. In addition, it also defines the business architecture that enables value creation, exchange, and capture logic. A business model is said to be viable when all the participating members are able to capture value such that they remain committed to the business model (Chesbrough et al., 2006).

Since GP intends to provide a service to its customers, we will briefly explore service science in the context of business model design. Business models and services are intricately linked. A business model is perceived as a mediation device between services and value creation (Bouwman, De Vos, & Haaker, 2008; Chesbrough & Rosenbloom, 2002). Even before an organisation/s venture into new

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service development the business model has to be attractive. However, before the business model for the intended service can be designed, the business service concept has to be clear. Business model design and service design are often carried out in close collaboration.

We distinguish between two type of services namely business services and information systems services (Bardhan, Demirkan, Kannan, Kauffman, & Sougstad, 2010). A business service is a service that is usually offered to a customer for example transportation, or health care service (Lankhorst, 2012). Business service refers to the concept of service in the service-marketing domain. A well-established definition of a business service in the service marketing domain defines it as *"the application of specialized competences (knowledge and skills) through deeds, processes, and performances for the benefit of another entity or the entity itself"* (Stephen L Vargo & Lusch, 2004, p. 2). Furthermore, scholars also stress the following characteristics of a business service: value is co-created with the end user; services are usually performed in a business ecosystem setting; goods are seen as distribution mechanism for services; and a service creates customer experiences (Bitner, Ostrom, & Morgan, 2008; Stephen L. Vargo & Lusch, 2008). The service-marketing domain adopts a customer centric, and a business ecosystem approach towards business service, which is very valuable in the context of business model design. A customer centric approach helps to develop value propositions and customer experiences that the end user wants this increases the chances of designing a viable business model. Furthermore, the ecosystem approach to services is valuable because it helps the business model designer to identify stakeholder who have the capability to add the desired values, and configure them in a viable manner. An information service is a service that exposes automated behaviour (Lankhorst, 2012). Information services leverage data, software, and hardware to support business services in an automated manner, for example a web service. Information services are an important part of business models because they have to support the business service, otherwise the business service cannot function. Therefore, for the sake of this research we develop the business service concept, which is the blue print of the service offered to the customer. Next, we develop information services architecture, which is the organising logic of the information services necessary to support the business service.

Business model ontologies (BMOs) are languages used to design and evaluate business models. D'Souza, van Beest, Huitema, Wortmann, and Velthuijsen (2015) have reviewed several well-established BMOs and found that none of them fully support the design of a viable business model in a business ecosystem setting. In addition, they also found that existing BMO's either adopt a focal firm perspective on business models, or a business ecosystem perspective. However, in business ecosystem setting it is necessary to combine the focal firm perspective as well as the business ecosystem perspective for a viable business model design. Since no single BMO allows the combination of these perspectives, D'Souza et al. (2015) recommend using two different BMOs namely the business model canvas and the e3-value to design viable business models.

Solar photovoltaic is the fastest growing renewable technology globally in terms of install capacity; from 2008-2013, the average install capacity grew at the rate of 55% annually (Sawin & Sverrisson, 2014). However, the growth of solar photovoltaics is being hampered by lack of viable business models (Frantzis, Graham, Katofsky, & Sawyer, 2008; Huijben & Verbong, 2013). **Table 5** presents the different types of business models for PV systems found in the literature.

Table 5 Business model types for PV systems

Business model type	Description	Source

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Turnkey projects provider	In this business model the service provider targets commercial and residential customer segments who want to own PV systems, but don't want the hassle of doing the research, installing it, and maintaining it. Their value proposition is ease of use. Ease of use refers to one stop shop solution for all PV system related needs including customer support, pre and post sales.	(Frantzis et al., 2008; Huijben & Verbong, 2013; Schoettl & Lehmann-Ortega, 2011)
Third party	Here the energy retailer installs the PV system on the customers premise, or rents space from real-estate owners. However, the retailer owns and operates the PV system, and retails the energy to the customers on whose premise the PV system is installed. The energy retail contracts usually span several years with a fixed energy price. This business model has several variants in terms of Key partners, value proposition, and cost structures, for example the energy retailer who owns the PV system may have to pay a rent to the real-estate owner for using their space for setting up and operating the PV system.	(Frantzis et al., 2008; Huijben & Verbong, 2013; Schoettl & Lehmann-Ortega, 2011)
Value added service provider	The service provider assists the customer with specific tasks in acquiring and operating the PV system, for example, administration for subsidies. These service providers are usually the consulting firms and they target commercial as well as residential customers.	(Schoettl & Lehmann-Ortega, 2011)
Construction and installation service provider	The service provider provides construction and installation services necessary for the PV system. They target both commercial as well as residential customers.	(Schoettl & Lehmann-Ortega, 2011)
Large scale power producers	Here the power producer owns large-scale PV systems primarily for producing and selling energy. They mainly target energy retailers or large-scale consumers of energy.	(Schoettl & Lehmann-Ortega, 2011)
Virtual power plant	The firm acting as a virtual power plant tries to balance the grid by controlling supply and demand. Such a player is usually a market maker since they have insights in total demand and supply. Such players can have varied revenue streams such as, transaction fees, and membership fees.	(Schoettl & Lehmann-Ortega, 2011)
Community owned solar farms	Here the community usually forms a cooperative and they collectively invest in an offsite solar farm. The member of the cooperative purchase shares in the solar farms, and or purchase power produced at the solar farm. Such cooperatives usually target residential and small businesses that are unable to or do not want to purchase and install PV systems on their own location.	(Asmus, 2008; Huijben & Verbong, 2013)

Asmus (2008) makes the case for community owned solar farms in the United States of America. The author provides a high-level description of how community owned solar farms work in the United States. This information provides valuable input for designing the community owned solar farm business model, but it misses important elements of a business model such as cost structure. Furthermore, the community owned solar farms developed in the Netherlands would be subjected to different rules and regulations. Huijben and Verbong (2013) analyse business model experiments for PV technology in the Netherlands. They found community solar farm business model as one of the emerging business models. Furthermore, they also found that the financial viability of this business

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model depends on the net metering regulation. The net metering regulation refers to the ability to deduct the amount of energy supplied to the grid from the total amount of energy taken off from the grid. Similar to Asmus (2008) a high level description of the business model is provided. According to Huijben and Verbong (2013) the community owned solar farm business model is unviable because the net metering regulation does not apply to them in current regulation in NL. However, according to the website *hier opgewekt* since 2014 new regulations and subsidies have been announced for community owned solar farms, such as post code subsidy ("*Postcoderoos regeling*"), and SDE+ ("*De regeling in het kort*," 2015). These subsidies could lead to a viable business model for community owned solar farms. Since the community owned solar farm business model is described at a very high level and in a generic manner, GP or any other organisation will be unable to implement the business model because the description is missing many important business model design details such as cost structures. Furthermore, the business model has been described in an informal manner, which leaves a lot of room for misrepresentation and misinterpretation of the business models. The role of BMOs in designing and evaluating the above mentioned business models has largely been ignored. BMOs are languages that are used to design, communicate, and evaluate business models for example the business model canvas by (Osterwalder & Pigneur, 2010). It is important to use BMOs because they leave little room for misrepresentation and misinterpretation (D'Souza et al., 2014).

3. Methodology

In this paper, we seek to design a business model, which will define how GP and its partners are going to create, capture, and exchange value in a business ecosystem setting. Therefore, we adopt the design science research approach, which is a well-established method to design artefacts that are of relevance to organisations (Hevner, March, Park, & Ram, 2004). Design science research focuses on designing objects with an embedded solution to an understood research problem (Peffers, Tuunanen, Rothenberger, & Chatterjee, 2007, p. 49).

Hevner et al. (2004) prescribes seven guidelines for applying the design science research method. First, a problem or a gap and the relevance of solving that problem should be clearly articulated. The problem and the relevance of solving the problem are presented in sections one and two. Second, the contribution towards solving the articulated problem should be clearly articulated in terms of an artefact design, design foundations, and/ or design methodologies. The contributions towards solving the problem are clearly articulated in the introduction. Third, to ensure rigour appropriate methods should be employed to design/develop and evaluate the artefact. This section presents the methods used to design and evaluate the designed artefact. Fourth, the product of a design science research process should be a construct, a model, a method, or an instantiation. The solution and the derived generalisations are presented in sections 4.6, 4.7, & 4.8. Fifth, the designed artefact should be evaluated on its utility, quality, and its efficacy. The evaluation of the artefact is carried out in section 4.8. Sixth, the design of an artefact using design science research process should be viewed as an

iterative process. The design process was carried out in iterative steps. The designers actively sought feedback from industry experts and academics. Seventh, the produced artefact should be communicated to the relevant audience. The artefact was communicated to relevant stakeholders within GP. Additionally, the viable business model is communicated via this paper to academics and practitioners.

In order to design a viable business model for GP the following steps were taken: first, a literature review was performed in order to set the foundation and understand the state of the art in the domain of community owned solar farms. Second, a high-level description of the business idea was

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developed based on the data collected (interview, and literature). The first and the second step have already been presented in the introduction, and the related work section. Third, a stakeholder analysis was performed. Fourth, based on the stakeholder analysis value propositions were formulated for each stakeholder. Fifth, a detailed business service concept was created using the service blue printing technique. The service blue printing technique is a well-established technique use to explore all the issues inherent in creating and managing a service (Stickdorn & Schneider, 2012). Sixth, the technical architecture necessary to support the envisioned service and business model was conceptualised. Seventh, the business model is conceptualised using business model canvas from the focal actors perspective. The business model canvas is a well-established tool used to design business models of individual firms. Eighth, the e3-value business model ontology is used to design the business model from the perspective of the business ecosystem. Finally, the resulting business model is evaluated for its viability and the results of the evaluation are used as feedback until a viable business model design emerges, or until it is decided that a viable business model cannot be designed.

The data necessary for designing the intended business model was collected through primary and secondary sources. Ten interviews were carried out with experts, and potential stakeholders in the business model. Semi-structured questionnaires were used to conduct the interviews. The interviews lasted for about 45 mins - 1.30 hrs. The interviews were transcribed and then used as inputs for designing the business model. In addition, a workshop was organised to develop the business service concept. Seven participants attended the workshop. Three participants were academics and four of them were experts in the domains of energy, and ICT. Furthermore, the researchers also attended meetings organised by GP for potential *prosumers* who wanted to buy shares in the proposed community owned solar farm. Moreover, the researchers were also given access to four internal documents that described the business idea, cost and revenue structures. Secondary sources of data were used to triangulate the information such as, reports on PV technologies, community owned solar farms, and GP's website.

4. The community owned solar farm business model

In accordance with the guidelines of Hevner et al. (2004) this section presents the designed business model.

GP is an energy cooperative and they intend to setup and operate community owned solar farms on behalf of communities. They are doing this in order to achieve their goals of transitioning to a

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sustainable local energy system and profit for a purpose. The service that GP wants to provide involves identifying appropriate sites for setting up the solar farm. The people who are interested in a sustainable energy system or renewable energy will be approached for sales of shares in the solar farm. The interested *prosumers* will then be organised into a cooperative who will then collectively invest in the solar farm. GP will manage all the administration and logistics around setting up and operating the solar farm in return for a fee. The *prosumers* will earn revenues that include subsidies and sale price of the electricity.

4.1. Government policy

The Dutch subsidising agency has introduced the post code subsidy ("*postcoderoos regeling*") policy. This policy allows the members of the small-scale cooperatives, and housing associations to get approximately 9 euro cent subsidy per Kwh of electricity supplied to the energy retailers. In addition, this discount can be availed by residents living in the same post code area as well as neighbouring post code areas. Fig 3 shows that under the post code policy post code area 9733 and the post code areas surrounding it, marked in red, qualify for the subsidy (RVO, 2014).
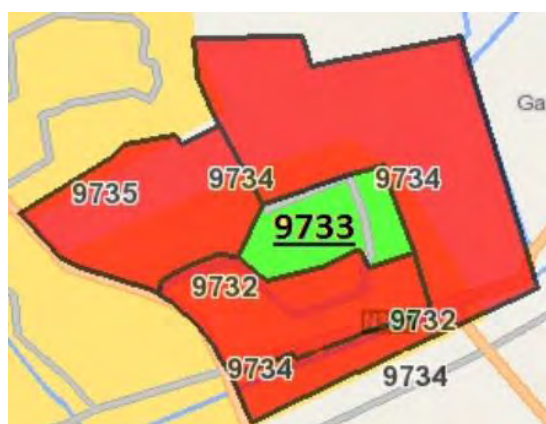
Fig 3 post code subsidy example – areas marked in green and red qualify for subsidy

Therefore, this policy is one of the main factors that leads to a viable business model for community owned solar farms. The Policy also states that the only small-scale user will qualify for the subsidy. In addition, they have to be organised in the form of a housing association or an energy cooperative. The cooperative or the housing association as a whole will not qualify for the subsidy, but the individual members of the cooperation will qualify for a subsidy up to a maximum limit of 10.000kWh's ("De regeling in het kort," 2015).

4.2. Stakeholders

A stakeholder analysis revealed seven stakeholders and the roles they play in this business model. Some of the identified stakeholders are defined as only roles because multiple actors can take them on. The roles are indicated in italics.

4.2.1. Prosumer

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A prosumer produces or co-creates goods and services that they consume. In this business model the prosumers will be co-creating the energy by owning the solar farm collectively. GP will mainly be targeting customers who are early adopters and who are interested in a sustainable life style and therefore want to reduce their impact on the planet.

4.2.2. Grunneger power (GP) - solar farm service provider

GP is an energy cooperative active in the province of Groningen. Their goal is to provide energy and energy related services that are sustainable, fair, and locally sourced. Moreover, they also want to stimulate the local economy. Their goal is to earn profits with a purpose. The purpose is to reinvested in sustainable energy projects and related services. In the context of this business model they will play the role of the solar farm service provider. The responsibilities of this role includes all the activities related to setting up and operating the solar farm such as, administration, acquiring

resources (e.g., real estate), and retail of energy.

4.2.3. Energy retailer

The energy retailer retails energy to the end user. Their main activities in this business model are to purchase energy from the solar farm and from the market, and to retail energy to the *prosumers*. In addition, the *subsidising agency* provides subsides to the *prosumers* in terms of reduced taxes on their energy bills. Therefore, the energy retailer functions as a channel through which the subsidies are provided to the *prosumer*. This role can be taken by one or many energy retailers. Their main goal for participating in this business model is to earn a profit.

4.2.4. Enexis – DSO

Enexis plays the role of the regional *distribution system operator (DSO)*. The DSO is charges with setting up and maintaining the gas and the electricity grid. Additionally, the grid should be reliable, affordable, and safe. Enexis provides transportation service to the solar farm as well as to the *prosumers.* In addition, Enexis currently functions as a sink which absorbs all the energy produced by the solar farm. It is able to do so because the amount of energy produced by the solar farm when compared with the total demand and transport capacity is negligible. However, this could change in the future when the amount of renewable energy increases and the reliability and safety of the grid is at stake. The main goal of the DSO is to earn a profit.

4.2.5. Municipality of Groningen – local governing body

The municipality of Groningen play the role of the local governing body. They play an important role in facilitating this business model by providing all the necessary licenses and permits. In addition, they also provide cheap access to real estate; in this particular case, they are providing free access to real estate. The municipality is interested in reducing the CO_2 emissions of Groningen, and stimulate the local economy by creating local jobs.

4.2.6. The Netherlands enterprise agency – subsidising agency

The Netherlands enterprise agency plays the role of the subsidising agency. This role involves disbursing subsidies in accordance with the government's policy. In this context, they will disburse subsidies in accordance with the post code subsidy policy. Their goal is to reduce CO_2 emissions, and stimulate local economy by creating jobs.

4.2.7. Hardware supplier

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The hardware suppliers provide turnkey solutions for the setup and operation of the solar farm such as supplying solar panels, installing the solar panels, and maintenance. GPs will collaborate with local hardware suppliers in order to stimulate local economy. The main goal of the hardware supplier is to make profits.

4.2.8. Information systems supplier

One or many information systems providers can take on this role. They provide all the necessary products and services to market, setup, and operate the solar farm such as, web site, accounting information service, billing information service etc. GP will source these products and services from local firms in order to stimulate local economy. The goal of the information systems supplier is to earn profits.

4.2.9. Accounting firm

The accounting firm provides bookkeeping and accounting services. A local accounting firm takes on this role. The goal of the accounting firm is to make profit.

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4.3. Value proposition

A value proposition are a bundle of benefits that an organisation offers its customers (Osterwalder & Pigneur, 2010). Table 6 presents value propositions for all the stakeholders involved.

Table 6 Value proposition

Stakeholder	Value proposition
Prosumers	Sustainable living experience , social benefits, convenience, reliable, reasonable ROI, relevant reports
Grunneger power - *solar farm service provider*	Profit, green energy, stimulate local economy, and reduce dependence on fossil fuels
Energy retailer	Supply of green energy, reduction of CO2, sourcing local energy, reliable suppliers for green energy, profit
Enexis – *distribution system operator*	Profit, sustainability
Municipality of Groningen – *local governing body*	Reduction of CO2, stimulation of local economy by creating jobs
The Netherlands enterprise agency - *subsidising agency*	Reduction of CO2, stimulation of local economy by creating jobs
Hardware suppliers	Profit
Information systems provider	Profit
Accounting firm	Profit

4.4. Business service concept

It is important to have a clear conceptualisation of the desired business service before designing the business model because the business model has to be designed to exploit the business service. In addition, a clear conceptualisation of the business service also helps to derive a list of channels, and value creation activities necessary for providing the desired business service. Fig *4* shows the business service concept. The depicted service evidences are the evidences that the *prosumer* expects to experience in a consistent manner, for example consistent and relevant information. The *prosumers* action shows the actions that the *prosumer* has to take to co-create, or to consume the service, such as login to the online portal. The front stage shows the touch points through which the *prosumer* will interact with the service for example website. The back stage depicts the value creation activities necessary to realise and deliver the service.

4.5. Technical architecture

A technology architecture is a collection of fundamental concepts or properties of the technical system in its environment that are embodied in its components, relationships, and in the principles of its design and evolution (Lankhorst, 2012). The technical architecture is an indispensable part of a business model. Especially for business models that rely on technologies for creating, capturing, and exchanging value (Bouwman et al., 2008). In the context of this case there are two layers of technology architectures namely the physical technology architecture layer and the information services architecture layer.

Fig 5 shows the technical architecture of the business model. The physical technology architecture shows all the necessary physical technologies needed and their organising logic, for example PV panels, inverter, etc. The solar farm will be using the grid of the DSO because it is cost effective. Furthermore, it can also be observed that important data meter readings and operation related data (e.g., are the PV panels functioning properly) are transmitted to the appropriate information service.

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The information service will then process the data into necessary information needed to support the business service. The information services architecture part of the figure shows the different information services necessary to support the business service. The boxes with sharp edges represents the stakeholder, the box with rounded edges contained within the stakeholder box represents the information service, and the dotted lines connecting the boxes represent the flow of information and data. The stakeholders containing the information services are responsible for providing the contained information service/s. The figure also shows the distributed nature of the information services.

In order to derive the depicted information services, first high level business processes were designed. Designing high level business processes is an important logical step in arriving at the depicted information services architecture (Lankhorst, 2012). However, discussing the designed business models is beyond the scope of this paper. Following is a brief description of the information services.

GP will provide the following information services.

4.5.1. Product /service information service

The product/service information service provides potential customers, and collaborators with relevant information related to the service GP is providing, such as value proposition.

4.5.2. Sales /reservation information service

Sales /reservation information service facilitates the sales and reservation transactions.

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Service evidence (deliverables)	Information through social media, advertisements, and word of mouth	Information through website, and sales personnel	Purchase online, or via sales personnel, documentation, sales confirmation/welcome emails	Welcome package, reduced energy bills, reports, participate in management meetings, customer portal, customer support, energy	Social media, newsletters, mobile apps, investment certificates
Prosumer action	Read messages on electronic channels, interact with family and friends	Browse website, talk to sales personnel, decision to buy	Register, pay, receive document	Receive welcome package, co-create (e.g., participate in the cooperation, and online community), benefits, reports, energy	Receive news letter, check app
Line of interaction Frontstage	Print media, electronic channels (e.g., social media), sales personnel, word of mouth, events	Print media, electronic channels (e.g., social media), sales personnel, word of mouth, events	Electronic channels (e.g., website), sales personnel	Electronic channels (e.g., website, and apps), customer support personnel	Print media, electronic channels (e.g., customer portal, and apps)
Line of Visibility Back stage (Value creation activities)	• Marketing/ advertising • IS infrastructure (e.g., website, and social media apps)	• IS infrastructure • Sales • Marketing/ advertising	• Sales • Accounting • Customer relationship management • Administration • IS infrastructure (e.g., accounting systems)	• Customer relationship management • Solarfarm setup • Solarfarm operation • Partner management • Technology infrastructure (IS and physical technology infrastructure) • Marketing • HRM • Accounting • Administration • Energy retail • Energy transport	• Marketing/ advertisement • IS infrastructure • Custoemr relationship management

Fig 4 Business service blue print – this figure describes the service offered to the prosumer

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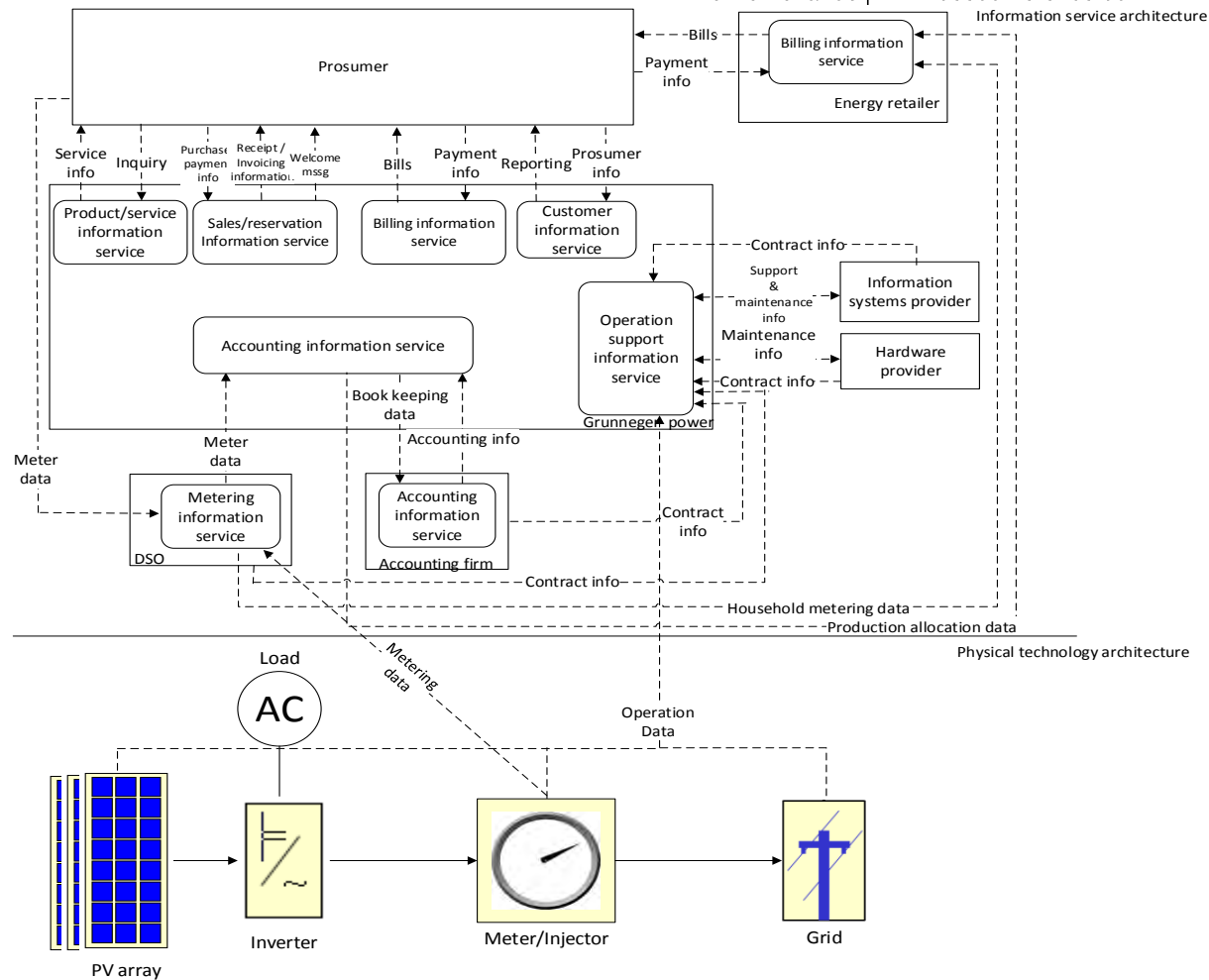
Fig 5 Technical architecture – the technical architecture depicts the physical technologies architecture and the information services architecture

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4.5.3. Billing information service

Billing information service provided by GP allows GP to send its customers relevant and timely bills.

4.5.4. Accounting information service

Accounting information service allows GP to collect relevant data from the DSO and then process it. Processing the data involves allocating the amount of energy produced to the stakeholders based on their shares. This information is then made available to ener who will then use it to calculate and allocate subsidies to the *prosumers*. Furthermore, this service also allows GP to enter, manage, and transmit relevant book keeping data to the accountants who will then process the information into relevant information and transmit it back to GP.

4.5.5. Operation support information service

Operation support information service facilitate the operation of the solar farm and the coordination of setup and maintenance activities of the solar farm with relevant partners, for example contract expiration dates, work order tracking etc.

The DSO will offer the following information service.

4.5.6. Metering information service

The metering information service will collect and store data from the meters from the solar farm, and from *prosumers* homes. The metering data from the solar farm is made available to GP, and the data from *prosumers* home is made available to the energy retailers.

The accounting firm provides **the accounting information service** receives data from GP and then processes it into important accounting information and transmits it back to GP, for example profit and loss statements.

The energy retailer provides the **billing information service** that allows the energy retailer to receive relevant data and process it in order to send out timely and correct bills to the *prosumers*. This also involves calculating the relevant subsidies and applying it to the relevant customers.

4.6. Business model from GP's perspective

Fig 6 presents the business model from GP's perspective. The costs, revenue, and profitability of the business model are based on the information available at the time of the research. However, this could change when the business model is being implemented. Fig 6 shows that if GP implements the business model as depicted it will make a loss of 512 euros per year. Furthermore, since the focal actor, i.e., GP is unable to make a profit, the business model is unviable. Another important condition for a business model to be viable is that GP's partners should be viable. However, business model canvas does not facilitate the analysis of value capture by all the stakeholders participating in this business model. Since the focal actor is unviable, the traditional business model design efforts would stop here. However, adopting a business ecosystem perspective there is still a chance that this business model can be rendered viable. The following section focuses its design efforts from a business ecosystem perspective.

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Key Partners	Key Activities	Value proposition	Customer Relationship	Customer Segment
Municipality Distribution system operator (DSO) – Enexis Suppliers - IS suppliers - Hardware suppliers Investors/customers (prosumer) Finance service provider Energy retailer	Marketing/advertising Sales Setup solar farm Operate solar farm Customer/investor relationship management (CRM) Partner management	**VP for Prosumers:** Sustainable living experience • Green energy • Self sufficiency • Reduction of environmental impact Social benefits Reasonable ROI Reports Convenience Reliable	Communities Personal Automated Co-creation	Prosumers who are interested in a sustainable lifestyle, and without the possibility of installing solar panels on thier own roof. Furthermore, customers in this segment are also interested in creating social benefits.
	Key Resource Finance Knowledge Human resource Information systems Hardware (e.g. solar panels) Accounting capability Billing capability Energy transport capability Realestate	**VP for Energy retailers:** Access to green energy produced locally	**Channels** Sales force Website Internet communities Community resprentatives	Energy retailers who want to buy green energy and retail it.

Cost Structure

Capital expense	
Investment in solar farm	37.773 €
Operating expense (opex)	
Average annual opex	3.178 €
Average annual divident paid to prosumer	452 €
Total opex	3.630 €

Revenue Stream

Transaction revenue	Amount
Sale of shares in the solar farm	37.773 €
Recurring revenue	
Average annual revenue through sale of electricity	1.785 €
Average operational expenses charged to prosumer	1.333 €
Total recurring revenue	3.118 €
Average annual revenue before taxes (revenu stream- cost structure)	-512 €

Fig 6 Business model from GP's perspective – if the business model is implemented as shown above GP will suffer a loss

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The business model presented in **Fig 6** is based on the following assumptions:

- the solarfarm will qualify for the subsidy under post code subsidy rules, and it will be available for a period of 11 years
- the solar farm will consist of 150 solar panels and it will require capital expense of 37.773 €, operating expense of 3.630 €
- average annual revenue through sale of electricity 1.785 €, average wholesale price of electricity 0.054 €, average electricity produce annually 33.318 kWh
- lifespan of the project 20 years

4.7. Business model from the business ecosystem perspective
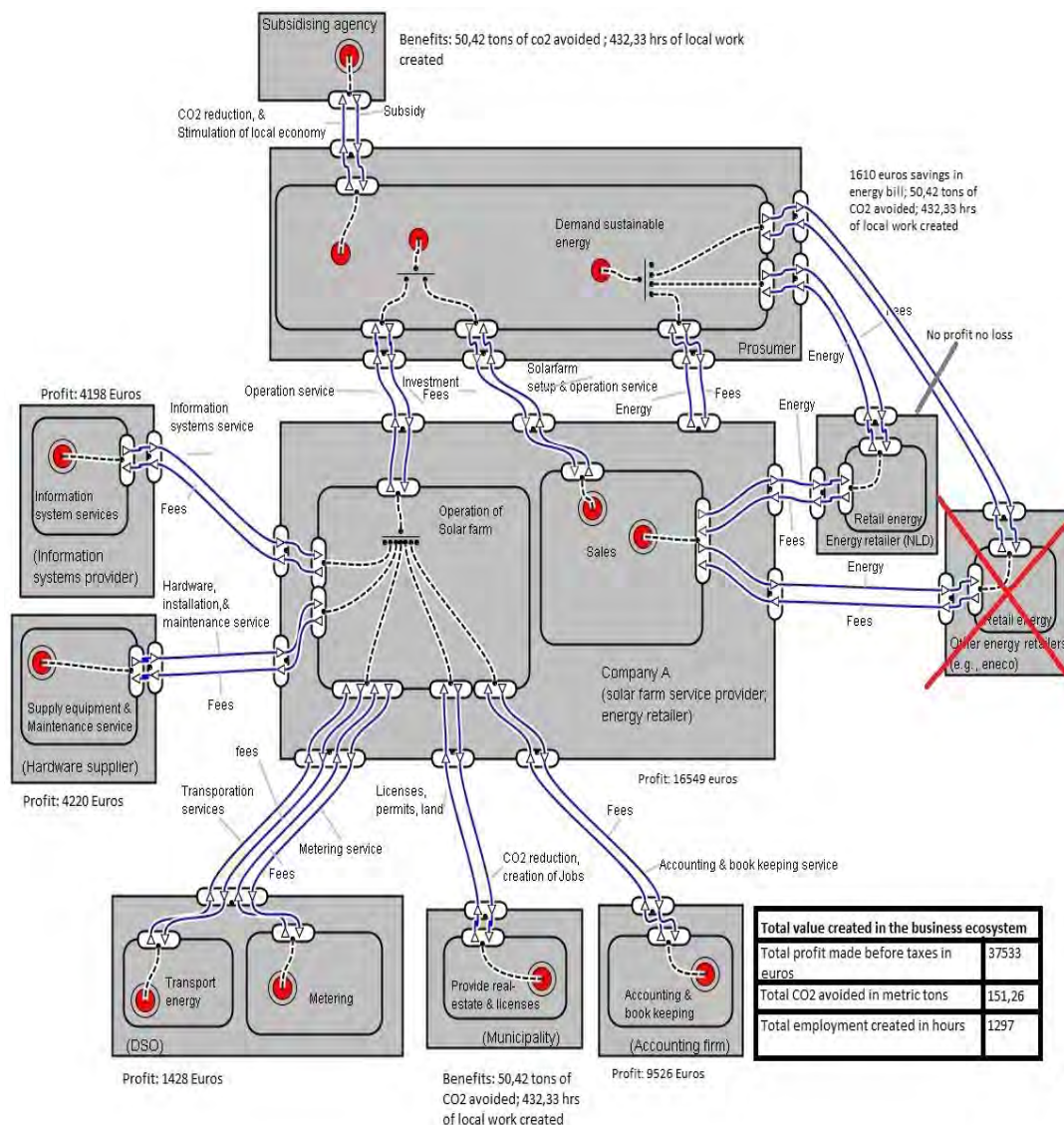
Fig 7 Solar farm business ecosystem – the figure shows the viable configuration of the business ecosystem

The e-3 value modelling technique is used to represent the business model above. Each of the boxes with sharp edges represents a stakeholder in the business ecosystem, and the box with rounded edges with in the boxes with sharp edges represents the value creation activities assigned to each stakeholder. The lines connecting each of these different stakeholders represents the value exchange

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relationships among the stakeholders, and the red dots represent the start and end of the value exchange relationships. For more details on the semantics see Gordijn (2002). The business ecosystem presented in Fig 7 was found to be viable. As can be observed from Fig 7 the traditional energy retailers were eliminated from the business ecosystem and their role was reassigned to Noordelijk Lokaal Duurzaam (NLD). This was done because the traditional energy retailers were not adding sufficient value in the context of this business ecosystem. This means that if the *prosumers* wants to participate in this business ecosystem and avail the full benefits they will have to sign up with NLD for an energy supply contract.

NLD was formed by cooperatives similar to GP. NLD's sole purpose is to retail energy and channel back profits to the member cooperatives based on the number of customers they refer to NLD. This was done in order to lower the operating costs of the energy retail activities and to create economies of scale. On an average, an energy retailer makes a profit of about 78 euros profit per household in the Netherlands (Eneco, 2014; Essent, 2013; OFGEM, 2014). NLD will now be able channel back this profit to GP and they can use this profit to cover their operation expenses of the solar farm. Here it is assumed that the NLD will be able to operate at the same level of profitability as the traditional energy retailers. Based on the above assumption GP will require *prosumers* from at least seven different households to participate in this business ecosystem to break even.

Fig 7 shows that all the stakeholders are viable in the business ecosystem. For stakeholder not interested in profit benefits were quantified in terms of reduction of CO2 and hours of employment created. From Fig 7 the stakeholders are able to capture the following values: GP: 16549 €; *prosumers*: 1610€ in terms of cost savings on energy bills, 50,42 tons of CO_2 avoided, 432,33 hours of local work created; *DSO*: 1428 €; *hardware supplier*: 4220€, *accounting firm:* 9528€p; information system provider 4198 €; *municipality:* 50,42 tons of CO_2 avoided, 432,33 hours of local work created; *subsidising agency:* 50,42 tons of CO_2 avoided, 432,33 hours of local work created. All of the above figures are earnings before taxes, depreciation, and amortisation. Furthermore, the total sum of non-economic values that is CO_2 and creation of local jobs created in the business ecosystem have been divided equally among the interested stakeholders to avoid overestimating the non-economic values. The allocation of value creation activities to different stakeholders was a function of regulations, and price vs value.

The business ecosystem depicted in Fig 7 is based on the following assumptions:

- Assumptions presented in the section business model from GP's perspective
- Analysing the business model of each stakeholder in detail would be very cumbersome and would not add much value to our existing design activity. Therefore, we have assumed profit margins for each stakeholder, and their profitability is calculated based on these assumptions (see

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- Table **7**). The profit margins were assumed based on literature and interview data.

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Table 7 Stakeholders and their assumed profit margins

Stakeholders	Revenue €	Profit margin	Source
GP	1.311.741	4.33%	(GP; Eneco 2014; Essent, 2013; OFGEM, 2014)
DSO	31.728	4,5%	(Enexis 2013)
Accounting firm	11.910	80%	(GP)
Hardware supplier	43.960	9%	(GP)
ICT supplier	26.235	16%	(Guevara, Stegman, & Hall, 2013; Yardeni & Abbott, 2015)

- Annual household energy bill 1087€ (ECN, 2012; PBL, 2013); 1297 hours of local work will be created; 454g CO_2/ kW is emitted in the Netherlands; The required rate of return demanded by the *prosumers* is 1% per annum; 30 households will be participating in this business model.

4.8. Evaluation of the business model

Expert evaluation of business models is a well-established method to evaluate newly designed business models that are yet to be implemented (Bouwman et al., 2008). The designed business model was presented to four experts active in the field of energy two of them were academics with previous experience in industry, and the other two are still active in management positions in the energy industry. The experts were asked to rate the designed business model on the following scale ++ (very positive), + (positive), +/- (neutral), - (negative), -- (very negative). **Table 8** presents the evaluation results. All of the experts were positive about the viability in terms of value. Furthermore, they were very positive about the technological viability of the solar farm. However, one of the experts expressed some concerns about the assumption that NLD will be able to operate at the same profit margin as the traditional energy retailers. The concerns stem mainly from the fact that NLD still does not have a very large customer base to truly enjoy economies of scale, but on the other hand NLD is a lean start-up without the over heads of large incumbent energy retailers.

Table 8 Evaluation results of the business model

Evaluation criteria	Expert 1	Expert 2	Expert 3	Expert 4
Viability in terms of value	++	+	+	+
Technological viability	++	++	++	++

Furthermore, the experts also reviewed the assumptions and were positive about the validity, completeness, and coherent application of the assumptions.

The business model is critically dependent on the post code subsidy for viability. The profitability of GP is highly sensitive to the number of households participating in the solar farm. GP's profitability will be high if the number of houses participating in the solarfarm is high. GP will need approximately seven households participating in the solar farm to break even. GP's viability is also highly sensitive to their cost structure. The viability of *prosumers* largely depends on the subsidy and the wholesale price of the electricity. If the *prosumers* do not receive subsidy they will not be viable in terms of economic value. If the wholesale price of electricity falls below .043 € and all other factors remain constant the *prosumers* will not be viable in terms of economic value. The viability of the *prosumers*

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both in terms of economic and CO2 reduction is sensitive to the rate of diminishing production efficiency of the physical technologies. In addition, the viability of the *prosumers* is also highly sensitive to the capex and opex of the solar farm. It is especially sensitive to cost of the solar panels because it constitutes most of the capex. The lower the capex and opex the higher the profitability of the *prosumers* in terms of economic value. However, lowering the opex and capex of the solar farm could have a negative impact on the profitability of other stakeholders in the business ecosystem. Furthermore, the viability of other stakeholders is highly sensitive to the assumed profit margins; the higher the margins the higher the profitability. However, in reality their profitability will also largely depend on competition, the value they provide to their customers, and their cost structures. The non-economic values are sensitive to the number of solar panels installed in the solar farm and the assumed CO_2 emissions. In addition, the viability of the business model also depends on the assumptions made by the designer during the design process.

Before even starting the exercise of designing the business model it was important to have a clear business service concept. Having a clear business concept was useful in identifying key stakeholders, value creation activities, and the necessary channels for creating, capturing, and exchanging value. This finding is in line with Bouwman et al. (2008) recommendation of making business service design an integral part of business model design. Consequently, we generalise that one should have a clear business service concept before starting the process of business model design. Designing the business model from GP's perspective alone was not sufficient; we had to also adopt a business ecosystem approach to arrive at a viable business model. Therefore, we propose that in a business ecosystem setting it is important to design the business model from the focal actor's perspective as well as from the business ecosystems perspective. From Fig 7 it can be observed that it was crucial to eliminate the traditional energy retailers because they were not adding sufficient value to the business ecosystem. Furthermore, the role of the energy retailer and the value streams associated with it were assigned to another stakeholder called NLD within the business ecosystem. Consequently, we were able to arrive at viable configuration of stakeholders, and the value creation activities they would perform in the business ecosystem. Hence, we draw the following generalisations: it is crucial to have clear definition of roles and the value streams associated with the roles; it is crucial that stakeholders not adding sufficient value should be eliminated from the business ecosystem and their roles should be reassigned to other stakeholders in a way that enables viability. The viability of the designed business model largely depends on the post code subsidy (government policy) and the assumptions made about the business model, for example whole sale price of the electricity. Therefore, the business model design artefacts should explicitly consider the environmental factors such as government policy affecting the viability of the business model, and the assumptions made about the business model.

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5. Conclusion

The energy cooperatives are spearheading the transition to sustainable energy systems. GP is one such organisation based in Groningen, The Netherlands. They aim to provide their customers with sustainable energy and related products and services. In particular, they want to setup and operate community owned solar farms on behalf of local communities. However existing literature largely ignores how energy cooperatives can design and implement viable business models. Furthermore, the literature treats community owned solar farms superficially. Without much guidance from existing literature, firms such as GP adopt a high-risk strategy of finding viable business models by trial and error method. However, such unnecessary risks can be greatly reduced by adopting a business model design exercise before implementing the business model. Therefore, the goal of this paper is twofold: i) one is to design a viable business model for community owned solar farms that will be setup and operated in the north of the Netherlands. ii) To present the findings from this case study, and to propose generalisations that are relevant for the development of artefacts that can be used to facilitate the design of viable business models in a business ecosystem setting.

In order to achieve the above goals we have designed a viable business model for community owned solar farms. This business model is readily implementable by cooperatives such as GP in the Netherlands. We adopted a design science research approach for designing the business model. In addition, we used two well established BMO's for designing the business model. Four experts from academia and energy domain successfully validated the designed business model. However, the validation process is limited by the bounded rationality of the experts. We have tried to overcome this limitation by using multiple experts from academia and energy domain to evaluate the business model. Furthermore, we have drawn the following generalisation based on this business model design exercise: i) It is important to have a clear business service concept before starting to design a business model. ii) In a business ecosystem setting, it is important to design the business model from the focal actor's perspective as well as from the business ecosystems perspective. iii) it is crucial to have clear definitions of roles, the value creation activities assigned to these roles and the value streams associated with the roles. iv) All the stakeholders should add sufficient value, if not they should be eliminated from the business ecosystem and their roles should be reassigned to other stakeholders in a way that enables viability. v) The environmental factors and the assumptions directly affecting the viability of the business model should be made explicit. Future research should evaluate how the designed business model will be implemented in practice. Additionally, the derived generalisations should be incorporated into an artefact that will facilitate the design of viable business models.

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Preventing Tragedies: Using Government Procurement and the International Labor Standards to Change the World

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Abstract. The tragedies in Bangladesh in 2012 and 2013, similar to the Triangle Shirtwaist factory fire in the United States in 1911, could have been prevented had the international labor standards been implemented. Despite the promulgation of these guidelines, workplace disasters continue to occur worldwide. Small and medium enterprises (SMEs) no longer operate in a vacuum and are affected by global labor trends. Buyers, as part of their commitment to ensure enterprise social responsibility, are requiring their suppliers, including SMEs, meet criteria related to labor conditions. These organizations must balance their commitment to profitably conduct business and to remain competitive with the need to expand their relationships as business partners in the supply chain. Government procurement contracts have been used by the United States and in other countries to affect social change. The United States government is the world's largest consumer of goods and services. The American governmental mandates for affirmative action, with their emphasis on goals and timetables for federal contractors and subcontractors, have been instrumental in successfully encouraging equal employment opportunity programs on a large scale. This paper aims to highlight the global trend of corporate social responsibility, focusing on the treatment of employees in countries where materials are sourced or products are manufactured. Existing methods for encouraging SMEs to be accountable for implementing the international labor standards are inadequate. The use of government procurement to change social policy is briefly described, based on a literature review. After rejecting the concept of mandatory compliance, the paper then proposes a mechanism for implementation of the international labor standards modelled on the recommendations of the Kenan Consensus. The use of incentives for government contractors, based on compliance with certified management standards such as Social Accountability 8000 (SA8000), is also explored.

1 Introduction

In March 1911, fire at the Triangle Waist Company in New York City shocked the conscience of the American public as images of workers leaping from buildings to escape the flames made front page news nationwide. The streets were strewn with the bodies of 141 men and women, many burned beyond recognition. Egress by the stairways was blocked, allegedly to prevent tardiness among the workers. ("Doors Were Locked", 1911). Officials called for an investigation into the laws that might have prevented such a tragedy. ("141 Men and Girls die", 1911).

Another country, more than a century later, yet the same issues concerning safety and health conditions continue to exist. In November 2012, citizens worldwide were horrified as they viewed pictures on social media and read how a factory fire in Bangladesh had killed 117 workers; their bodies were identified using DNA samples (Ahmed & Botelho, 2015; Manik & Yardley, 2012). In November 2013, the world was again startled to learn of the collapse of a nine-story building housing five garment factories. Although more than 2,400 individuals were rescued, 1,127 workers lost their lives (Ahmed & Lakhani, 2013). The double-tragedy in so short a period of time produced an outcry in the press for more accountability on the part of employers and, perhaps more importantly, the role played by buyers in the supply chain for monitoring the working conditions in the facilities of their suppliers. (Boulden, 2013; Yandley, 2013). The tragedies in Bangladesh in 2012 and 2013, similar to the Triangle Waist Company fire in the United States in 1911, could have been prevented had the international labor standards been implemented. Despite the promulgation of these guidelines, workplace disasters continue to occur worldwide.

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This is not solely an international issue, however. Violations of labor standards occur not only in developing countries but also in developed countries, such as the United States. Reports by the United States General Accountability Office (GAO) (2010) and a United States Senate Commission (United States Senate Commission on Health, Education, Labor, and Pension, 2013) found that almost 30% of the top violators of the federal wage and safety laws were also current federal contractors. Even the largest of companies have been found to violate what most would consider essential safety and health laws. In 2012, the Occupational Safety and Health Administration (OSHA) alleged 24 repeated and serious violations of safety and health standards in a Wal-Mart supercenter in Rochester, New York (United States Department of Labor, Occupational Health and Safety Administration [OSHA], 2012). Those "unacceptable safety hazards" included obstructed exit routes, lack of eye and face protection, confined space hazards. Wal-Mart entered into a settlement agreement with OSHA to improve safety and health conditions in all 2,857 Wal-Mart and Sam's Club stores and will pay $190,000 in civil penalties (OSHA, 2013).

This paper explores the issue of providing incentives for small and medium enterprises (SMEs) to participate in programs to promote compliance with the international labor standards, Part I provides an overview of the global trends in corporate social responsibility, and traces the development of international labor and human rights performance guidelines. Part II reviews the existing methods for incentivizing organizations to be accountable for implementing these standards. Part III identifies the significant gaps in the coverage of the existing regulatory infrastructure for holding SMEs accountable. Part IV proposes a mechanism for implementing the international standards building on the recommendations of the Kenan Consensus.

2 Global Trends of Corporate Social Responsibility

2.1 Corporate Social Responsibility

Global trends of corporate social responsibility have focused on the treatment of employees in countries where materials are sourced or products are manufactured. The recent events in Bangladesh serve as a reminder that enterprises must behave ethically in the treatment of their employees.

Multinational Corporations (MNCs) use outsourcing, particularly modular production, to reduce labor costs and to seek competitive advantage. Manufacturing now involves multiple entities in a variety of organizational settings (Donaghey, Reinecke. Niforou, & Lawson, 2014; Monczka, Trent, & Petersen, 2008).

Definitions of corporate social responsibility vary depending on the perspective of the entity. The World Business Council for Sustainable Development (1998) defined corporate social responsibility as "[t}he continuing commitment by business to behave ethically and contribute to economic development while improving the quality of life of the workforce and their families as well as the local community and society at large" (Watts & Holm, 1998). The European Commission (2011) streamlined its definition to "the responsibility of enterprises for their impacts on society" and stressed that enterprises should have a process to integrate concerns, including those related to human rights, into their business operations and core strategy

Three perspectives are dominant in the discussion of the cost of corporate social responsibility. One theory suggests that when organizations assume costs related to corporate social responsibility, they suffer a competitive disadvantage. (Aupperle, Carroll & Hatfield, 1985; Dyck, Behehtian-Ardakani, Gordon, & Kung, 2011; McGuire & Sundgren, 1988; Ullmann, 1985 Vance, 1975). Another theory proposes that the actual cost of corporate social responsibility is minimal and organizations can

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benefit from improved employee morale and productivity (Dyck et al., 2011; McGuire and Sundgren, 1988; Moskowitz, 1972; Soloman & Hansen, 1985). Finally, the stakeholder theory argues that the significant costs of social responsibility are offset by other costs (Cornell & Shapiro, 1987; Dyck et al., 2011; McGuire & Sundgren, 1988). Common to these theories, however, is the concept that corporate social responsibility involves serving stakeholders (including employees) beyond legal mandates (Dyck et al., 2011). Drucker (2010) noted that companies can create a sustainable competitive advantage by aligning their interests with suppliers, government and other stakeholders. Indeed, companies now view corporate social responsibility as a core competency (Davis, 1960; Hurst, 2004; Porter & Kramer, 2006; Pratt, Rendon and Snider, 2012). Drucker (1984) noted "the proper social responsibility of business is to tame the dragon that is to turn a social problem into economic opportunity and economic benefit, into productive capacity, into human competence, into well-paid jobs, and into wealth" (p. 62).

2.2 International Labor Standards

In attempting to remedy the conditions of workers throughout the world, the United Nations has promulgated a series of conventions and guidelines.

The Universal Declaration of Human Rights, adopted by members of the United Nations in 1948, called on "every individual and organ of society" to promote and secure human rights. These "organs of society" have been interpreted to include civic groups, corporations, and governments (Aaronson, 2005).

The International Labour Organization (ILO) and its constituents (i.e., government, employers and workers) have drafted legal instruments addressing international labor standards. These standards may be either conventions, protocols to conventions or recommendations. In many cases, conventions establish the basic principles to be implemented by ratifying countries. They are legally binding international treaties. Recommendations, which are non-binding, may or may not be linked to a convention. A related recommendation supplements the convention by providing more detailed guidelines on how it can be applied. ILO Member States can choose whether or not to ratify an ILO Convention. However, the ILO keeps track of developments in all Member States, regardless of their ratification status. Once a country has ratified an ILO convention, it is obligated to report regularly on the measures it has taken toward implementation. The United States, while a Member State of the ILO, has ratified only two of the core conventions: those related to the abolishment of forced labor and the prohibition of child labor (United States Department of State, Treaties Pending, 2015; United States Department of State, Treaties in Force, 2015). Significantly, ILO Convention No. 94 (1949), requiring a linkage between certain fair labor standards and government contracts, has not been approved by the United States (ILO, 2015).

The ILO Declaration on the Fundamental Principles and Rights at Work (1998) established "core labor standards" of internationally recognized basic work-related rights and principles to which Member States are committed whether or not they have ratified the relevant Conventions. The four fundamental rights, referencing eight essential conventions, are: (i) freedom of association and the effective recognition of the right to collective bargaining, (ii) elimination of all forms of forced or compulsory labor, (iii) effective abolition of child labor, and (iv) elimination of discrimination in respect of employment and occupation. The text of the Declaration was unanimously ratified by the ILO's member states (including the United States) (ILO, 1998). This document, although it avoided the ratification by the member states of each of the 188 binding ILO conventions, does not have the same status as an international treaty (Donaghey, 2014). The Declaration parallels references to core international labor standards included in the United Nations (UN) Universal Declaration of Human

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Rights (1948), the UN Covenant on Civil and Political Rights, and the UN Covenant on Economic, Social and Cultural Rights that came into force in 1976 (Trebilcock & Howse, 2004).

Additional guidance for businesses can be found in the Organisation for Economic Co-operation and Development Guidelines for Multinational Enterprises (1976), the ten principles of the United Nations Global Compact (1999), the ISO 26000 Guidance Standard on Social Responsibility (2010), the ILO Tripartite Declaration of Principles Concerning Multinational Enterprises and Social Policy (2006), and the United Nations Guiding Principles on Business and Human Rights (2011). Internationally recognized, these documents provide a framework for protecting individual rights, including human rights and labor and employment practices (including employee safety and health, diversity, gender equality, and training) (European Commission, 2011).

2.3 The United Nations and Voluntary Codes of Conduct

The United Nations in its enforcement of labor standards has primarily relied on the voluntary compliance of enterprises and governments. The Global Compact, launched in 1999, and the Norms on the Responsibilities of Transnational Corporations and Other Business Enterprises with Regard to Human Rights, adopted in 2003, were limited in their scope. They applied to only a few of the sectors where noncompliance with the standards might be common. More importantly, there were significant differences in the content of the instruments themselves, including conflicting definitions of the core labor standards and provisions for monitoring performance (Trebilcock & House, 2004). The ILO, despite provisions in its constitution addressing enforcement, has relied on more informal methods such as public shaming through published reports to encourage compliance (Ho, 2006).

In response to the apparent ineffectiveness of the ILO to implement the labor standards, non-governmental organizations and other interest groups have developed alternatives such as certification, labeling and voluntary codes of conduct (Trebilcock & Howse, 2004). External forces, such as consumer concerns and the potential for media exposure for substandard labor conditions have also provided an impetus for developing codes of conduct. In addition, the passage of the United States Sentencing Guidelines (18 U.S.C. 3553) in 1991 encouraged organizations to institute codes of conduct. Companies could gain lenient sentencing based on mitigating factors including the establishment of a program to prevent and detect violations of the law (Kenny, 2007).

2.4 Corporate Voluntary Compliance

Liubinic (1998) identified two primary private models for ensuring compliance: corporate monitoring or agency monitoring. Corporate monitoring involves the use of in-house quality control inspectors and auditors who visit overseas work sites and is a prevalent method used by many American multinational corporations (Liubicic, 1998). Agency monitoring involves paying a third party, e.g., PricewaterhouseCoopers (PwC), to perform outside audits to monitor their code compliance. (Liubicic, 1998). It has been suggested that the use of third party auditors provides organizations with a comparative advantage in auditing policies and procedures related especially to the codes of conduct concerned with child labor (Liubicic, 1998). However, the professional capability of accounting or independent consulting firms to audit the codes has also been challenged (Trebilcock & Howse, 2004). There are inherent conflicts in interest when organizations self-monitor ((Liubicic, 1998). Hong (2000) has noted that the financial costs, especially those incurred as a result of external or third party monitoring, deter more than minimal compliance with the internal codes.

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2.5 Mandatory Compliance

Countries have attempted to mandate compliance with accepted international labor principles. Indeed, often as part of their treaty obligations they are required to do so (de Jonge, 2011; Ruggie, 2007). It is unlikely that the United States will enact legislation implementing the international labor standards. The United States has been reluctant to ratify several of the United Nations conventions related to labor rights citing constitutional constraints regarding the rights of individual states.

Accordingly, the United States has deferred to the individual states to enact legislation related to employee rights. Although a discussion on international law and its impact on corporations is beyond the scope of this article, it is important to note that American courts have been reluctant to consider breaches of the international labor standards in foreign countries by multinational corporations (MNCs) operating transnationally (de Jonge, 2011; Ruggie, 2007).

2.6 Certified Management Standards

External standards provide objective assessments based on global norms (de Jonge, 2011). Certification standards measure performance and define requirements or minimum standards to be certified by independent external auditors (Behnam & MacLean, 2011). They attempt to control the social, environmental and economic impact of organizations and to bridge the significant gaps in the existing international regulatory infrastructure. (Behnam & MacLean, 2011; Boatright, 2000; Deva, 2006; Gilbert & Rasche, 2008; Stigzelius & Mark-Herbert, 2009). Organizations have become more focused on addressing certification and performance audit requirements, such as ISO 9000 and ISO 14000 (Ciliberti, deGroot, De Haan, &, Potrandolfo, 2009; Leipziger, 2001). SA8000, an accountability standard developed by Social Accountability International (SAI, 2014), was designed to be integrated efficiently into this scheme (Ciliberti et al., 2009; Leipziger, 2001). Based on accepted international labor standards promulgated by the United Nations, the certification standard is applicable to a wide range of industries regardless of size. SA8000 defines minimum requirements for workplace conditions (Behnam & Maclean, 2011; Gilbert & Rasche, 2007; Göbbels & Jonker, 2003). Guidance documents and industry-specific training are provided to participating organizations to aid in addressing the nine Social Accountability Requirements (Göbbels & Jonker, 2003; SAI, 2014). Because SA8000 is clearly defined, with assurances of compliance and sanctions for non-compliance, organizations are likely to adopt the standard as part of day-to-day operations. (Behnam and MacLean, 2011).

3 Small- and Medium-sized Enterprises (SMEs)

3.1 Small and Medium Enterprises and Corporate Social Responsibility

3.1.1 Definition of small and medium enterprises

The United Nations Industrial Development Organization (UNIDO) has estimated that small- and medium-sized enterprises (SMEs) make up 90% of business worldwide and account for 50-60% of employment (Jenkins, 2004; Luetkenhorst, 2004; Raynard & Forstater, 2002; Sachdeva, & Panfil, 2008). They make a significant contribution to regional economic development and gross domestic product growth. (Lund-Thomsen, Jamali, & Vives, 2014; Morsing & Perrini, 2009).

The definition of small and medium enterprises has varied among governmental entities. The European Commission has defined small and medium enterprises (SMEs) as organizations having less than 250 employees (European Commission, 2003). The United States Small Business

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Administration, however, considers the number of employees, its average gross revenue, and the type of industry. Manufacturing concerns, for example, should have less than 500 employees or less than $7 million in average gross revenue over the last three years, to be considered a small business (United States Department of Defense, n.d.). Existing methods for encouraging organizations to be accountable for implementing the international labor standards target MNCs and fail to address the unique characteristics of SMEs. Research on corporate social responsibility has focused primarily on multinational corporations (MNCs) (Baumann-Pauly, Wickert, Spence, & Scherer, 2013). There has been an on-going debate whether the activities of SMEs are comparable with those of MNCs (Baumann-Pauly et al., 2013; Fuller & Tian, 2006; Jamali, Zanhour, & Keshishian, 2009; Lund-

Thomsen, Jamali, & Vives, 2014). International guidelines, including proposals for corporate codes of conduct, have been developed but these target MNCs rather than SMEs (Jamali et al, 2009; Jenkins, 2004; Williamson, Lynch-Wood, & Ramsay, 2006). Indeed, the European Commission (2008) has issued guidelines expressly exempt SMEs from their coverage. However, in the United States, under Executive Order No.13673 (2014), only those contractors and subcontractors with contracts of more than $500,000 are mandated to comply. In accordance with Executive Order No. 11246 (1965), a prime or first tier subcontractor with 50 or more employees and a contract amounting to $50,000 is required to submit compliance reports.

3.2 SMES Approach CSR Differently

Small and medium enterprises, no longer operating in a vacuum, are affected by global labor trends. Multinational corporations, in an effort to reduce labor costs and to seek competitive advantage, frequently engage in outsourcing (Donaghey et al., 2014; Monczka, Trent, & Petersen, 2008). Buyers, as part of their commitment to ensure corporate social responsibility, are requiring their suppliers, including SMEs, to meet criteria related to labor conditions (Pedersen & Andersen, 2006). Organizations must balance their commitment to profitably conduct business and to remain competitive with their need to expand relationships as business partners in the supply chain.

A review of the literature confirms that SMEs manage their relationships with stakeholders differently from MNCs (Jenkins, 2006). Unlike MNCs, SMEs place an emphasis on maintaining strong personal and interpersonal relationships with key stakeholders including customers, employers, suppliers and the local community. (Fuller and Tian, 2006; Jamali et al., 2009; Lund-Thompsen, et al., 2014; Murillo & Lozano, 2006; Perrini, 2006; Vallejo Martos & Grande Torraleja, 2007). These relationships are grounded in the ethical and religious values of the owners (Murillo& Lozano, 2006; Vives, 2006) and influence corporate social behavior of SMEs (Jenkins, 2006).

The relative size of SMEs creates advantages for SMEs. Sarbutts (2003) has noted that SMEs are more adaptive to change since their flatter structure permits them to respond more quickly to its environment. Vives (2006) has found SMEs are more willing to respond in an ethical manner with an emphasis on the greater good, even if it means sacrificing some of its profits.

4 Government Procurement

Government procurement contracts have been employed by countries, including the United States, to change social policy. The use of public procurement for human rights purposes is well-established (McCrudden, 1999). Government agencies and organizations acquire supplies and services from outside sources, usually on the basis of competitive bidding (McCrudden, 2007; Thai, 2001; Snider et al., 2013; Thai, 2001). The government thus becomes a participant in the market rather than a

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regulator. (McCrudden, 2007; Snider et al., 2013). The award of public contracts provides a significant inducement for contractors to adopt sound business practices (McCrudden, 1999).

A study by the World Bank identified four possible roles for government: mandating by establishing minimum standards for corporate social responsibility actions through legislation and regulation; facilitating by providing incentives to firms to engage in corporate social responsibility to address complex social problems; partnering with firms; and endorsing by acknowledging the efforts and performance of firms (Fox, Ward, & Howard, 2002).

Public procurement has been used as a tool for promoting corporate social responsibility in several states in the European Union (Albareda et al., 2008; de la Cuesta González & Valor Martinez, 2004; Snider et al., 2013). The European Parliament and Council, in its Public Procurement Directive (2004) and Defense Procurement Directive (2009), authorize national authorities to include provisions for SME subcontracting (Kidalov, 2011; Snider et al., 2013).

Aaronson (2005) has acknowledged the market power of the United States government to influence public policy, particularly those related to labor and the environment. As the single largest consumer in the nation, the federal government purchases more than $500 billion in goods and services each year (United States Office of Management and Budget, n.d.). Its procurement power is demonstrated through the use of contractor standards, proposal evaluations, contract specifications and the subsequent influence of contractors on others in the supply chain (Snider et al., 2013). Contract compliance policies have been used to influence social change most notably the encouragement of equal employment opportunity (McCrudden, 1999; Leonard, 1990). Special treatment for SMEs has been addressed by the Small Business Act (Snider et al., 2013).

4.1 Efforts by the United States Government affecting Public Procurement

Several actions have been taken by the United States Government to use procurement to affect social change.

4.1.1 *Executive Order No. 11246 Equal Employment Opportunity (1965)*

Executive Order No. 11246 (1965) prohibits those federal contractors and subcontractors with contracts greater than $10,000 from discriminating against individuals in employment decisions on the basis of race, color, religion, national origin, or sex. Compliance is monitored by the Office of Federal Contract Compliance Programs (OFCCP), an agency within the United States Department of Labor. The prime contractor agrees to insert a clause in the contract affirming the commitment of the prime contractor to equal employment opportunity (41 C.F.R. 60-1.4, 2014). The contractor also agrees to include this clause in every eligible subcontract or purchase order. Therefore, the provisions of the contract related to non-discrimination are also binding on each of the subcontractors (41 C.F.R. 60-1.1, 2014). If the contractor does not comply with the terms of the clause, contracts may be terminated. Contractors and prime-tier subcontractors with 50 or more employees and a contract greater than $50,000 must file an annual report. Where the award would be greater than $10 million, a pre-award compliance evaluation is required. In addition, contractors must develop and maintain a written affirmative action program (AAP) for each of its establishments (41 C.F.R. 60-1.7, 2014). The document defines a set of specific and results-oriented procedures to which a contractor promises to apply every good faith effort. Developed by the contractor (with technical guidance from OFCCP), the AAP relies on an organization's self-audit of its workforce. The program emphasizes the establishment of goals and timetables for correcting the underutilization of women and minorities (United States Department of Labor, nod.) The American government mandates for affirmative action, with its emphasis on goals and timetables for federal contractors

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have been instrumental in successfully encouraging equal employment opportunity programs on a large scale (McCrudden, 2007).

4.1.2 Model Business Principles (1994)

The Executive Branch under President Bill Clinton, published a set of Model Business Principles in 1994 (United States Department of State, 1997; US Department of Commerce, 2007), emphasizing corporate human rights codes (Cassel, 1996). The document encouraged businesses to adopt and implement voluntary codes of conduct on a global scale. These principles would cover labor and human rights performance concerns such as workplace health and safety; fair employment practices, including bans on child labor, forced labor and discrimination and the rights to organize and bargain collectively (Cassel, 1996). The United States Department of Commerce was assigned the responsibility for implementation (Cassel, 1996; Lewis, 1995; Scherer & Smid, 2000). Some

organizations responded by expressing a preference for the OCED and ILO guidelines issued in the 1970's, arguing they encompassed most of the areas in the Model Business Principles. Few large firms, however, were willing to support the Principles for framing the codes of conduct for individual businesses (Cassel, 1996; Lewis, 1995; Scherer & Smid, 2000).

4.1.3 Fair Labor Standards Act

A precedent has been established for assuring compliance throughout the value supply chain in the enforcement of domestic government labor standards. The Wage and Hour Division of the United States Department of Labor implemented a program whereby goods made in violation of the Fair Labor Standards Act (FLSA) (29 U.S.C. 201, 2014) were embargoed. The goods were not released unless the apparel manufacturer agreed to establish a formal monitoring and compliance program for the contractor and subcontractor shops. Terms and conditions for compliance were established. Weil (2010), in a study evaluating the effectiveness of this method, found a statistically high level of compliance with the agreements. Manufacturers were more likely to comply with the law and increase their use of contractors who were in compliance.

4.1.4 Executive Order No. 13673 Fair Pay and Safe Workplaces (2014)

The United States Government Accountability Office (2013) reported that many large government contractors were not in compliance with American labor laws but were still permitted to continue to submit bids on government contracts. Executive Order No. 13673 requires federal contractors, where the value of goods and services to be purchased is greater than $500,000, to disclose any judicial or administrative action for violation of certain labor laws and regulations. Subcontractors must make similar disclosures to the prime contractors. The information will be used to make determinations concerning the eligibility of contractors and subcontractors to bid on federal contracts.

Significant gaps thus continue to exist in the regulatory infrastructure for holding business organizations, including SMEs, accountable for their labor and human rights performance. Despite the issuance of these regulations incorporating government procurement methods by the United States government, the issue of implementing the international labor standards on a national level by the federal government still remains unresolved.

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5 Proposal: Implementing the International Labor Standards Modeled on the Recommendations of the Kenan Consensus

5.1 Kenan Institute Study Group Consensus Recommendations

The Kenan Institute Study Group Consensus (2003) provided recommendations for adopting, implementing and enforcing labor standards to meet internationally accepted principles promulgated by the United Nations. While addressing the challenges presented by globalization, it acknowledged the role played by the United States Department of State in supporting the OECD Guidelines for Multinational Enterprises. Similarly, it called upon the United States Department of Labor to promote adherence to the ILO Tripartite Declaration of Principles concerning Multinational Enterprises and Social Policy and the ILO Declaration on Fundamental Principles and Rights at Work. To foster global corporate social responsibility, the group recommended the U.S. government provide incentives, such as tax breaks. Further, it proposed that the President issue an Executive Order requiring United States government agencies to integrate labor and human rights performance into their procurement preferences. They noted that such preferential treatment already exists for those who meet certain environmental and energy-efficient criteria. The group cautioned that these reporting regulations should not be overly burdensome for contractors and should be consistent with international law and procurement regulations related to small and medium enterprises SMEs (Kenan Institute, 2003).

While the Kenan Consensus focused on mandating standards, research by the World Bank (Fox, Ward, & Howard, 2002) and the United States General Accountability Office (2008) indicates that businesses are more likely to comply when the government facilitates compliance. American companies surveyed by the GAO favored a government role supporting business' voluntary efforts (United States General Accountability Office, 2008).

5.2 Proposal

5.2.1 Compliance

Public contract awards can effectively induce contractors to adopt good business practices (McCrudden, 1999). The procurement power of the United States government should be used to promote corporate social responsibility, including compliance with the international labor standards (Aaronson, 2005). The United States government is one of the largest consumers of goods and services in the world. (United States Environmental Protection Agency, n.d.). The policies and procedures concerning equal employment opportunity and affirmative action social policies adopted by the United States government have served as an example for other nations (McCrudden, 2007). Similar mechanisms could be developed to ensure compliance with the international labor standard incorporating the recommendations of the Kenan Consensus.

Public contract awards can effectively induce contractors to adopt good business practices (McCrudden, 1999). As a condition of providing goods and services to the United States government, organizations could insert the clause in contracts with their subcontractors to ensure compliance with the internationally accepted guidelines recommended by the Kenan Consensus. Using the value supply chain, then, there would be an ever-widening net of subcontractors who would be required to comply with the international labor standards.

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5.2.2 Certified management standards

The use of certified management standards, such as SA8000, could be used to incentivize SMEs to participate in programs promoting compliance with the international labor standards. Independent third parties, auditing on behalf of SAI, could document compliance with SA8000. Once certified, firms could be monitored on an on-going basis to ensure they conform to the norms (Gilbert, Rasche, & Waddock, 2011).

As occurs with affirmative action plans developed to promote equal employment opportunity, goals and timetables could be developed to encourage progression through the compliance levels. Independent auditors, trained in the assessment of the certified management standards, could be used to provide specific recommendations for improving performance. Auditors could work collaboratively with organizations to develop guidelines for improving labor and human rights performance.

5.2.3 Incentives

Existing methods of encouraging SMEs to be accountable for implementing the international labor standards are inadequate.

Currently, as mandated by Executive Order No. 13673 (2014), certain federal contractors must certify there have been no administrative or judicial decisions concerning labor violations within the past three years. However, most SMEs are exempt from that requirement. Further, the definition of labor violations does not include violations of the norms established by the international labor standards.

Past performance is often used by government agencies as an evaluation factor in awarding procurement contracts (Snider et al., 2013). Favorable evaluation factors have been established for those bidders meeting certain environmental and energy related criteria (Kenan Institute, 2003). Compliance with SA8000 standards could be considered an additional factor to be assigned higher importance when evaluating bids. A point system could be created based upon different levels of compliance with the standards (e.g., SA8000 certification for a single production facility or the entire supply chain) (Behnam & MacLean, 2011). Government agencies might consider accepting higher-priced bids from contractors in exchange for documented higher compliance levels with SA8000 when evaluating proposals. Organizations with more compliance points would be awarded permitted to bid at a proportionally higher price.

Suppliers, particularly SMEs are faced with increased pressure to reduce costs while at the same time maintaining or improving working conditions. Organizations are often tempted to engage in undercutting practices in order to maximize profits through supply chains (Donaghey et al., 2014). Despite their best intentions, SMEs often lack the resources to address reporting requirements. Incentives highly regarded by SMEs, consonant with their value systems, would provide the motivation to implement the international labor standards. The use of favorable evaluation factors based on labor and human rights performance, combined with the resultant opportunity to submit higher-priced bids, could encourage SMEs to become more engaged in meeting the certified management standards, such as SA8000. Thusm a new level of performance would be required to procure government contracts, one more in alignment with established international norms.

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Regulations should not be overly burdensome for contractors and should be consistent with international law and procurement regulations related to small business (Kenan Institute, 2003). Because SA8000 is integrated with other certified management standards, this procurement process promotes the efforts of SMEs to be both profitable and socially responsible. It is consistent with the principles of international law since all prospective bidders, whether domestic or international, would

be required to meet the same criteria. Because the criteria is based on internationally-recognized labor and human rights principles and meets global standards, the procurement process would not discriminate against companies from any particular country (McCrudden, 1999).

6 Conclusion

Tragedies, such as those at the Triangle Waist Company in New York and in factories in Bangladesh, could have been prevented had the international labor standards been implemented. Existing methods for encouraging SME to be accountable for implementing the international labor standards are inadequate.

This paper proposes the integration of certified management standards and the government procurement process to encourage compliance by small and medium-sized enterprises (SMEs).A review of scholarship in the areas of human resource management, supply chain management, and government procurement was undertaken. Significant gaps in the existing regulatory infrastructure were identified. An environment was identified where small to medium-sized enterprises are not incentivized to participate in programs promoting compliance with the labor standards. An original proposal was discussed for integrating certified management standards, such as SA8000, into the government procurement process. Independent auditors would ensure compliance with the certification requirements and training would be provided on establishing goals and timetables for establishing levels of compliance. An incentive system, based on higher-priced bids for those who meet or exceed the benchmarks for labor and human rights performance, was proposed. The recommended mechanisms have implications for the future of SMEs, the implementation of the international labor standards and government procurement. Further study is warranted to investigate the feasibility of this proposal and its impact on SMEs.

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Defining a healthy and safe work environment in SEs in New Zealand: A study of the 'good employer'.

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Abstract. This paper examines the concept of a 'good employer' regarding employment relations (ER) and occupational health and safety (OHS) practices in small enterprises (SEs) in New Zealand. The assumption that SE employers' are paternalist and favour an individualistic approach to managing the employment relationship and OHS risk, and consequently that SE terms and conditions of work are generally inferior to large enterprises has not been tested in SEs in New Zealand. A qualitative approach was adopted involving conducting semi-structured interviews with 12 small enterprise employers. How these 'good employer' perceptions, attitudes and beliefs were implemented in practice was explored through the five dimensions of a 'good employer' adapted from the ILO dimensions of socially decent work at the workplace level. The overall results on a continuum showed some were only compliance driven, some employers had characteristics such as training and development along with OSH risk management, and the few exceptional employers could be described as having most of the characteristics of a 'good employer'.

1 Introduction and background

Why explore the 'good employer' in a small enterprise context? International researchers recognize the important contribution small and medium enterprises (SMEs) make to innovation, job creation and economic development, but the plethora of literature focuses on finance, marketing and operational management in SMEs (Wilkinson, 1999). Researchers consistently draw attention to a dearth of information on employment management practices and issues in SEs (Coetzer, Cameron, Lewis, Massey & Harris, 2006; Edwards, Ram, Gupta & Tsai, 2006; Forth, Bewley & Bryson 2006; Lamm, Massey & Perry, 2007; NZHRC, 2010; MED, 2004; Wilkinson, 1999; Woodhams, Howard, Johri, Shulruf & Yee, 2007). The most comprehensive research in OHS practices in small New Zealand enterprises at the time the research was conducted was by Legg, Battisti, Harris, Laird, Lamm, Massey and Olsen (2009).

The existing literature concerning 'good employer' practices in New Zealand focuses on large businesses in the public and private sectors (Boxall, 1991; Brown & Butcher, 2004; Butcher & Stewart-Loughnan, 2005). The government has taken the lead in defining 'good employer' practices in case law and a raft of statutes enacted by parliament, specifically the State Sector Act 1988 (NZHRC, 2006). As an employer, the State Sector also acts as a model for the private sector, guided by their statutory duties to understand employee's interests, to maximize common interests, to resolve conflict in a manner that will ensure sustainability of the enterprise and, where possible, accommodate the employee's interests. In an examination of the 'good employer' concept outlined in the State Sector Act 1988, Boxall (1991) points out the expectation that good public employers will be able to fulfil their statutory duties within the bounds of accountable and sustainable management practices.

The private sector can model their policies and practices on the public sector. Although modelling is voluntary, employers are also bound by statutes and case law. Employment law statutes and amendments to the statutes are the primary source of employment law defining mutual obligations for conducting behaviour in employment relationships and include, but are not restricted to: the Employment Relations Act 2000 (ERA), the Holidays Act 2003, the Health and Safety in Employment

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Act 1992 (HSEA), and the Human Rights Act 1993. In this study we refer to the relevant current employment law, but the reader is to note that this encompasses all the amendments to the specific law. At times specific amendments are discussed. Common laws are legal principles and precedents decided by courts and tribunals. The courts have also defined the 'good employer' by principles of natural justice requiring employment procedures to be fair in all circumstances (NZHRC, 2009, 2013). However, the New Zealand Human Rights Commission (NZHRC) enquiry about work suggested that the current statutory duties may not be delivering the intended outcomes. This is evident in the NZHRC recommendation that Equal Employment Opportunity legislation applying to both the public and private sectors be reviewed. Amongst other recommendations, they advocate "amending the Employment Relations Act 2000 to include a positive duty to be a good employer" (2010, p.31). Under the employment legislation, good employment practices have been defined as voluntarily going beyond compliance with minimum statutory requirements (DoL, 2003).

The NZHRC concerns are compounded in the literature debating whether employment laws based on the assumption that collaboration and collectivism foster more productive relationships in enterprises are pertinent in a predominantly individualist employment environment, particularly when there is an inherent inequality in bargaining power (Atkinson & Curtis, 2004; Bewley, 2006; Rasmussen & Lamm, 2002, 2005). In a study on rising individualism, Rasmussen, Foster and Haworth (2010) reiterate this concern, highlighting legislative amendments, and proposed amendments by the National Government post 2008 related to personal grievances, minimum wages, annual leave, sick leave, union access, and employee representation rights. These amendments appear to lean in favour of employers and there is conflicting research as to whether SE employers generally find the volume and complexity of employment laws too onerous (New Zealand Business Round Table, 2010) and disproportionately influencing SMEs (Harris, 2000; Woodhams, et al, 2007) or not (NZCTU, 2010; Knuckey, Johnston, Campbell-Hunt, Carlaw, Corbett & Massey, 2002). Regardless of this debate, there is evidence of non-compliance with both the Employment Contracts Act 1991, considered to favour the employer, (Gilbert & Jones, 2000) and the ERA, alleged to favour employees (Business NZ, 2008; DoL, 2010b; Gilbert & Jones, 2000; Knuckey, et al, 2002; Waldergrave, Anderson & Wong, 2003). One explanation is that breaches occur through ignorance (Scott, Roberts, Holroyd & Sawbridge, 1989).

While the courts in New Zealand and elsewhere have attempted to determine the concept of a 'good employer' (Bewley, 2006; Boxall, 1991; NZHRC, 2006; Rudman, 2008, 2015), statutes alone cannot provide the notion. Academics suggest turning to contemporary management literature to gain a fuller understanding of the changing ideas of what constitutes best management practices (Boxall, 1991; Haydu & Lee, 2004). The emerging management theories may be treated as rhetoric or ideologies that expose a set of assumptions about businesses, employees and employers, and the means by which the employer manages the business and employees (Barley & Kunda, 1992). However, the concept has largely been developed in a large enterprise (LE) and public sector context and there is no consensus on the key characteristics of socially decent work (Bonnet, Figueiredo, & Standing, 2003; Standing, 1997; Derante & MacMillan, 2012; Warhurst, Findlay & Kallenberg, 2011). The Human Relations journal is publishing a special issue in 2013 as a platform for increasing understanding of job quality and addressing the lack of comparability between countries, and may include work focusing on SEs (Warhurst, et al, 2011).

The general dearth of literature indicates there is a pressing need for a study exploring how ER and OHS are managed particularly in a SE context in New Zealand. The way forward is to uncover ER and OSH practices that have positive outcomes for SE employers and employees. The need to provide exemplars of 'good employer' behaviours that have increased financial performance and productivity has also been identified as a means of encouraging employers in a predominantly

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unitarist/individualist context to improve employees' workplace conditions (Brown & Butcher, 2004; EC, 2003; Fuller & Tian, 2006; Giaccone & Celleoni, 2009; Jenkins, 2004, 2006; Lawrence, Collins, Pavlovich, & Arunachalam, 2006; Margolis & Walsh, 2001) and reduce the incidence of workplace induced illnesses and injuries in large enterprises (LEs) in New Zealand (Brown & Butcher, 2004; Butcher &Stewart-Loughnan, 2005).

2 Developing the concept of a 'good employer' in a SE context

The increasing interest in SMEs is reflected in the inclusion of micro enterprises in comprehensive national ER surveys. Both the Workplace Employment relations Survey (WERS) 2004 conducted in the UK and the Australian Workplace Industrial Relations Survey (AWIRS) 1995 included micro enterprises employing less than ten employees (Forth, *et al*, 2006: Kersley, Alpin, Forth, Bryson & Bewley, 2006; Morehead, Steele, Alexander, Stephen & Duffin, 1997). These longitudinal studies are invaluable in comparative research as they provide a snapshot of ER at specific points in time and do capture key characteristics of a 'good employer' such as employee voice in workplace decisions, training and development opportunities, pay and terms and conditions of employment (Kersley, *et al*, 2006; Knuckey, *et al,* 2002; Morehead, et al, 1997; Sengupta, Edwards & Tsai, 2009; Storey, Saridakis, Sen-Gupta, Edwards & Blackburn*,* 2010). An advantage of national WERS and the AWIRS is that they integrate data from managers, employees and employee representatives on a set of objective and subjective measures. It is, however, difficult to establish whether the employer's perceptions correspond with the employee's experience in a specific enterprise (Godard, 2001). The data can be used to develop theory and comparisons of large and SEs. For example Storey, *et al* (2010) used WERS data to explore the relationship between the formality of human resource (HR) practices and job quality. However, data analysis will be subject to the same limitations as the WERS.

Even though researchers have recognized that a national employment relations study would provide comprehensive and integrated data to fill the gaps regarding the nature of policies and practices (Lamm, 2002; Ryan, 1996), there is no similar survey in New Zealand. The *Firm Foundations* study (Knuckey, *et al*, 2002) is the most comprehensive New Zealand research. This study, aimed at uncovering 'good employer' practices and performance in a New Zealand context, was used to support the "Employer of Choice" initiative (DoL, 2003). Although this study included SEs it was limited to formal management practices, which did not adequately capture the nature and extent of employment relations (ER) and occupational health and safety (OHS) practices that may be effective in SEs. The researchers themselves pointed out the limitations of the study, questioning the robustness of their model for SEs. Coetzer, *et al's* (2007) qualitative study of SEs addressed this limitation by capturing informal practices, although a strong HR perspective does not capture how employer and employee interests and expectations are aligned and how issues are resolved.

The ER literature in New Zealand predominantly captures a LE perspective of the persistent decline in union collective bargaining (Foster, *et al*, 2009; Foster & Rasmussen, 2010), employee voice (Boxall, Haynes & Macky, 2007; Haynes, *et al*, 2005; Rasmussen, *et al*, 2000) or non-union voice mechanisms (Haynes, 2005; Haynes & Fryer, 2001). Academics researching Employment Relations Problems (ERPs) highlight a need to gain a better understanding of differences in experiences for SMEs, including why ERP's arise earlier for SE employers (Waldergrave, *et al*, 2003; Wiesner, McDonald & Banham, 2007; Woodhams, *et al*, 2007). However, the articles in a special addition of the New Zealand Journal of Employment Relations devoted to ER issues in SMEs focused on the employer rather than on issues related to the employer-employee relationship (Battisti & Deakins, 2010).

OHS research has similarly been criticized for a strong focus on LEs (Lamm, *et al,* 2007), although there has been some OHS research in SMEs (Bohle & Quinlan, 2000; Champoux & Brun, 2003; Eakin,

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1992; Hasle, Kines, & Anderson, 2009; Hasle & Limborg, 2006; Laird, 2008; Lamm, 1999, 2002; Legg, *et al*, 2009; Walters & Lamm, 2004; Walters, 2010). There is, nevertheless, a general dearth of literature integrating ER and OHS management practices. Gallie (2003) argued that there is significant evidence linking the quality of working life to personal well-being. For example, career-blockage and job instability appear to have an impact on health (Siegrist, 1989 cited in Gallie, 2003). Conversely, Barling, Kelloway & Iverson (2003) linked high-quality work and job satisfaction to a reduction in workplace injuries. Several academics have identified this need to gain a better understanding of how OHS is managed in SEs, the extent and importance of employer and employee participation and psychosocial issues; and why some SEs have more proactive OHS management than others (Laird, 2008; Lamm, *et al*, 2007; Legg, *et al* 2009).

Kersley, *et al* (2006) recognized that few methodologies in the social sciences offer universal solutions. Rather advances are made incrementally through a variety of methods, which together broaden understanding in different but complementary ways. It was, therefore, encouraging to see the progression from quantitative research methods adopted in early SE studies in the UK (Curran & Blackburn, 2001) as studies became more diverse over time. Qualitative and interpretivist methods became more common as the field developed. Blackburn and Smallbone (2008) reported that 55 percent of the papers presented at The Institute of Small Business and Entrepreneurship conferences between1996-2006 adopted qualitative approaches.

Later national level (often state funded) studies tend to take a mixed methods approach accommodating the inclusion of all stakeholder groups(Hull & Read, 2003; Kersley, *et al*, 2006; NZHRC, 2010; Waldergrave, *et al*, 2003). Other studies have captured employer and employee perspectives (Barrett & Khan, 2005; Tsai, Sengupta & Edwards, 2007) or focused on either employer (Geare, *et al*, 2009; Nadin & Cassell, 2007; Ryan & Fursman, 2005) or employee samples (Boxall, *et al*, 2007; Considine & Callus, 2002; Rasmussen, *et al*, 2000). This is significant as early studies tended to focus on the employer which led Curran (1986) to observe that "those who work in SEs might in many ways be called 'the invisible labour force'" (p.33). Macky & Boxall (2008a, 2008b) suggested this could be partly due to difficulties in engaging employees working in smaller enterprises in research. There is still some difficulty in identifying role-holders who have knowledge of ER and an absence of recorded data on employment issues in SEs (Forth, *et al*, 2006). An additional influence on research results has been a general decline in response rates across all surveys (Kersley, *et al*, 2006).

The nature of research into the practice of ER has, moreover, altered with an increasing focus on efficiency and the diffusion of high involvement and high performance management practices (Kersley, *et al, 2*006). The work in New Zealand appears to be following this trend with performance and sustainability the focus of most research.

2.1 The key characteristics of small enterprises

The main assumption is that SE employers' are paternalistic and favour an individualistic approach to managing the employment relationship and OHS risk (Atkinson & Curtis, 2004: McDonald, 2005; Wilkinson, 1999). This assumption is compatible with unitarist ideological beliefs and is a significant issue as the literature shows that the unitarist management norm to protect managerial prerogative prevails in New Zealand workplaces (Geare, Edgar & McAndrew, 2006, 2009) and specifically in

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Australian SMEs (McDonald, 2005). The available literature suggests there may be some tension between the unitarist employers' perceptions of a 'good employer' and the pluralist assumptions embedded in employment legislation. This study is based on the assumptions that employees in SEs generally have:

- shorter employee tenure (Guest & Conway, 1999),
- less pay and higher likelihood of non-permanent employment contracts (Guest & Conway, 1999),
  - o pay increase less common in SEs (Barrett & Mayson, 2007; Gilman, Edwards, Ram & Arrowsmith, 2002)
- less tangible terms and conditions of work offered to them (Barrett & Khan, 2005; Nadin & Cassell, 2007; Rainnie, 1989), including
  - o less formal training and development opportunities than employees in large enterprises (LEs) (Forth, Bewley & Bryson, 2006; Kotey & Slade, 2005)
  - o less likelihood of access to work-life balance arrangements (Kersley, et al, 2006; Yasbek, 2004),
- less likelihood that employers will provide regular formal and systematic information, less likelihood owner/managers will inform them about financial matters (Forth, et al, 2006), and that employers will be more reticent to commit themselves to consultative and partnership practices (McDonald, 2005; Ram, Edwards, Gilman & Arrowsmith, 2001),
  - o consequently employees in SEs have weak bargaining power and minimal union activity (McGovern, Smeaton & Hill, 2004; Rasmussen, 2009a)
- a higher incidence of employment relations problems (ERPs) (Woodhams, et al, 2007; Saridakis, Sen-Gupta, Edwards & Storey, 2008; Harris, 2000; Wilkinson, 1999), and
- higher risk of experiencing a workplace illness or injury because employment and OHS legislation are a low priority in many SMEs (Eakin, 1992; Lamm, 1999; Mayhew, 2000).

These assumptions suggest that SEs offer less favourable terms and conditions of work than LEs yet satisfaction studies show employees are more satisfied in SEs than those in LEs (Considine & Callus, 2002; Forth, et al, 2006; Storey, Saridakis, Sen-Gupta, Edwards & Blackburn, 2010).

2.2 The key characteristics of a 'good employer'

2.2.1 Employment and voice security
The ERA promotes collectivism, however, New Zealand employers generally favour a unitarist ideology and tend to adopt an individualistic approach to managing employees (Foster, et al, 2009; Foster & Rasmussen, 2010; Geare, et al, 2006, 2009; Haynes, et al, 2005; Waldergrave, et al, 2003). The absence of collective employee representation in many SEs suggests that the SE workplace environment may not be supportive of employee participation in decision-making concerning issues that affect employees including the management of OHS risks. The literature has also highlighted the detrimental effects of lower quality work on an employee's physical and psychosocial well-being. The relatively low incidence of joint consultation in the smallest SEs furthermore suggests employment legislation intended to facilitate productive employment relationships has had a marginal effect. While research has raised some relevant issues there is a need to gain a deeper understanding of attitudes towards information sharing and consultation in the context of individualized employment relationships. An exploration of how employees are informed and involved, the level of employee involvement, and what effect employee voice has on decision-making and outcomes will uncover whether it is realistic to expect genuine information sharing and consultation in SEs.

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2.2.2 Income security
The research suggests many SEs do pay less than LEs, but firm size in itself is not a determinant of lower pay. The wide range of pay outcomes, between and within industries, suggests that type of industry and skill level influence employee expectations. Also, employees with strong bargaining power are in a stronger position to negotiate good pay and conditions. In the absence of union organization, less skilled employees have little bargaining power or experience and have lower expectations, but often report being satisfied with their pay. There has been debate on employers' preference for individual agreements, and the decrease in union membership and collective agreements, but because of the confidentiality of individual agreements little is known about pay in SEs in New Zealand.

2.2.3 Skill reproduction (job) security
In addition, New Zealand research is consistent with international research indicating that the provision of opportunities for skill development is generally influenced by the availability of resources, skill level and type of employment (full-time, core workers). Training is an ongoing issue for productivity and job security in the increasingly individualized ER environment. Training and development opportunities are vital in the new concept of job security, a key characteristic of a 'good employer' (Bonnet, *et al*, 2003; Boxall, 1991; Bewley, 2006; Cappelli, 1999; Guillèn, 1994; Watson, Meares, de Bruin & Spoonley, 2009).

2.2.4 Work security and legislative compliance
Although LEs and SEs have similar costs related to providing formal work-life balance policies and practices, employees in SEs have less likelihood of access to formal work-life balance arrangements (DoL, 2011; Kersley, *et al*, 2006; Yasbek, 2004). While the literature has established that industry and size differences are primary indicators of the implementation of formal work-life balance initiatives, little is known about informal arrangements in SEs.

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2.3 Adopting an industrial pluralist framework to explore the 'good employer'

The academic debate (Corby, 2000; Gibb, 2004; Gill, 2010; Hull & Read, 2003), national and international benchmarking standards (Bonnet, *et al*, 2003; DoL, 2003; Knuckey, *et al*, 2002; NZHRC, 2006; SAI, 2008; Standing, 1997) and employment legislation (Bewley, 2006; Boxall, 1991; NZHRC, 2010) generally support the need for employees to have an independent voice in the determination of fair and proper conditions of work. This reflects an industrial pluralist ideological[1] approach to employee interests. By comparison the management rhetoric is more likely to take the paternalistic unitarist approach in the private sector and especially SEs (Cappelli, 1999; Coetzer, Cameron, Lewis, Massey & Harris, 2007; McDonald, 2005; Storey, *et al*, 2010).

While some researchers believe that the industrial pluralist framework is less sophisticated or helpful than the HRM framework in providing managers with help in relation to training, developing, and retaining employees (Boxall, 1991) or that the social and political division initiated by the industrial relations debate is unnecessary (Hull & Read, 2003), Sisson, Arrowsmith and Margison (2003) argued that ensuring issues are kept in the forefront is one of the most important functions of benchmarking. The other function being the co-ordination of economic and employment policy. In fact, it was the rise in non-standard forms of work (Beck, 1992; McGovern, *et al*, 2004) and the decline in collectivism (Sisson, *et al*, 2003) that renewed academic and policy debate on the conditions of work. Beck (1992) argued that non-standard, individualized employment would erode conditions that had been won by trade unions and result in a decline in job quality. Subsequent literature shows that workers in non-standard employment are more likely to work in jobs with more bad characteristics (Guest & Conway, 1999; McGovern, *et al*, 2004).

2.4 Testing assumptions about SEs through the Decent Work Index lens

Over and above the general issues related to research in SEs, OHS research is limited by the under-declaration of injuries which is likely to influence the assessment of injury and disease attributed to SEs (Champoux & Brun, 2001). Issues in the actual workplace include the tendency to trivialize OHS risk and to hold employees responsible for their own safety; low levels of awareness of legislative requirements (a prerequisite but not sufficient factor in compliance) and relevant associations and assistance programmes; low management and training skills; lack of resources and knowledge on the part of both employer and employee. It is suggested work conditions would improve just by compliance with ER and OHS statutory requirements. Furthermore, compliance is influenced by employers' perceptions which have changed over the years. Several push-pull triggers have been found to enhance process regulation such as management training, experience and contact with industry associations, vocational training and job experience, and supply chain pressure. However, voluntary standards such as the ACC Workplace Safety Discount incentive have so far had a limited influence in SEs (Lamm, 2002; Legg, et al, 2009). While enforcement alleviates non-compliance with the prescriptive ERA legislation, the literature suggests minimum standards perceived as legitimate by all stakeholders may be a useful tool for supporting continuous improvement in management practices in all enterprises.

The purpose of the research is, therefore, to test these assumptions about SEs through the framework adapted from the ILO DWI (Bonnet, *et al*, 2003; Standing, 1997) and the work that was carried out by Bewley (2006), Boxall (1991), and Hull and Read (2003). This framework outlined in Table 2.1 will be tested in the construction, manufacturing, service and retail industries in an effort to capture high and low OHS risk industries as well as a range of unskilled to highly skilled jobs.

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Table 2.1

ILO Framework of Socially Decent Work Adapted to Explore the Concept of a 'Good Employer' in the Small Enterprise Context.

	Employment security	Work security	Skill reproduction (job) security	Income security	Voice security
ILO (Bonnet, Figueiredo & Standing, 2003)	• Regular employment contracts • Predetermined prior notice of retrenchment • Benefits to workers being retrenched • Dismissal procedures regulated by collective agreement	• Safety committee or department • EEO labour practices	• Formal/informal training • Entry level training for new recruits • Retraining to improve performance or to transfer workers to other jobs • Retraining to upgrade workers for promotion • Financial contribution to formal training	• Economically equitable workplace if less than 5% received the minimum wage • Minimum wage equal to, or greater than 50% of the average wage • Average wage was higher than industry average • Non-wage benefits and entitlements	• Union presence, 50%+ unionized • Joint-management committee • Workers own more than 10% shares
Hull & Read (2003)	• Open, timely, informal access to information and feedback	• High levels of safety • Safety integrated into all aspects of the workplace	• Performance based career development linked to access to training.	• Wages and salaries at least at industry standard • Good pay and conditions often a sign of respect and confidence	• Participating in decisions that affect the day-to-day business • Employee engagement in all aspects of the business
UK public sector conceptualisation of a 'good employer' (Bewley, 2006)	• Job security more likely in public sector	• Various Bills and regulations concerned with work-life balance including paternity leave, flexible working, childcare, working time and leave	• Fairness measured as presence of formal EEO policies and monitoring and reviewing policies • More off the job training provided for experienced		

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		entitlement • Health and safety campaign to reduce deaths, injuries and ill health by 2010	core employees in the public sector		
New Zealand statutory minima	• ERA accommodates individual agreements • Has provisions for vulnerable workers • Genuine consultation regarding potential redundancy • No statutory requirements for redundancy compensation	• ERA Flexible Working Arrangements Amendment • HSEA all practicable steps to prevent harm to employees at work Effective OHSM system: formal policies and practices, safety committees (employee input, OHS representative), emergency plan, OHSMS review • Workplace Health and Safety Strategy for New Zealand to 2015 (DoL, 2009, 2010c)		• Minimum Wage Act $12.75 from 1 April 2010	• OHSE Enterprises with more than 30 employees obliged to establish an employee participation system if one or more employees or a union representing them requests the right to participate • ERA employers and employees obliged to act in good faith

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3. Methodology and results

It is now widely accepted that SEs are not small versions of large enterprises, furthermore, that SEs are not all the same. The problem is that policy development and theory development is predominantly based on a large enterprise perspective. The aim of the study was to define what constitutes good employment practice from a SE perspective. The WERS 2004 framework capturing many of the indicators of a 'good employer' was adapted to guide the data collection and initial analysis of the transcribed data. Semi-structured interviews were used to collect in-depth data on the sensitive and complex ER and OHS policies and practices.

Thematic analysis guided by Tolich and Davidson's (1999) and Silverman's (2010) recommendations allowed additional themes to emerge from the interview conversations. The themes were then explored through the adapted ILO dimensions of socially decent work: employment security, voice security, income security, skill reproduction security, and work security (see Table 3.1) (Bonnet, *et al*, 2003). The aims of the research, time constraints and employer confidentiality were key considerations in the design and selection of the research methodology.

Table 3.1

Adapted ILO dimensions of Socially Decent Work

Employment Security	Voice Security (ILO priority)	Income Security	Skill reproduction (job) Security	Work Security (ILO priority)
Regular employment contracts	Employee input in operational decision making	Recruitment	Training opportunities	Work-life balance
Dismissal and dispute resolution procedures	Employee voice in the determination of pay and terms and conditions of work	Pay and Terms and conditions of work	Development opportunities	A safe and healthy work environment
Redundancy & structural change – genuine consultation	Employee voice in the management of OHS risk			

3.1 Employer perceptions of a 'good employer'

Employers generally perceived a 'good employer' as one who made a concerted effort to at least consider an employee's other commitments and, where possible, accommodated employees. A 'good employer' nurtured a positive culture and encouraged contented employees to work efficiently in a cohesive team to achieve a common goal. In some cases this encompassed health and safety. Fairness and understanding was typically described as a reciprocal arrangement between employers and employees and overlapped with talk of collaborative teamwork and industry boundaries that limit flexibility. Only a minority referred to employee involvement which varied widely from none to a high level of input.

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There appeared to be three distinctive attitudes towards OHS (see Table 3.2). Employers who operated in high risk industries were managing risks and were not concerned about OHS, those that had a high concern for OHS and were proactive, and those who had a low concern for OHS and expected workers to act responsibly. The results also suggest there may be some relationship between perceptions of a 'good employer' and concern for OHS as employers with a high commitment to OHS talked about 'adopts fair and understanding employment practices'. While those with a low concern for OHS typically mentioned 'promotes a collaborative culture'. Even though some perceived characteristics and practices supported an employer's obligations outlined under the ERA and/or the HSEA the regulations were never mentioned.

Table 3.2

Summary of The Relationships Between Perceptions of a 'good employer' and Concern for OHS

	High concern/high commitment	Low concern/high commitment	Low concern/low commitment
Promotes a collaborative culture		3	4
Adopts fair and understanding employment practices	3	3	1
Provides a good work environment	2	1	1
Involves employees and efficiently resolves issues	1	1	2

3.2 Employment practices implemented in the SEs
The results show a distinctive preference for an individualist approach though size, industry, OHS risk, award-winning status and urge to comply with legislative minimum employment standards influenced the policies and practices implemented to establish and maintain productive employment relationships within a safe and healthy work environment.

Daily interactions were generally conducted on an informal basis. However, the employment relationship was guided by a structured framework setting out clear expectations for employee behaviours. All the SEs had comprehensive written Individual Employment Agreements (IEAs), usually including procedures for performance management, termination of employment and personal grievances. The high risk SEs usually included OHS policy in the IEA. The majority of employers used a template to draw up their standard IEA and/or consulted an employment specialist to protect their business and to ensure they were compliant with employment law. Employing 10 or more employees tended to precipitate enlisting part-time or full-time assistance.

Informal recruitment strategies were favoured and supported by formal strategies when necessary. In-house job-specific training was preferred, but a significant number of the SEs were developing

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employees for leadership roles and/or employing apprentices. Regular short performance appraisals suited to the SEs needs, were popular in SEs where employees had direct contact with customers. Significantly, despite careful selection and performance appraisal, eleven of the employers had experienced an ER issue and had used either formal performance management and/or dismissal procedures to resolve the issue. The employers tended to follow the obligations set out in the ERA concerning redundancy, especially keeping employees informed of the general status of the enterprise and possible structural changes.

There was no union representation and downward communication dominated. Employees tended to have minimal input in determining the terms and conditions of work, but in some instances had input in drawing up the initial standard IEAs. Employees generally had modest influence in operational decision-making and the management of OHS risks mediated by size, industry and risk. Overall, employers retained control over decision-making. Employers appeared to be considering employee's needs, however availability of formal flexible working arrangements was generally governed by type of industry, size and type of role.

 There was typically a high concern for efficient OHS management. Motivators to implement formal OHS policies and practices were compliance with the HSEA, age of business, to protect employees and customers, financial loss caused by lost time injuries, and supply chain pressure. There were industry differences with higher risk industries tending to implement more formal policies and practices and employee involvement in hazard management. Some employers raised concern about the fairness of having to shoulder the major responsibility for the safety of employees and others.

On the whole employers were careful to comply with the current employment legislation even if they believed it did not always accommodate SEs. This research prompted several employers to review their current ER and OHS policies and practices. Some reported they would make adjustments in the future. As employees were not included in this study the employee turnover rates are used as a broad indication of employee satisfaction with the pay and other terms and conditions of work.

4 Discussion
The discussion first provides a broad overview of the level of formality of ER and OHS practices in this sample of SEs. Specific practices are explored in more detail in the dimensions of a 'good employer'.

4.1 The general level of formal and informal management practices
Previous research suggests HR practices vary but that relatively informal practices are well founded and not necessarily inferior to practices in large enterprises (Coetzer, et al, 2007; Gilbert & Jones, 2000,). However, the formalization of expectations concerning all aspects of the employment relationship increases the likelihood of employees being treated fairly as the number of employees increases (Knuckey, et al, 2002; Kotey & Slade, 2005, Kotey & Sheridan, 2004; Legg, et al, 2009; Storey, 1994; Wilkinson, 1999) and protects the SE against potential claims of unfair dismissal (Harris, 2000). As this study was directed at identifying good practices the selection criteria purposefully omitted enterprises that were in the start-up survival phase, where the employer may have very limited resources, expertise and/or managerial knowledge.

The findings showed a variation in implementation of formal ER and OHS policies and practices. Whereas, all of the employers prioritized the management of the employment relationship demonstrated in formal ER policies, OHS management was given lower priority in lower risk

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industries. The high concern for compliance with the ERA should not detract from the high incidence of formal OHS policies and practices. The preference for formal ER and OHS practices in this study suggests a general improvement in policies and practices in SEs compared with predominantly informal practices recorded in earlier New Zealand studies (Gilbert & Jones, 2000; Knuckey, et al, 2002). Although Gilbert and Jones (2000) sample were concerned about the HSEA, they did not have help from external OHS advisors. However, the researchers had difficulty discerning whether concern for the statutory requirements led to the implementation of procedures.

The majority of employers referred to employment lawyers, ER and HR specialists, and industry/trade associations suggesting improvements in compliance could be partly due to a tendency for employers to seek advice from external sources.The fact the majority of employers sought external specialist advice is positive as it suggests that they were being proactive about increasing and supplementing their managerial knowledge and skills in relation to the employment relationship, an area where they have previously been found lacking (Lamm, 1999). There was, however, a marked difference in the sources employers used for external information. While specialists (including industry organizations) were consulted when drawing up an agreement, many of the employers cited the Department of Labour (DoL) website as their first source of OHS information. In some instances an OHS issue had been dealt with through the disciplinary process so the employer would have had advice from the external advisor. This difference in advice seeking strategy was interpreted as a higher concern for compliance with the ERA than for the HSEA. It could have been that some employers were aware of the website and were comfortable to using it, nevertheless, none of the employers talked about the new interactive multimedia online tool 'Infozone Business Essentials' that provides access to basic ER and OHS management practices (DoL, 2010a).

These emergent themes corresponded with two dimensions of the 'good employer' prioritized by the ILO (Bonnet, et al, 2003): employee voice security and work security, which are embedded in the ERA and HSEA.

4.2 Employment security

All employers met the basic ILO expectation and duty under the Employment Relations Act 2000 (ERA) to provide employees with employment agreements. The high level of formalization of disciplinary and dispute resolution policies and procedures is consistent with international research showing this practice is becoming increasingly common in SEs. These policies and procedures appeared to differ between industries, however, the overarching reason for formal dispute and termination procedures appeared to be an effort to avoid undue costs arising from personal grievances. Thus, they were essentially compliance driven. Acknowledging some shortcomings in following their formal dispute process, two employers had settled out of employment court prior to the Employment Relations Amendment Act 2010.

Redundancy must be genuine and procedures must be fair and reasonable. The ERA makes provision for genuine consultation regarding potential redundancy but there is no statutory requirement for redundancy compensation. The employers tended to take great care keeping employees informed of the state of the SE especially when redundancies were anticipated. A third of employers had used restructuring to terminate employment relationships and there were two instances where genuine consultation had occurred. However, none of the employers went beyond statutory requirements and the references to statutory minimum suggested that ER practices were more influenced by legislation than non-enforced recommendations of 'good employer' practice.

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The precautionary nature of formal policies and procedures recurring throughout the findings supports evidence that SE employers are increasingly following formal procedures as a defensive measure against potential personal grievance claims. The time and financial costs that the SE could incur in the event of an employee lodging a personal grievance and/or having to pay for legal advice and compensation far outweighed the cost related to establishing a formal agreement. Research shows that redundancy is one of the most common types of ERPs (Woodhams, et al, 2007) and one of the common justifications for employees lodging a 'personal grievance'. The resources employers expended on protective ER policy and practice in this study suggested employees may be more likely to lodge a personal grievance than raise concern about an OHS issue, but this may change. The findings highlight a need for further research to determine the degree to which formalizing policies and procedures in IEAs increase fairness in employment relationships and reduce ERPs in SEs explore the value of short adapted performance appraisals in improving ER outcomes for the employer and the employee.

4.3 Voice security

The majority of employers talked about collaborative teams, but only four noted that employee input in decision-making was a characteristic of a 'good employer'. The employers described a collaborative culture as one where employees were selected according to 'attitude and fit'. In effect, this generally meant people who would work hard and make suggestions for improvements but not pose a threat to the manager's final decision-making powers. These beliefs reflected a unitarist ideology common in SEs that manifested in their implemented policies and practices. There were two instances where employees had a consistently high involvement in all areas of decision-making in the workplace including OHS.

When it came to input in operational decisions, open-door policies and regular informal input and formal meetings suggested employees had a high level of input in operational decision-making. Input was considered to be genuine as suggestions were frequently implemented and effected outcomes but were bounded by managerial prerogative and resources. Hull and Read (2003) characterized a 'good employer' as one who acknowledges the positive impact of employee contributions and supports this with good pay and conditions. While employees in professional, higher paid, higher skilled jobs are more likely to be acknowledged and reciprocated, it was two employers employing lower skilled, lower paid workers who acknowledged the high value of employee suggestions and reciprocated this with higher than industry standard pay and, in turn, employee turnover was very low.

Employers more generally unilaterally determined the pay and terms and conditions of work; employees could accept or reject the employer's offer. However, some employers had fulfilled their statutory duty to act in good faith involving fair and transparent behaviours and practices. The pockets of consultation in the determination of pay and other terms and conditions of work varied. There was one instance where skilled employees had collectively negotiated a change in pay and also cases where lower skilled employees had had some collective input in determining conditions of work which were subsequently used as a standard employment agreement. The employers' preference to use a standard template when establishing a new employment relationship further demonstrated concerns about compliance and protecting the business. The diversity in the level of employee input supported concerns that SE employees often have weak bargaining power and low input in determining their pay and other terms and conditions of work.

Although the employers did not mention employees requesting participation in the management of OHS risk, the informal open-door policies and regular meetings provided a mechanism for employees

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to raise any issues and concerns including OHS. Employers operating in the higher risk manufacturing and construction industries adopted more formal OHS policies and practices than those in lower risk office environment and there were higher levels of formal employee involvement in the OHSMS. A minority standardized employee input through OHS representatives. The administrator or co-ordinator of the OHSM system was not referred to as an OHS representative, but described as acting in the capacity of employer's agent entrusted with implementing the system. Two employers had adopted innovative strategies to involve employees with a varying degree of success. The most successful outcome appeared to be related to a progressive management style (Hull & Read, 2003; Walters,2010; Walter & Lamm, 2004) embracing a high level of general employee involvement and empowerment. However, the award winning employers were amongst those with higher levels of employee input in operational decision-making and the management of OHS, suggesting that entry in the award scheme had raised awareness that had let to improvements in ER and OHS policies and practices.

While the pockets of employee input in decision-making were encouraging there is an immediate need to gain a deeper understanding of the level and incidence of genuine consultation and negotiation in SEs, especially:

- What motivates employers to facilitate employee voice in low-skill, low-pay jobs?

- How does genuine employee voice influence outcomes for employers and employees in SE?

- To explore how satisfied employees are with their level of input in SEs and barriers to increasing employee influence in decision-making that affects working life.

- To determine what inhibits the effectiveness of OHS representatives in SEs when employers implement a comprehensive OHSM system?

4.4 Income security
The minimum wage met the ILO criteria for decent work and all employers in this study met the ILO expectation and ERA obligation to pay minimum wage (Bonnet, et al, 2003). Formal recruitment strategies were attributed to employers' efforts to broaden the pool of potential applicants to overcome skill shortages particularly in small towns. Skills were not sufficient, rather additional to the likelihood the potential applicant would fit into the existing team, and some employers indicated this averted conflict. This practice fitted with the employers' perceptions of a team of employees collaborating to achieve a common goal and the unitarist management tendency to protect managerial prerogative.

Evidence of the 'good employer' characteristic of offering good conditions and pay (at least industry standard wages and salaries as a sign of respect and confidence) is noted above. Pay varied widely within and between industries. Although few employers regularly increased wages, it was significant that two retail employers regularly gave employee pay increases as this is rare in the traditional service sector. In addition, two employers offering higher skilled jobs wage setting practices underpinning fairness were compatible with public sector practices. This suggested that the policies and practices characteristic of a 'good employer' are achievable in SEs, even those operating in traditionally low-skilled, low-income industries.

The relatively high incidence of short performance appraisals in this sample of SEs was encouraging because appropriate formal policies and practices are a means of ensuring the fair treatment of employees. Although this practice appeared to be motivated by the size of the SE and the need to control standards of customer interaction, the adoption of formal performance appraisal procedures implied employers were committed to a basic level of performance based equity. This commitment

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appeared to be moderated by little evidence of employers linking performance appraisals to either pay increases or training and development requirements.

4.5 Skill reproduction (employee job) security

The minimum expectation for skill reproduction amongst the concepts of a 'good employer' was the provision of informal training opportunities. Beyond the tendency to ensure employees had the appropriate and relevant OHS training, training and development opportunities appeared to be based on reciprocation implying a fair exchange between opportunities for employees and the retention of employees with enhanced skills. Overall this sample of employers demonstrated a high commitment to providing on-the-job training and developing opportunities with a minority distinguished by providing non-trade related formal generic training. It must be noted that there was a high proportion of SEs in this study operating in trade industries, but this should not diminish their effort to provide formal training. In fact, the training of apprentices was the most prominent form of formal training and an area where this sample of employers excelled. Five of the seven employers in trade industries were training apprentices, four operated in smaller enterprises compared with one employer in Watson, et al's (2009) study. This suggested size did not inhibit the ability of these employers to train apprentices.

There was also a relatively high prevalence of developing employees in leadership roles linked to growth. Though the outcomes from informal on-the-job training would be limited for both parties this preference for informal training is common in SEs (Forth, et al, 2006; Knuckey, et al, 2002) and, unless there are general skills shortages such as in the trade industries, it appears unlikely SE employers in non-trade industries will take a similar collaborative approach.

4.6 Work security

The employers generally accommodated time off from work to attend to unforeseen personal issues. Findings supported literature showing that industry is a better indicator than size of the likelihood an enterprise will implement formal family friendly policies. Moreover, the improvements in the manufacturing industry suggested that the ERA Amendment (2007) may have had a positive impact on the provision of family friendly policies in some industries despite evidence showing employers and employees generally have a low awareness of this legislation (DoL, 2011).

Although only two employers, who had won business awards, perceived the provision of a safe and healthy work environment as a characteristic of a 'good employer', in practice all employers had some OHS risk management policies and practices. The level of formal and informal policies and practices varied but employers who operated in higher OHS risk trade industries generally implemented comprehensive formal OHSM systems. Employees who worked in the construction industry, manufacturing industry, building services and fuel retailing generally had more involvement in identifying and/or managing OHS risks. Safe work practices tended to be incorporated into the way work was done. Safety training and the safe handling of materials and equipment was also a priority in these SEs. In the lower risk SEs, in the service and retail industries, OHS was less of a concern reflected in an ad hoc informal approach. It was significant that low risk SEs prioritized emergency plans whereas the construction and manufacturing SEs generally viewed this as common sense. This sample appeared to be knowledgeable, well informed, linked to several business networks and very aware of their statutory obligations. However, the interviews had drawn attention to areas some employers planned to address.

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This study found the primary motivators and barriers were generally consistent with those commonly highlighted in the literature (Champoux & Brun, 2003; Laird, 2008; Legg, et al, 2009; Walters & Lamm, 2004; Walters, 2010):

- a higher awareness of statutory requirements,

- industry associated concern for OHS risk,

- the size of the enterprise,

- general industry and OHS training,

- knowledge and experience,

- costs, and

5 Conclusions

The employers generally appeared to be making an effort to adopt 'good employer' behaviours. Overall, these employers were considered as 'good employers' relative to arguments that a 'good employer' complies with the statutory employment minimum. However, when the characteristics of a 'good employer' were examined more closely, subtle differences appeared between employers and they are best described on a continuum. The 'good employers' at the lower end of the continuum appeared to be essentially compliance driven. Employers in the middle of the continuum excelled on some of the characteristics, particularly in providing training and development and the management of OHS risk. The exceptional employers demonstrated higher levels of the characteristics that fitted with the concepts developed in large enterprises and the public sector and excelled on most characteristics encompassed in the concept of a 'good employer', particularly in voice and income security, the two characteristics prioritized by the ILO (Bonnet, *et al,* 2003).

The main themes emerging from the employers perceptions corresponded with the two dimensions of the 'good employer' prioritized by the ILO (Bonnet, *et al*, 2003): employee voice security and work security, which are embedded in the ERA and HSEA. However, in practice consultation and negotiation was limited.

One significant disparity from the New Zealand literature was the strong tendency to seek external specialist ER/HR advice to supplement managerial knowledge and skills which appeared to be linked to the high incidence of formalising the employment relationship, policies and practices. Whereas, industry related OHS risk was the primary motivator to implement comprehensive OHSMSs and the DoL the primary source for OHS information. The researchers concluded that the advice seeking tendencies and high level of formalization of policies and practices demonstrated the employers' concern for compliance with current ER and OHS employment laws. It was clear that minimum standards were the main framework guiding good employment policies and practices. The voluntary motivators to implement good employment policy and practices such as: industry and business awards, supply chain pressure and knowledge (including specialist advisors) increased awareness of 'good employer' but only occurred in pockets and, therefore, is likely to have limited influence in supplementing statutory minimum in the general SE business population.

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Footnote

Conflict theory provides three models for understanding conflict in employment relations. Unitarists view conflict as unnecessary, dysfunctional and incompatible with organisational goals, with managers as the legitimate source of authority. Pluralists perceive managers as co-ordinators of a coalition of interest, and conflict as an inevitable and a potentially positive part of a democratic institutional system that encourages consensus. While radicals see managers as exploiters of workers, thus conflict is necessary for changing power relationships to oust capitalism (Rasmussen & Lamm, 2002).

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The inter-relationship between Employment Relations Practices and Occupational Health and Safety Practices in SMEs: Testing a theoretical perspective.

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Abstract. The nature and function of Employment Relations (ER) practices have been extensively researched in larger enterprises and a growing literature in small and medium enterprises (SMEs). The management of Occupational Health and Safety (OSH) has also been extensively researched in SMEs. However, there is little research examining the inter-relationships between ER and OHS systems and practices in SMEs. A quantitative and qualitative methodological study has been designed to determine the nature and extent of the inter-relationships between the ER and OHS practices and systems in SME's. This will be done by further development and testing of a model adapted from the ILO framework of Socially Decent Work (Bonnet, Figueiredo & Standing, 2003; Coetzee, 2011). Based on the statistical analysis of two sub-objectives, the results of this survey will identify the level of commitment to ER and OHS practices in SME's. In other words, the SMEs with developed ER systems and practices should have developed OHS systems and practices. These inter-relationships will be tested specifically by enterprise size and industry sector. It is important from an ER perspective that 'positive employment relations' systems and practices are developed in SMEs to contribute to overcoming the low productivity record in this country. This is also important from an OHS intervention design perspective, where the existence (or not) of OHS systems and practices can have a positive (or negative) influence on health and safety performance outcomes for SME's in particular.

1. Introduction

The nature and function of employment relations (ER) practices have been extensively researched in larger enterprises (Bewley 2006; Considine & Callus 2002; Gibb 2004; Hull & Read 2003; Kersley, Alpin, Forth, Bryson, Bewley, Dix, *et al*, 2006) and there is a growing literature concerning ER practices in small medium enterprises (SME's) (Atkinson & Curtis 2004; Forth, Bewley & Bryson, 2006; McDonald 2005; Kotey and Slade 2005;). The management of occupational health and safety (OHS) in small businesses has also been extensively reviewed (Champoux & Brun, 2003; Eakin, Lamm & Limborg, 2000; Lamm, 2000; Lentz, Sieber, Jones, Piacitelli & Catlett, 2001; Legg, Battisti, Harris, Laird, Lamm, Massey & Olsen, 2009; Mayhew, 1997, 2000, 2002; Okun, Lentz, Schulte & Stayner, 2001; Lamm and Walters, 2003; Larsson, 2003). However, there is little research examining the inter-relationships between ER and OHS systems and practices particularly in SME's even though OHS is an inextricable part of employment relations policies and practices in New Zealand. The Employment Relations Act 2000 and the Health and Safety in Employment Act 1992 place a duty on employers to provide a safe work environment. The health and safety legislation is undergoing the major review since it was enacted in1992.

The objectives of the study[1] are to identify which of those small medium enterprises (SMEs) to be surveyed have developed functional employment relations (ER) and occupational health safety (OSH) systems and practices, and to determine the inter-relationships between these practices and systems in SME's. To determine this, an extensive review of the literature was carried out. The intention is to uncover the characteristics of employers in small and medium size enterprises, motivators and barriers to the implementation of good practices, and strategies to overcome these barriers.

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2. Literature review search strategy

A
systematic approach was adopted in searching and selecting literature for the review. The search was conducted from August 2009 to January 2010 as part of Coetzee (2011) research into the concept of the 'good employer' in SMEs. The principle sources of information were three Bibliographic Databases: Google Scholar, Business Source Premier, and Scopus. Additional sources were the Council of Trade Unions (CTU) website, and the New Zealand Department of Labour (DoL) website provided information on regulatory obligations and responsibilities, assistance and programmes, and research related to small and medium businesses (SMEs). The search parameters included the year of publication 2000-2009; Full-text; Scholarly (peer-reviewed) journals; Keywords: Employment relations OR industrial relations AND SMEs, occupational health and safety OR OHS AND SMEs AND best practice OR good employer, small business OR medium AND good employer, SME AND good employer.

2.1 Study selection

Initial database searches were refined by adding more keywords. Publications appearing on all three databases together with frequently cited publications were selected as a starting point. Reference lists of all publications were also consulted to identify key research in the investigated areas. A total of 139 publications including books, scientific journal articles, conferences and working papers were selected for the development of the interview and analytical frameworks. This was narrowed to 61 to constrain the review.

To determine the prevalent trends in New Zealand, this review focused predominantly on New Zealand publications (37/61) representing 61%. Thirty three percent (20/61) of the references were published 2000-04, 61% 2005-09. The remaining 6% were publications for the period 1996-1999.

2.2 Assessment criteria

The following criteria were used to assess the quality of the publications: provision of definitions, use of theory and analysis, and contribution to new knowledge. The literature was classified by research methodology and with relation to topic addressed. The majority of the research was directed at uncovering and describing practices implemented in SMEs, some theory and framework development, and statistical analysis. Topics were classified as: characteristics, motivators, and barriers.

2.3 Limitations of the review

The review was restricted to the English language and peer reviewed published work thus important contributions from non- English speaking researchers work have not been considered. The decision to deliberately focus on relevant works to establish academic and practice progress means some key works have been excluded. The key words used in the search narrows research to studies explicitly focusing on these words. The literature review has a bias towards SME practices in New Zealand reflected by a majority of reviewed publications (63%). This study captures more recent research and some US research

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3. Literature Review

The increasing interest in SMEs is reflected in the inclusion of micro enterprises in comprehensive national ER surveys. Both the Work Employment Relations Survey (WERS) 2004 conducted in the UK and the Australian Workplace Industrial Relations Survey (AWIRS) 1995 included micro enterprises employing less than ten employees (Forth, J., Bewley, H., & Bryson, A. 2006: Kersley, B., Alpin, C., Forth, J., Bryson, A., Bewley, H., Dix, G. 2006; Morehead, Steele, Alexander, Stephen & Duffin, 1997). These longitudinal studies are invaluable in comparative research as they provide a snapshot of ER at specific points in time and do capture key characteristics of a 'good employer' such as employee voice in workplace decisions, training and development opportunities, pay and terms and conditions of employment (Kersley, *et al*, 2006; Knuckey, S., Johnston, H., Campbell-Hunt, C., Carlaw, K., Corbett, L., & Massey, C. 2002; Morehead, A., Steele, M., Alexander, M., Stephen, K., & Duffin, L. 1997; Sengupta, S., Edwards, P. K., & Tsai, C. J. 2009; Storey, D. J., Saridakis, G., Sen-Gupta, S., Edwards, P. K., & Blackburn, R., A. 2010). An advantage of national WERS and the AWIRS is that they integrate data from managers, employees and employee representatives on a set of objective and subjective measures. It is, however, difficult to establish whether the employer's perceptions correspond with the employee's experience in a specific enterprise (Godard, 2001). Data can be used to develop theory and comparisons of large and SEs. However, data analysis will be subject to the same limitations as the WERS. For example Storey, *et al* (2010) used WERS data to explore the relationship between the formality of human resource (HR) practices and job quality.

Even though researchers have recognized that a national employment relations study would provide comprehensive and integrated data to fill the gaps regarding the nature of policies and practices (Lamm, 2002; Ryan, 1996), there is no similar survey in New Zealand. The *Firm Foundations* study (Knuckey, *et al*, 2002) is the most comprehensive New Zealand research. This study, aimed at uncovering 'good employer' practices and performance in a New Zealand context, was used to support the "Employer of Choice" initiative Department of Labour (DoL, 2003). Although this study included SEs it was limited to formal management practices, which did not adequately capture the nature and extent of (ER) and (OHS) practices that may be effective in SEs. The researchers themselves pointed out the limitations of the study, questioning the robustness of their model for SEs. Coetzer, A., Cameron, A., Lewis, K., Massey, C., & Harris, C. (2007) qualitative study of SEs addressed this limitation by capturing informal practices, although a strong HR perspective does not capture how employer and employee interests and expectations are aligned and how issues are resolved.

The ER literature in New Zealand predominantly captures a LE perspective of the persistent decline in union collective bargaining (Foster, Rasmussen & Murrie, 2009; Foster & Rasmussen, 2010), employee voice (Boxall, Haynes & Macky, 2007; Haynes, *et al*, 2005; Rasmussen, McLaughlin, & Boxall, 2000) or non-union voice mechanisms (Haynes, 2005; Haynes & Fryer, 2001). Academics researching Employment Relations Problems (ERPs) highlight a need to gain a better understanding of differences in experiences for SMEs, including why ERP's arise earlier for SE employers (Waldergrave, Anderson & Wong, 2003; Wiesner, McDonald & Banham, 2007; Woodhams, Howard, Johri, Shulruf, & Yee, 2007). However, the articles in a special addition of the New Zealand Journal of Employment Relations devoted to ER issues in SMEs focused on the employer rather than on issues related to the employer-employee relationship (Battisti & Deakins, 2010).

OHS research has similarly been criticized for a strong focus on LEs (Lamm, Massey & Perry, 2007), although there has been some OHS research in SMEs (Bohle & Quinlan, 2000; Champoux & Brun, 2003; Eakin, 1992; Hasle, Kines & Anderson, 2009; Hasle & Limborg, 2006; Laird, 2008; Lamm, 1999, 2002; Legg, *et al*, 2009; Walters & Lamm, 2004; Walters, 2010). There is, nevertheless, a general dearth of literature integrating ER and OHS management practices. Gallie (2003) argued that

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there is significant evidence linking the quality of working life to personal well-being.

For example, career-blockage and job instability appear to have an impact on health (Siegrist, 1989 cited in Gallie, 2003). Conversely, Barling, Kelloway & Iverson (2003) linked high-quality work and job satisfaction to a reduction in workplace injuries. Several academics have identified this need to gain a better understanding of how OHS is managed in SEs, the extent and importance of employer and employee participation and psychosocial issues; and why some SEs have more proactive OHS management than others (Laird, 2008; Lamm, *et al*, 2007; Legg, *et al* 2009).

Kersley, *et al* (2006) recognized that few methodologies in the social sciences offer universal solutions. Rather advances are made incrementally through a variety of methods, which together broaden understanding in different but complementary ways. It was, therefore, encouraging to see the progression from quantitative research methods adopted in early SE studies in the United Kingdom (UK) (Curran & Blackburn, 2001) as studies became more diverse over time. Qualitative and interpretivist methods became more common as the field developed. Blackburn and Smallbone (2008) reported that 55 percent of the papers presented at The Institute of Small Business and Entrepreneurship conferences between1996-2006 adopted qualitative approaches.

Later national level (often state funded) studies tend to take a mixed methods approach accommodating the inclusion of all stakeholder groups(Hull & Read, 2003; Kersley, *et al*, 2006; New Zealand Human Rights Commission (NZHRC), 2010; Waldergrave, *et al*, 2003). Other studies have captured employer and employee perspectives (Barrett & Khan, 2005; Tsai, Sengupta & Edwards, 2007) or focused on either employer (Geare, Edgar & McAndrew, 2009; Nadin & Cassell, 2007; Ryan & Fursman, 2005) or employee samples (Boxall, *et al*, 2007; Considine & Callus, 2002; Rasmussen, *et al*, 2000). This is significant as early studies tended to focus on the employer which led Curran (1986) to observe that "those who work in SEs might in many ways be called 'the invisible labour force'" (p.33). Macky & Boxall (2008a, 2008b) suggested this could be partly due to difficulties in engaging employees working in smaller enterprises in research. There is still some difficulty in identifying role-holders who have knowledge of ER and an absence of recorded data on employment issues in SEs (Forth, Bewley & Bryson, 2006). An additional influence on research results has been a general decline in response rates across all surveys (Kersley, *et al*, 2006).

The nature of research into the practice of ER has, moreover, altered with an increasing focus on efficiency and the diffusion of high involvement and high performance management practices (Kersley, *et al, 2006*). New Zealand appeared to be following this trend with performance and sustainability the focus of most research, at the time of the original literature review.

3.1 Defining small enterprises

Though there has been some interest in SEs since the1960s, defining the SE is complex and definitions vary between countries as well as over time (Blackburn & Smallbone, 2008; Storey, 1994). In the European Union and UK LEs are often defined as employing more than 250 full time equivalent employees (FTEs) (European Commission (EC), 2003; Forth, *et al*, 2006; Storey, *et al*, 2010; Wilkinson, 1999) and 200 in Australia (Kotey & Slade, 2005). In New Zealand a LE is defined as employing far fewer employees, varying between employing more than 50 (Coetzer, *et al*, 2007; Knuckey, *et al*, 2002) or 100 employees (Ryan & Fursman, 2005; Woodhams, *et al*, 2007). The definition of SEs and medium enterprises also varies widely in international studies, however, fewer than 20 employees is commonly used to define SEs in New Zealand (Coetzer, *et al,* 2007; Knuckey, *et al*, 2002; Legg, *et al*, 2009) and Australia (Kotey & Slade, 2005).

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Researchers also use a combination of characteristics to overcome the limitations of entirely numerical definitions in explaining behaviour in diverse SEs such as economic characteristics (total business, share of employment and share of turnover) (Curran & Blackburn, 2001), ownership and sector characteristics (Lamm, 1999), and technology (Scott, Roberts, Holroyd & Sawbridgel, 1989). Some definitions classify SEs as managed by the owner and, as such, eliminate enterprises operating as part of a franchise where the employer has access to expertise, but has to operate according to strict franchise, guidelines (Legg, *et al*, 2009). Even the terminology in recent New Zealand studies differs. The Ministry of Economic Development (MED) (2009, 2010) defines less than 20 employees as SME and Legg, *et al* (2009) as small businesses. Thus, a specific study may have used the term SME to indicate inclusion of both small and medium enterprises. Alternatively, this terminology may have been broadly used to describe SEs. This inconsistency in definitions and samples is a limitation of comparative research.

The Bolton Report (1971) was criticized for the lack of a single definition for all participants (Storey, 1994). Bearing this in mind Coetzee (2011) adopted a simple definition following Storey's (1994) recommendations to keep definitions simple in order to facilitate comparison with international studies, including similar subgroups such as Coetzer, *et al*, (2007), Forth, *et al,* (2006), Kotey and Slade (2005), Legg, *et al*, (2009). Size has been widely used in definitions of SEs concerned with ER (Wilkinson, 1999) and, therefore, considered appropriate for this study. The term SE is adopted to define enterprises employing between 10-20 employees. Medium size enterprises employing 21-50 employees. Another reason for this size is that an increase in formal practices has been linked to this specific number of employees, because the advantages of informal management practices are lost in enterprises with more than twenty employees (Knuckey, *et al,* 2002; Kotey & Slade, 2005, Legg, *et al*, 2009; Storey, 1994; Wilkinson, 1999).

3.2 Barriers to the implementation of systematic OHS risk management and ER practices

Awareness and knowledge of the enterprise's risks and statutory obligations is a prerequisite but not sufficient to motivate compliance behaviours to achieve standards set out in employment legislation, and international and national standards (Atkinson & Curtis, 2004; Champoux & Brun, 2003; Walters & Lamm, 2004). It is, therefore, concerning that SME employers in New Zealand still appear to have a patchy knowledge of OHS legislation and little awareness of OHS programmes. The major obstacles are employer lack of will and resources (Walters & Lamm, 2004). This may partly be due to SE employers being responsible for all management functions as well as working long hours, leaving less time for non-core tasks which employers often perceive OHS to be (Eakin, 1992; Legg, *et al*, 2009). These obstacles may be compounded by isolation, size (few workplaces in NZ are large enough to sustain formal structures), relationship with regulatory agencies and the use of consultants. It is, therefore, not surprising that accidents occur more frequently in SEs compared with other sized enterprises, particularly serious and fatal injuries (Eakin, 1992; Eakin, *et al*, 2000; Lamm, 1999; Hasle & Limborg, 2006).

It is evident the employers' perceptions of the impact of OHS and ER legislation have changed over the years. Investigating practices in SEs (employing 5-20 employees) in the Auckland/Waikato region, Gilbert and Jones (2000) found few employers considered the Employment Contracts Act (ECA) 1991 to be an issue. Employers were most concerned with the Health and Safety in Employment Act (HSEA) 1992 because they were unable to employ an expert to manage hazards, and participants appeared to have a limited knowledge of other relevant regulations. HRM practices breached a number of regulations in some of the enterprises. By comparison, there was some

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concern about the impact of the Employment Relations Act (ERA); Knuckey, *et al's* (2002) results suggest that employers' perceptions had changed as they considered regulations had had a detrimental impact on their business.

In particular, ER regulations were considered to have a negative impact on productivity and performance. Yet, significantly, SEs were under-represented compared with LEs in responding that certain regulations had a negative impact on their business. Harris (2000) also found no opposition to expanding employment rights despite the employers perceiving the cumulative effect to be costly, time consuming and having a disproportionate effect compared with LEs. The fact that OHS was more likely to be taken seriously than ER is cause for further concern (Legg, *et al*, 2009). This is confounded by Waldergrave, *et al's* (2003) results showing the large majority of workplaces were unaffected by the ERA because the employers already recognized the value of good employment relationships.

In a national survey of employer's attitudes to changes to employment legislation in 2008 and 2010 covering both LE and SMEs, Foster, Rasmussen and Coetzee[2] (2013) found employers will press for further reductions in employee rights. This was borne out in legislative changes in 2014. The findings align with the constant employer criticism of too much legislation, transactional costs and unsuitable use of personal grievance rights. There are also considerable concerns about low wage, low skill and how this drives 'brain drain', career constraints, social problems and exclusion. It is difficult to see how these legislative changes can be part of overcoming New Zealand's long-running disappointing productivity record. Furthermore, it is unclear what future impact the legislative changes will have on the development of 'positive employment relationships' (Foster et al, 2013). As mentioned above the OSH legislation is being reviewed in light of the Pike River Mine disaster. The legislation is being delayed due to opposition from business, especially SMEs. Their main objection is to health and safety representatives in business with less than 20 employees.

The Ministers of Commerce and Finance in New Zealand set up a Ministerial Panel on Business Compliance to advise the government on ways to reduce unnecessary or burdensome compliance costs imposed on SMEs (MED, 2001, cited in Alexander, Bell & Knowles 2004). Alexander, *et al* (2004) aimed to address this issue by quantifying the extent of compliance costs for small business. Ironically, the study involved resource-intensive in-depth interviews and additional collection of weekly diary data of actual compliance costs of a randomly selected sample of 25 Dunedin based SMEs. The results showed employers had different attitudes to compliance costs: while some believed compliance costs inhibit business growth, others viewed it as a minor cost or no cost at all. In fact, the largest compliance costs were associated with payment of the accountant followed by industry membership. The New Zealand Council of Trade Unions (NZCTU) (2010) also disputed employer protestations that the current employment legislation restricts the efficiency of the labour market (New Zealand Business Round Table, 2010) on the grounds that Organization for Economic Co-operation and Development (OECD) ratings placed New Zealand fourth lowest out of 30 countries for employment protection (OECD, 2011).

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3.3 Overcoming barriers

Management training, experience and contact with industry associations are a means of increasing knowledge and awareness, and have been identified as a means of overcoming barriers to implementing good practices (Lamm, 2002; Massey, *et al*, 2006; Legg, *et al*, 2009). Lamm's (1999) results showed that where employer and/or employees' had formal vocational qualifications and on-the-job training incorporating OHS, good health and safety practices were established. Furthermore, job experience increased the understanding of risks. However, Legg, *et al* (2009) found that the perceived knowledge of their sample of hairdressers, printers and apple growers, was less than their actual knowledge. What was more, not many had knowledge of the main OHS legislation. The results showing better performance of apple growers was partly attributed to industry training in the management of hazardous chemicals and concurs with Lamm's (1999) observations. This is consistent with Watson, Meares, de Bruin and Spoonley (2009) results showing employers generally prefer in-house, informal training for employees, and limited employer engagement in employment related programmes supports the integration of OHS in vocational training qualifications. Compulsory OHS training programmes have had a positive impact on improving living and working conditions in Europe (Hilton, 2001).

Walters and Lamm (2004) propose the use of processes and agencies that can act as push-pull factors, triggers, levers, and champions of social awareness are the best means of ensuring regard for OHS requirements is incorporated into the business life of SMEs to achieve better OHS arrangements and outcomes in small businesses. Supply-chain pressure (Coetzer, *et al*, 2007; Edwards, Ram, Gupta & Tsai, 2006; Walters & Lamm, 2004) is an incentive for most employers. However, the ACC Worksafe Safety Discount 105 (WSD) has not been successful in acting as an incentive for employers to engage in implementing good Occupational Health and Safety Management (OHSM) systems (Legg, *et al*, 2009).

3.4 Key indicators

Tables 3.1 and 3.2 summarize the key indicators commonly used to measure the quality of work in large enterprises and national studies, and small enterprises Studies.

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Table 3.1

Key Indicators Commonly Used to Measure the Quality of Work in Large Enterprise and National Studies

Authors	Date	Research Methods	Key Objective	Good Relationshi	W-L Balance	H&S (Work)	Equality (Work/Skill)	Job	Training & Developme nt (Skill	Pay (Income)	Employee Input
Gibb	2004	literature	Review of models. Organized into two broad patterns locating HRM in social or organizational context.	x				x	x	x	x
Bewley	2006	literature	Describes legislative change and extent government has fulfilled pledges to unions. Examines government behaviour relationship between private/public practices.	x	x	x	x	x		x	
Kersley, *et al*	2006	national survey	Provide a nationally representative portrait of employment relations and working life.	x	x	x		x		x	x
Considine & Callus	2002	national employee ph survey (AQWL)enterprises employing S<10, L>1000 employees	Provide a national benchmark on work-life issues that concern Australian workers. Aim to (promote and maintain employee satisfaction) to improve working conditions for employees and organizational effectiveness for employers.	x	x	x	x	x		x	x
Hull & Read	2003	interviews & surveys	Determine the nature of excellent work across Australia.	x		x				x	x
Gill	2010	literature	Define the concept of an employer of choice from and Australian perspective and use of IT to inform and engage employees.	x		x			x		x

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Boxall	1991	literature	Develop a theory of the good employer which observes the specific provisions of the State Sector Act 1988 and acts as a coherent framework for management action.	x	x	x	x	x	x
Knuckey, *et al*	2002	national survey		x			x	x	x
New Zealand Human Rights Commission	2010	interviews with all stakeholder groups	Identify how work can be improved to increase productivity and profitability and at the same time enhance family life, and community well-being.	x	x				x

Note: A good relationship encompasses policies and procedures for managing performance and resolving disputes. Generally, enterprise level studies focus on the policies and practices that govern a good employment relationship while macro studies are concerned with broader social implications reflected in a focus on how a good employment relationship is established and maintained such as acting in good faith.

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Table 3.2

Key Indicators Commonly Used to Measure the Quality of Work in Small Enterprise Studies

Authors	Date	Research Methods	Key Objective	Good Relationshi	W-L Balance	H&S (Work)	Equality (Work/Skill)	Job Security	Training & Developme nt (Skill	Pay (Income)	Employee Input
United Kingdom											
Rainnie	1989	case studies clothing and printing	Explain why SBs have become important. To analyse the role of the SB in the 20th century to provide a method of analysing IRs.					x		x	x
Scott, *et al*	1989	case studies x30 traditional/hi-tech manufacturing traditional/hi- tech services <20	Recognized the heterogeneity of the small firms sector to analyse the day-to-day IR practices with special reference to the impact of labour legislation.	x		x	x	x		x	x
Ram	1994	case study 3 Asian clothing SEs	Explore workplace relations in the West Midlands clothing industry as test case for the varying perspectives of workplace relations in small firms.						T	x	x
Storey	1994	various surveys 1989-1922 10000 SEs	To outline research findings and policy issues of the Economic and Social Research Council (ESRC) programme.						x	x	x
Sengupta, *et al*	2009	ph & face-to-face interviews managers, 3 case studies	Examine the polarization of post-bureaucratic organizational forms argued to strengthen the polarization between good and bad jobs.	x		x	x	x		x	x

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Australia

Wiesner & McDonald	2001	national survey 20-200	To fill a gap in existing research on HRM in Australian SMEs by considering standard HRM practices and some IR practices.	x	x		x	x	x
Barrett & Khan	2005	survey, and semi-structured interviews with employers and employees	Look beyond objective measures of job quality to define a SE quality job. Take into account the contexts (structure) within which people (agents) make decisions and take actions.	x	x		x		x
Kotey & Slade	2005	survey in enterprises employing < 20 (S) and <199 (M)	Examine the rate of adoption of formal HRM practices with increasing firm size.					T	

New Zealand

Lawrence, *et al*	2006	questionnaire survey CEO/owner	Reports on sustainability practices in SMEs (social and environmental).	x	x			T	
Coetzer, *et al*	2007	50 semi-structured interviews in enterprises with 5-50 employees	To determine the nature of HRM practices in NZ SMEs, why managers use such practices and the interactions between practices.	x	x		x	x	
Arrowsmith & Parker	2010	literature	Examine the concepts of 'good work' and 'good workplaces' and significance of these in NZ.	x	x		x	x	x	x

Note: A good relationship encompasses policies and procedures for managing performance and resolving disputes. Generally, enterprise level studies focus on the policies and practices that govern a good employment relationship while macro studies are concerned with broader social implications reflected in a focus on how a good employment relationship is established and maintained such as acting in good faith.

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4. Survey to test the inter-relationships between ER and OSH

Based on Coetzee's (2011) extensive literature review a quantitative and qualitative methodological study has been designed to determine the extent of the inter-relationships between the ER and OHS practices and systems in SME's through the following sub-objectives.

- To analyse the ER practices adopted for employment agreements, working arrangements, working hours, pay systems, training and development opportunities, performance appraisal, management communication, grievances and disciplinary matters, and redundancy.

- To evaluate the effect of OHS management practices on hazard management, accident reporting, monitoring, and investigation, employee participation, emergency procedures, training and development, and managing contractors.

The theoretical framework for the proposed study is the further development and testing of the model adapted from the ILO framework of Socially Decent Work (see Table 4.1) (Bonnet, et al, 2003) and captures the pillars of an effective OHS management system (ACC risk management model). Based on the statistical analysis of the two sub-objectives, the results of this survey will identify the SMEs' commitment to ER and OHS practices. In other words, the SME's with developed ER practices/systems should have developed OHS systems and practices. These inter-relationships will be tested specifically by enterprise size and industry sector.

Table 4.1

Adapted ILO dimensions of Socially Decent Work

Employment Security	Voice Security (ILO priority)	Income Security	Skill reproduction (job) Security	Work Security (ILO priority)
Regular employment contracts	Employee input in operational decision making	Recruitment	Training opportunities	Work-life balance
Dismissal and dispute resolution procedures	Employee voice in the determination of pay and terms and conditions of work	Pay and Terms and conditions of work	Development opportunities	A safe and healthy work environment
Redundancy & structural change – genuine consultation	Employee voice in the management of OHS risk			

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4.1 Methodology

Data collection will be undertaken using both quantitative and qualitative methodologies A representative sample of 2500 organizations employing between 10 and 50 employees using the 19 ANZIC codes will be used. The surveyed regions will be the Central regions aof the North Island in New Zealand (Taranaki, Manawatu, Whanganui, Horowhenua, and Hawkes Bay). Data from the self-administered questionnaire will be analysed descriptively in relation to responses and analysis of open field narrative responses will utilise thematic analysis. A two dimensional matrix will be generated to quantitatively score the ER and OHS systems and practices identified.

5. Implications of the results

This would be one of the first studies examining the inter-relationship between the development of ER and OHS systems and practices in SME's. It is important from an ER perspective that 'positive employment relations' systems and practices are developed in SMEs if this country is going to move from a 'low skill', 'low wage' economy and overcome New Zealand's long-running disappointing productivity record. This is also important from an OHS intervention design perspective, where the existence (or not) of OHS systems and practices can have a positive (or negative) influence on health and safety performance outcomes for SME's in particular. Also, the study will identify whether the development of practices aligned to the concept of a "good employer" has any benefit to an enterprises' ER or OHS performance.

Footnote

1. The 2015 survey testing the inter-relationships between ER and OSH is funded by a grant from the New Zealand Industrial Relations Foundation and Massey University, School of Management.
2. D. Farr (Née D. Coetzee)

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Networks of small and medium-sized enterprises – a potential policy instrument to promote health and safety?

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Abstract. The Nordic countries have a large number of small and medium sized enterprises (SMEs), and it is a well-documented problem, that many SMEs find it difficult to address their health and safety challenges. It is also a problem that the regulative bodies find SMEs difficult to address in a way that match their circumstances. Researchers and regulatory bodies lack an in-depth understanding of how small and medium sized enterprises (SMEs) make decisions about workplace health and safety improvements and the role played by business networks in these decisions.

To improve regulation and support there is a need to create the means to empower SMEs to work systematically with occupational health and safety, and it is our assumption that engagement in a network can motivate and help the companies to work with health and safety issues.

In an ongoing research project, we study and compare three cases in which groups of small enterprises have formed networks to solve a health and safety oriented challenge: A group of dairies, brewers and demolishers. From a realistic theory perspective, we have analyzed data describing the process of addressing a health and safety issue in each case. The data was obtained through qualitative interviews, document analysis and observations and our analysis focuses on the internal and external mechanisms that are driving the processes. We conclude that given that both external pressures and internal motivations are present the SMEs benefit from engaging in networks to improve their health and safety conditions, thus we find that facilitation of networks has potential as a policy instrument.

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1 Introduction

Small and medium enterprises (SMEs) account for 99% of Danish companies, employ more than 30% of workers, and are considered a major source of growth (Hasle & Limborg, 2006:10). However, it is mainly the experience from studies of large companies that form the basis for regulation of safety and health in large companies as well as in SMEs.

Current research shows that SMEs have a reasonable knowledge of legislation and health and safety regulations, but experience great difficulties in meeting the requirements of work environment interventions (Hasle et al, 2004 : 44; Fonteyn et al., 1997; Aldrich et al., 1999). SMEs generally have a lower degree of formalized and systematic planning than larger companies and approach working environment questions in an ad-hoc and informal manner. Improvements in working conditions and preventive measures are in general linked to external influences. However visits from the labour inspection are rare, and do not seem to motivate to invest in OHS – improvements (Hasle, 2000; Walters, 2001; Axelsson, 2002). It is proposed that what matters more to them, is the threat of falling behind the competitors, or being imposed costs that are not a general demand among the businesses in the trade. (Hasle, 2000; Walters, 2001).

To improve regulation and support there is a need to create the means to empower SMEs to work systematically with occupational health and safety. According to Street and Cameron it is a common assumption that especially SMEs benefit from engaging in networks with other SMEs or with large companies, because it gives the SME access to resources that the company does not possess singlehanded (Street and Cameron 2007). We do not intend to contest this assumption, but rather to expand it to the field of health and safety. It seems logical that a small company do not have the expertise in health and safety that a large company with a health and safety officer or even a department has, but clusters of SMEs might achieve the necessary knowledge together, as they can share knowledge and resources. Since many health and safety issues are general for all small businesses in a sector and tends to be detached from the production, it is an area that competitors might be willing to share resources and knowledge (Levy et al 2003). It is our assumption that engaging in networks helps SMES to work with health and safety issues. Following Street & Camerons definition we define networks as 'a collection of relationships that binds a group of independent organizations together' (Street and Cameron 2007).

In the present study we compare three cases in which groups of small Danish enterprises have formed networks to solve a health and safety oriented challenge: A group of dairies, brewers and demolishers.

The aim of this paper is to pinpoint the mechanisms that had a positive effect across the three projects in order to advice policy makers what kind of support to offer and what demands to set for such networks.

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2 Theoretical point of departure – realistic evaluation and networks

Our theoretical foundation to pinpoint mechanisms is critical realism as it acknowledges some degree of causality in social phenomenon, but in a manner, that fits the reality of social research (Maxwell, Bygstad & Munkvold). Maxwell's contribution to critical realism addresses qualitative research, and as the results in this paper derives from qualitative data, Maxwell's version of critical realism is well suited. Critical realism takes a middle position between positivism and interpretive research. Maxwell explains the position by stating that critical realism combines a realist ontology with a constructivist epistemology and he quotes anthropologist Fredrik Barth to exemplify; 'Like most of us, I assume that there is a real world out there – but that our representations of that world are constructions.' (Maxwell p. 6).

Bygstad and Munkvold, have, although they write within the field of Information Technology, published a very inspirational paper (Bygstad & Munkvold), which aims to provide a framework for identifying causal structures in critical realist studies, they term these structures; mechanisms. A mechanism is, with philosopher Roy Bhaskar's definition (Bygstad & Munkvold p.1), simply defined as a causal structure that explains a phenomenon. According to the authors a critical realist research design would be a study with a limited number of cases where the researchers analyse the interplay between the actual events, the detected mechanisms that produced these events and the underlying structures. This corresponds well with our double aim; to account for the mechanisms which produced the outcomes in the three cases, but also to account for the transformation of the underlying structures which is a result of the human agency performed in the networks as they were producing their local results. Bygstad and Munkvold propose a stepwise framework for the data analysis with the following six steps: Description of events; Identification of key components; Theoretical re-description; Retroduction: Identification of candidate mechanisms; Analysis of selected mechanisms and outcomes; Validation of explanatory power.

According to the hermeneutic inspired network theory (March & Olsen, 1995, Powell & Dimaggio, 1983), networks are likely to be subject to 'top-down' processes that influence the institutional design of the network. A well described top-down process is isomorphic pressure, which makes networks or companies more similar out of an expectation that they will increase their legitimacy or economic efficiency by doing like the others. It is crucial for the cohesiveness of the network, that it develops a collective notion of a 'we'. Often, this notion is interconnected with a collective perception of various external pressures or events that 'threaten' the stability of the actors in the network and encourage the network actors to act collectively in order to restore conditions for community development, because: 'everybody is in the same boat'. Accordingly, the community development, i.e. the sharing of competences, knowledge and resources through regular contact, is built on a desire to strengthen the community (March & Olsen, 1995).

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Network theory suggests that a driving force in a network is the perception that shared resources are necessary in order to realize the actors´ shared goals and that joined the actors will achieve more influence and impact. The dynamics of the network is, therefore, characterized by interest matches, and the establishment of the network requires pre-negotiation that can aggregate the interests (Rhodes, 1997, Soerensen & Torfing, 2005). The collaboration of the network members depends on the possibility of formulating shared goals (instead of interest differences) and assignments that can act as an umbrella for the participation of various interests and objectives. Crucial to the network cohesion is also that the interdependency is big enough to solve the conflict interest through negotiation and through the development of formal and informal rules. Further, it is essential to create trust relations between the network actors, enabling them to interact and enter into binding corporation (especially when the exchange of resources is over time) (Rhodes, 2000; Soerensen & Torfing, 2005). Finally the theory highlights the inclusion and exclusion mechanisms of networks. The theory holds that cohesion of a network is threatened if resources are asymmetric among the network actors. A fact, that creates 'strong' and 'weak' participants (March & Olsen, 1995; Soerensen & Torfing, 2005).

3 Methodology

In the following sections of this paper we are inspired by Bygstad and Munkvolds recommendations for a stepwise analysis. We obtained information about each of the projects through qualitative interviews, document analysis and observations. Document analysis included review of existing written materials; project applications, project descriptions, project evaluations and minutes from meetings. The questions in the interview guides aimed at helping the interviewees recall the process and the key components in the process.

For case 1 we conducted semi structured interviews with representatives from 11 companies; four were group interviews, three were telephone interviews. We also conducted two expert interviews (Flick) with a key person and the data was supplemented with observations of two meetings and three visits to worksites. For case 2 we conducted three semi structured expert interviews with a key person and seven interviews with business owners, five were telephone interviews. We also visited two worksites and talked informally with the employees. For case 3 we conducted one semi structured interview with a group of experts and nine interviews with business owners or managers, five were telephone interviews. The result is a vast amount of data, for the analysis in this paper we have chosen to focus on the data which reflect group dynamics because we believe that they are central for understanding networks.

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3 Three cases

In the following section, we introduce the three groups and their projects.

3.1 A group of small dairies

The 21 small dairies in the group were already organised in a network established by the trade organisation. The group jointly applied for funding for a project to prevent musculoskeletal disorders. A private consultancy firm assisted the group and the aim was to develop technical lifting aids that would fit the circumstances of the small companies.

The set-up was that three dairies would be cases and the others controls, the control dairies did not develop an aid, but would receive ongoing information about the development and the results, so that they might consider the pros and cons of copying the idea. The production of the aids was complicated due to the nature of the working processes and the small size of the businesses, so they needed to be designed in close collaboration with the employees.

3.2 A group of small breweries

25 small breweries, all of which belonged to the Brewers' Association Small and Medium Breweries Group, were inspired by the dairies project. Work in a small brewery generally involves manual tasks with heavy and repetitive lifting and awkward postures, which lead to musculoskeletal disorders (MSD). Most small breweries are not automated and cannot afford or do not have the expertise to implement the technical solutions, that exists in the large breweries. Thus the project proposed to develop ergonomic improvements to reduce MSDs, including a vacuum cleaner to transport malts, low cost lifting equipment for bottles and tools for handling of kegs. Three breweries agreed to develop and implement these improvements as case breweries. A consultant from the Brewer's Association was very active in setting up the project and developed the application for funding. One of the owners of a small brewery took the lead in the process of motivating the other brewers.

3.3 A group of demolishers

Demolishers are a large and heterogeneous group; some are mere farmers with a tractor, while in the top end the businesses are specialized in removing dangerous material. This diversity means that competition is hard and focused on prices, but rarely on the quality of the task. Quality in this business relates for a large part to the ability to apply with rules and standards for waste management or for environmental protection. The sector has seen a professionalization tendency during the last decade, but the standard still need to be raised according to our interviewees – who were all taken place in the top end companies. The group consists of 25 enterprises organized in a trade association. The group has three focus areas to raise the quality standard in the sector; one is a certification system, another to have stricter regulations and the last is a general vocational training program especially for demolishers, leading to the achievement of a certificate as a qualified demolisher. The last effort is the one we have chosen as our case.

4 In search of mechanisms

In the following section, we recount the background, proces and significant events in the three projects, based on how the participants described them to us. While we recount the events, we also take note of their causal potential as a significant mechanism that was important for the project outcome.

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4.1 The dairy project

The dairy sector is old and has well established corporative structures and meeting forums. Likewise the production- and market conditions are stable and formalized, even if resources are limited. The enterprises in the group are competitors, yet have a common interest because of the competition they all have from a very large dominant enterprise. Also, the network members are members of an association of small businesses within the sector. Their mutual interest in the project was to ensure that their production methods would match occupational health and safety standards to avoid negative attention and accordingly to improve the public image of the sector. Several businesses had namely received notes from the Labour Inspection due to shortcomings concerning ergonomics. The trade union and the collaborating consultant were deeply involved in the design of the projects. It was only because a consultant informed them about the funding possibility and wrote the application that the project came about.

The decision-making process was triggered by a pioneer figure amongst them who repeatedly gave voice to their shared interests and challenges. The first thing he highlighted was 'the negative awareness of the Labour Inspections' and a shared problem with ergonomic issues. The second, a shared enemy in 'the dominating company in the sector' who so far had gained all support from the union and the possible funding from a public "Prevention Fund", and thirdly he reminded his peers about the mutual gains obtained though the sharing of experiences through the history of the small dairies.

The group made an 'openness and commitment pact'. One of the dairy managers describes the process, this way: *'When we decided to make a pact on 'open doors' .. (the possibility of studying each other's production processes and workflows) .. the room was completely silent. So we asked if anyone was against the idea. Deafening silence - Eventually we had to ask everyone to stand up and say, whether they were 'in' or not, and then some had to think it over'.* In a shared understanding of the 'common good', consensus seeking and recognition of the power asymmetry among the dairies, the case dairies and the controls were selected. The consultant had an active role, she pushed the dairies to hold meetings, ensured they involved employee representatives, and facilitated the contact to suppliers.

At a final stage of the dairy project process the experiences from implementing the technological improvements was disseminated to the control dairies and other network members, through a series of "open house arrangement", that were well visited.

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4.2 The brewery project

The brewery sector has changed profoundly and most of the small breweries are new in business and thus entrepreneurial. The tradition of cooperation is based upon their entrepreneur spirit and their high enthusiasm for the product. In addition, the enthusiasm builds upon a professional interest in brewing and not necessarily an interest in running a profitable business. The brewery directors themselves typically take part in the production. Resources are limited and the breweries are still burdened by investments in new production capacity and a decreasing market. As in the dairy-case the small enterprises were competitors, but also had common interests because of the competition from a large dominant enterprise. Further, the network agents were members of an association of small businesses and their mutual interest was to ensure that their production methods would match occupational health and safety standards to avoid negative attention and accordingly to improve the public image of the sector. As in case 1 it was only because a consultant informed them about the funding possibility and wrote the application that the project received funding to come about.

None of the interviewed breweries had had any 'negative' experience with the Labour Inspection, and accordingly, the breweries had no 'fear' that visits from the Labour Inspections and fines were a serious external threat to the businesses. Though some of them revealed that they were sure this would probably be the case in the future, it was a general experience that the Labour Inspectors primarily were giving advises of how to solve the problems rather than enforcing costly solutions upon them. Whether this was due to the Labour Inspections policy towards newly established companies, indulgence towards breweries, or a coincidence we do not know, however, the threat of control was not as obvious to the breweries at the time of the interviews as it was to the dairies.

Most brewery owners felt the workload on their own bodies and were thus positive towards improvements of the working environment. However, driven by enthusiasm to the business, the issue of occupational hazards had not yet entered the top of the agenda at the brewery. The selection of case enterprises was an ad-hoc process influenced by 'single' businesses, 'pioneers' who wished to be test breweries themselves and thus benefit from the new developed technology. In consequence, the idea of the 'common good' of the network was never realised and the idea of a formalised partnership was never formulated.

The consultants were replaced and the companies were dissatisfied with the new consultants´ competencies. The effect was that the consultants did not have the same influence as in the dairy case and also the knowledge sharing process was less formal, and as a consequence the gained experiences was not disseminated to the other companies in the network as was the case in the dairy project.

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4.3 The demolisher project

On the annual meeting of the demolisher section, which is part of the construction association, a pioneer figure from one of the leading companies stood up and suggested that they made training for demolishers. He had made the suggestion twice before, but this time two of the other younger company owners supported his idea. He explained that *'I was tired of listening to them complaining like a bunch of cry-babies, so I suggested that we made training courses to raise the image of the sector'*. It is a powerful narrative and the other participants described the scene accordingly, but it was also revealed that he had raised the issue twice before, but this particular year, two other owners of leading companies had had a talk in the break and agreed to support the idea if he raised it again. The establishment of the section is an earlier example of a similar effort and we need to dwell a bit on its history to understand the power game in the section.

The pioneer at that time was a person with excellent social skills, many of our interviewees mentioned how the parties are always good and everyone feel included in the group under his leadership. We also interviewed the grand old man and he several times pointed to the importance of including everyone *'You know what they say about the weakest link, if we want to improve our image in the eyes of the public, we can't have someone fooling around...'* It is however important to remember that 'everyone' means everyone in the top, because everyone means those who will comply with the standards the group sets. The whole point of the section and the training is to raise the standard in the sector, so that means exclude the bottom end too.

 A working group was formed to realise the training idea. The association provided a consultant to assist the group and the trade union was also involved. They chose to develop a vocational education comprising a series of already existing courses, but supplemented with demolisher-specific elements, including a high priority to safety issues. The education lasts 1½ years, and varies between theory and practice; two weeks in school is followed by six weeks of on-the-job training and then a new part of the course starts in the same way.

It was a challenge to find a vocational school, and a teacher who knew enough about the tasks to teach and who also had the right approach considering the target group. The training is not mandatory, the companies who took part in developing the courses regularly sends employees to follow the education and so does a few of the others, but there were also several of the company owners or managers whom we interviewed who did not. Their reason was that they were too busy to have someone in school even for a few days or that their employees were already so experienced that it would be an insult to them. However they admitted that it was attractive to hire an employee who had accomplished the education, if one could persuade him to change company.

The accounts of the projects above is assembled from a number of accounts from our informants, along with minutes from meetings as well as a few observations. Some key features came up in several accounts and seemed to have explanatory power. Thus, the role of a pioneer figure and a consultant was emphasized in relation to all projects. The same is true for a desire to improve the public image and a mutual interest was formulated in two cases connected to the existence of a large dominant enterprise, but also the third case had a similar mechanism, as they wanted to set a new standard in relation to the public assessment of the sector. We will refer to this latter mechanism as 'a need to distinguish' as the common feature across the three cases.

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In all three cases a pioneer figure was mentioned as the one who made things happen, the stories in case 1 and 3 were strikingly alike in the narrative about how the pioneer 'got up' and raised his voice to outline their common challenge. Whereas the pioneer figure in case 2 made it happen, but lacked the uniting capability that especially the pioneer in case 1 had. It seems that a pioneer figure is an important trigger, in all cases it was a person from a leading company, which had a strong interest him/herself in the project and in case 1 and 3 also someone who had a vision on the behalf of the sector. Furthermore, we learn from case 3 that the pioneer figure must be given the mandate to speak for the common good.

In all cases there was a formulated wish to improve the public image of the sector, but the most prevalent threat was felt by the dairies in case one, because of the pressure from the Labour Inspection. In all three cases, the group had help and support from an outside agent; the trade organisation provided a setting for the groups, they received substantial financial support, from a fund in the first two cases and via the vocational training system in the third and a consultant helped with the practical process. Again, there was a difference between the two intervention projects and the consultant had the most impact in the first case.

A recognition of asymmetry in power was only prevalent in the first case, but theories of network dynamics suggest that it is an important mechanism. Network theory suggests that a driving force in a network is the perception that shared resources are necessary in order to realize the actors´ shared goals and that joined the actors will achieve more influence and impact – even if they enter the network with different status. The dynamics of the network is therefore, characterized by interest matches, and the establishment of the network requires pre-negotiation that can aggregate the interests (Rhodes, 1997, Soerensen & Torfing, 2005). The collaboration of the network members depends on the possibility of formulating shared goals (instead of interest differences) and assignments that can act as an umbrella for the participation of various interests and objectives. Crucial to the network cohesion is also that the interdependency is big enough to solve the conflict interest through negotiation and through the development of formal and informal rules. Further, it is essential to create trust relations between the network actors, enabling them to interact and enter into binding corporation (especially when the exchange of resources is over time) (Rhodes, 2000; Soerensen & Torfing, 2005). Finally, the theory highlights the inclusion and exclusion mechanisms of networks. The theory holds that cohesion of a network is threatened if resources are asymmetric among the network actors. A fact, that creates 'strong' and 'weak' participants (March & Olsen, 1995; Soerensen & Torfing, 2005). In case one, the asymmetry was transparent and accepted whereas it was an opaque mechanism in the two other cases.

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	Mechanism	Dairies (1)	Breweries (2)	Demolishers (3)
External	**External pressure from Labour Inspection**	**Active**	**Limited**	**Active**
	Need for distinction	**Active**	**Active**	**Active**
	External funding	**Active**	**Active**	**Active**
	Professional support (consultant)	**Active**	**Partly**	**Active**
Internal	**Pioneer figure**	**Active**	**Partly**	**Partly**
	Recognition of asymmetry	**Agreed**	**None**	**None**

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5 Detected mechanisms

Some mechanisms derive from outside the groups, and can be seen as part of the reason why the projects came about. This is true for the mechanisms of external threats and need for distinction. The financial and organisational support mechanism is on the boundaries between outside and inside, it comes from the outside but has an internal side too, as the consultants are part of the process. The inclusion/exclusion mechanism is powerful, but it is not visible as a direct cause, rather it is an underlying cause for other mechanisms. More direct and visible are the mechanisms of a pioneer figure and the recognition of asymmetry or lack thereof. We have outlined the mechanisms and their status in the figure below.

The dairy case has become our 'best practice case', as it has all the mechanisms we have listed. After an account of the outcomes in the cases we shall conclude what has been achieved in the first case, but not in the second and third to the same extend.

It seems that the inclusion and exclusion mechanism is powerful in our cases. In the first case they succeed in formulating common interests, there was an acceptance of asymmetry in the group and the process is open. Of the two intervention projects, it is also the case with the best results in terms of achieving the outcome they settled for. The goal of the project was to develop technical lifting assists for three of the most hazardous operations and thus reduce strain by 50% and total measured lifting weight by 60%, and a physiological test should also prove a reduction of work in extreme positions (Christiansen 2013). All three working groups developed a fully functional lifting assist, and a provider of technical lifting equipment was involved in order to develop a tool that could be marketed from the prototype. An ergonomic consultant performed the evaluation and concluded that: "All three developed lifting assists reduces the number of lifting and handling operations considerably, and the goals are accomplished when the lifting assists are in use" (Mathiasen & Jacobsen, 2011). However towards the last stages of the dairy project, the network dynamics lost power. The case companies experienced resistance towards the new aids among some employees, they were found to be too complicated to utilise, and neither the associated diaries nor other dairies have (to our knowledge) implemented the new technology fully.

But it is also the case with the most obvious pressure from the Labour Inspection so the companies in the bottom end may have felt more inclined to accept asymmetry, than in the other cases.

Because a large number of new small breweries have opened in the last 15 years, rates of work related injuries and illnesses are not available. The three case breweries developed technical assists to reduce manual lifting of bottles to and from the conveyor before and after bottling. This equipment was successfully implemented in the breweries where it was developed, but none of the others copied them. The main reason for not doing so was the cost, even though many of them expressed great interest to do so, if it had been funded as was the case at the case breweries. As the technical solutions mechanised the lifting of bottles at the bottling operations, it was in the evaluation considered by the OHS consultant to be a successful response to the goals.

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As for the demolishers the aim was to establish the training and to keep it running, which they succeeded in. Except from one year, the courses has been completed with two classes per year, though it is not yet mandatory and not all companies make use of the option. The companies report that they see a big difference in the trained employees and the whole company benefit from their knowledge, but none of our interviewees had measured sick leave or work accidents in relation to the trained employees. It is however, a general considered outcome, that the difference in the level of safety between the companies within the network and all the other "freeriders" has expanded.

Apart from the local and expected outcomes, there are also some unmeasurable, but important societal results. The group from our first case jointly received a public Occupational Health and Safety price for their project, for being an inspiration to other groups, such as the group in our second case. The interviewees from the dairies also reported that the they now have stronger bonds to the other companies and increased trust in their competitors, which is something, the whole sector can benefit from. The term co-opetition (Levy et al 2003), implies that competitors, and especially SMEs due to their limited range, benefit from cooperating on certain parts of their business, such as innovation. Another arena might be occupational health and safety as we learn from case 1.

In the second case it was mainly the few case companies who benefited from the project, there was however some dissemination of the results afterwards. In the third case the sector has seen a promising change in the way knowledge is shared and spread. Since we learned that before the training they had a network on management level in the trade association, but now the employees have networks amongst them as well and they learn from the education and from each other instead of being limited to the knowledge within their company. This may raise the standard in the sector considerably. But it still seems to be limited to the companies who took part in developing the course and a few others. Thus only in our first case did the network succeed in including everyone, even if it was an inclusion on diverging terms.

6 Conclusion

In case 1 where all the listed mechanisms were active, the network was strengthened and the sector was lifted in terms of occupational health and safety. Whereas the effect was more limited in case 2 and 3, thus it is important that the external mechanisms such as support, external pressure and a common interest are present, but internal mechanisms such as a pioneer and the groups´ ability to integrate all are necessary too. Looking at support to networks as a policy tool directed at small businesses, there seems to be positive prospects. Even in the two less successful cases there were still positive results and compared to other policy instruments directed at SMEs, such as information campaigns which are not often successful for the SME target group. Another is Labor Inspection visits, that might be effective as a threat, but does not provide solutions and also does not reach everyone either, they seemed to reach more employees and provide a way to help the companies to raise their health and safety level on their own terms. Finally it is evident in all three cases that without public funding of the activities – at least in the onset – they would not have been.

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Safety training to reduce wood dust: A work method

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Abstract. Air contaminants remain a problem in SMEs (Karlsson et al., 2006). Research has shown that short-term exposure to air contaminants can cause health risks, and short-term exposure has received low attention compared to long-term measured mean values of different air contaminants. Yet peak exposures often explain a large part of the mean exposure. The aim of this paper is to develop a work method that can be used to control wood dust and improve the work environment of SMEs. The work method was developed by earlier research in the field of safety training and occupational health, but also through interviews with regional safety representatives in wood industries. The work method illustrates several steps, such as risk and control identification of short term exposure, safety training (creation and implementation), and evaluation of safety training, collaboration in safety training, adaptation and implementation of safety training. The work method can be used by safety representatives to control wood dust primarily through safety training, but also to create conditions for further studies on risks and safety in SMEs.

1. Introduction

Workers in smaller organizations are to a greater extent exposed to safety risks, and they often have difficulties in controlling occupational health and safety risks (Hasle & Limborg, 2006). However, to mitigate these risks smaller organizations can involve employees and safety representatives in safety and health work (Hudspith & Hay, 1998). Indeed, when safety representatives are included in safety and health work, generally a smaller proportion of accidents occur at the workplace (Hudspith & Hay, 1998). In Sweden, safety representatives are appointed by local trade unions, and organizations must have safety representatives at the workplace if more than five employees are employed. The purpose of safety representatives is not only to generate a satisfactory work environment, but also to represent employees in safety issues, according to Swedish work regulations (Swedish Work Environment Ordinance, 1977: 1166; Swedish Work Environment Authority, 2014). Therefore, safety representatives are a target group with extensive knowledge in safety. Safety representatives are often trusted to foster participation in safety issues among employees (Milgate et al., 2002). However, it is evident that the role of safety representatives in these issues has been ignored in the existing literature (Walters, 1997).

Research on air contaminants in wood industries also specifies the lack of attention given to control methods of air contaminants in the literature (Buring, 1992; Swuste, 1996; Deurssen et al., 2014). There are however some studies that develop different kinds of models to decrease air contaminants (see Van Dijk, 1988; Buring et al., 1992; Boleij et al., 1995; Andersson, 1995; Säämänen, 1998; Maidman, 1998). These models describe, *inter alia*, identification of the source, and the influence of sources and transmission (Van Dijk, 1988; Buring, 1992; Boleij et al. 1995). These models also highlight exposure and potential hazard tape, or characterization of control strategies (Maidmen, 1998; Andersson, 1995). The work method that is developed in the present study is partly inspired by these previous models of how to control air contaminants, but also differs substantially, since it is a systematic work method focusing on safety training for safety representatives. The work method presented in this paper is developed theoretically and empirically, and is also intended to be used in that way.
The aim of this article is to develop a work method with focus on safety training that can be used by safety representatives in wood industries. The study is developed in order to obtain practical insights for improved wood dust control. The elements in the work method are discussed using interviews with safety representatives, and analyses of their attitudes with regard to the elements that may be improved, added or changed. An understanding is created through the literature and interviews for how a work method can be created, and how the different elements can be assembled. In the following text, various elements are presented that have proved to be important in previous studies in reducing air contaminants in primarily wood industries, a method is presented, followed by the results from the interview analysis, and finally a discussion is carried out with subsequent conclusions.

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2. Theoretical framework

2.1 Systematic approach and safety training

A systematic approach to work with air contaminants has been used and developed (Buring et al., 1992). The systematic approach has 5 phases. In the first phase, air contaminant problems are recognized and an assignment plan is created for the goals that should be reached to decrease air contaminants. In the second phase, sources for air contaminant are identified, for example, work practices. In the third phase, control measures to decrease air contaminants are identified. The fourth phase includes planning of implementation and measures to decrease air contaminants. The fifth phase includes an evaluation, a final report and a discussion regarding the withdrawal of an occupational hygienist or a safety consultant (Buring et al., 1992).

2.2 Create a training material for safety training

For various work operations, a technique is used where videos to simultaneously show the instantaneous value of air contaminant. The measurement is performed in the breathing zone. The method (PIMEX) synchronizes the video, which can be viewed in direct connection to the work, and provides much valuable information regarding exposure differences. This has also a pedagogical and training value, because the worker and the leader can view how exposed he /she is in a certain situation and discuss appropriate measures (Rosén et al., 2005; The Swedish Work Environment Authority, 2005). Furthermore, a direct reading instrument can be effective when oriented measurements are performed to find where exposure can be high, directly when doing the measurement. For instance, it may be effective to see the risks and the effect of measures taken. A direct reading instrument does not necessarily have to be expensive (The Swedish Work Environment Authority, 2005).

2.3 Peak exposure risks and measures in safety training

Wood industries are shown to have regular exposure in the form of short term peaks (Gummesson et al., 2015 in press). Peak exposure is defined as variation with a time constant of up to a few seconds (Gummesson et al., 2015 p. 1, in press). Several studies confirm that peak exposure constitutes a large proportion of the total exposure (Andersson, 1995; Lillienberg, 2008; Gummesson et al., 2014). There are a number of factors that affect how risks occur, and risk identification is therefore important and also that it is done thoroughly (Säämänen, 1998). Further, safety training typically includes risks and measures, as, for example, work practice change (Lazovich et al., 2002), and attitudes, as well as motivation, can be changed by safety training (Buring et al, 1992), as further described.

2.4 Attitude and motivational change by safety training

Key factors in controlling air contaminants are commitment and motivation, for a better work environment among workers (Rosen et al., 2005). Aspects that are important for the industry in decreasing air contaminant and making control measures effective are motivation and training. Training is needed for workers, middle managers and supervisors, and should be repeated regularly. The worker needs to obtain knowledge of control measures and be motivated, for example, to use control measures, or take part in cleaning in the industry. Regular evaluations of control measure usage are therefore essential (Buring et al., 1992).

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3. Method

The following study was conducted at wood industries in Dalarna, Sweden. To test and develop the various stages of a work method additional empirical evidence was added to a theoretical basis, in the form of experiences of safety representatives given in interviews at the wood industry. An interview analysis was done by using attitude coding (Miles & Huberman, 2013).

3.1 Participants

Safety representatives, aged 30-50 years, in the wood industries were interviewed, with work experience between 1-20 years. A majority had worked 10 years or more in the wood industries. All respondents worked at small and medium sized enterprises (SME). The largest company had about 120 employees, and the smallest about 5 employees. A SME is categorised as having less than 250 employees (Loecher, 2000). We focused on SMEs since they, in comparison with lager enterprises with HR departments, may have underdeveloped programs for HR polices and development work (cf. Rydell et al., 2014). The safety representatives were chosen as respondents because they have experience in the field of occupational health and safety, and are a central target group, regarding safety issues at the workplace.

3.2 The work method

A discussion basis was sent to the safety representatives before the interview. The discussion basis included information about various elements which are theoretically grounded in previous studies on safety training related to wood dust reduction in the industries. The safety representatives were thus given an understanding of the elements, to avoid wrong impressions and were given time to reflect and think about the different elements. The elements concerned were risk and control identification of short term exposure, safety training (creation and implementation), evaluation of safety training, collaboration in safety training, adaptation of time and implementation and a theoretically based example of a work method.
Question examples to consider and reflect upon before the interview were also written in the discussion basis. For example, one question was "Describe effective control measures?" (e.g. safety training). This was done to create a good interview atmosphere and to develop creative discussions. In this way, the preparation by the safety representatives was thought to be more effective, because they were better able to prepare themselves to answer the questions in the interview template.
The interview and interview template was based on the described elements. This approach was used to create a discussion and interview template which was theoretically grounded. The approach gave the opportunity to discuss possible improvements of the elements, and factors to add, such as those affecting the different elements, based on the practical experience of the safety representatives. By interviewing and understanding these practical experiences, the work method could be applied more conveniently and adapted to the safety representatives' work situation. Similar approaches have been used since different areas have been discussed in interviews, including safety training, to control wood dust (see e.g. Brosseau et al., 2002). The elements could further be externally evaluated and possibly validated. From these interviews, the work method was developed to show how safety training may be used by safety representatives to control wood dust.

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3.3 Interviews and analysis

With a semi-structured interview template, 9 in-depth interviews were performed with the safety representatives. The interview questions were divided into categories, based primarily on the different elements described above, but gave also opportunities for further opinions. The categories consisted of preliminary questions, and questions relating to general experience, control factors, risk identification, influencing factors, safety training, and additional questions that included issues that did not fit into the other categories. One example of additional questions was "is there something you want to add to the additional elements that is used for reduction of wood dust"?

Based on the interviews, transcriptions were made directly after the interview to avoid misunderstandings or forgetting important details. A value-coding was performed, in accordance with Miles and Huberman (2013). Value codes refer to a coding process in which the attitudes, beliefs and values are encoded from human experience and knowledge. Attitudes can be understood as the feeling about a specific thing (Arnold, 2005; Miles & Huberman, 2013). The transcription and coding was performed directly after the interviews. Descriptive coding labels were used to summarize the essential topics (Miles and Huberman, 2013). Based on this interview analysis and coding, a work method was developed and modelled with further ideas from Hägg and Wiedersheim-Paul (1984). A model may include arrows or text that is used as display on an image and abstraction of reality. Generally, models of different definitions are often characterized by abstractions. It should further be an object which may be real now, before, or in the future. The model should include simplification of the object. Authors also argue that associations should be characterized in models. It is possible to make several models with the same base but different detail level (Hägg & Wiedersheim-Paul, 1984).

4. Results

It was confirmed that the different element risks, measures, evaluation attitudes and motivation all were important and related to safety training, which is a key issue in reducing wood dust. By using safety training, involving risks and measures to decrease wood dust, a better work environment can be developed in SMEs. According to the safety representatives, attitudes and motivation are described as changing factors among the workers when safety training is used. Changing attitudes of employees through safety training that involves actions and risks to reduce wood dust is described by all safety representatives. Safety training could additionally be performed differently and contain different elements to become effective, as further described below, as a majority of the safety representatives described, and should be performed for workers and managers. It could, however, be discerned that a work method to reduce wood dust needs to be adapted to each company, because, for instance, of the fact that the experience of safety representatives varies.

4.1 Safety training for changed attitudes and motivation

It emerged in all interviews that attitudes and motivation to work to reduce wood dust should be changed, for example, regarding the need for better cleaning and the use of less compressed air. There are different ways to carry out safety training, according to the safety representatives. Overall, it was found effective by the majority of the interviewed to conduct safety training through class presentations of risks and measures in class, in small groups of 6-15 workers. It also emerged from several of the safety representatives that training could be conducted in small groups, where solutions to problems were performed together. Some safety representatives described how safety training programs could be made by visiting other companies and seeing how they manage risks and measures to reduce wood dust. Some safety representatives also described how safety training could be performed together in small groups, by going through its own organization and the different machines, to look at the risks and solutions and by discussing these together.

Safety Training could then be used in class, as several of the safety representatives pointed out. It can be advantageous to clearly state the purpose of the safety training to motivate the workers towards the training, as also described. According to some respondents, supplementary materials could also be used, if the target groups were susceptible to this. This could be, for example, in the form of Internet-based material on the intranet of the work-place, or on the workers' cell phones via QR – codes, as well as providing printed documents in the break or lunch room.

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However, as discussed by the majority of the respondents, it is important to continuously be able to adapt safety training and the educational situation of the target group and the company. For example, it was pointed out that younger audiences can more easily absorb the material online and make use of mobiles, as well as train themselves. The majority of the safety representatives described that there is limited time and resources available, and safety training therefore needs to be short and concrete. It was further pointed out as important that training sessions should be short and concrete for the workers, because they simply must take in the information in the Safety Training. The respondents described several instances where safety training can be performed. It was suggested, for example, that different timeslots such as production stops, or that certain cleaning days or specific informal or informal meetings could be used for safety training.

4.2 Risks, measures and safety training materials

It emerged that it is clearly important to get information about risks and measures included in safety training, for example, by PowerPoint presentations. These can be identified through safety rounds, as the majority of respondents worked in this way in identifying risks and measures. To identify risks and measures in safety rounds also saved time, because these are already established routines. Some safety representatives also described that they often identify risks that are particularly dangerous during work, where they can be easily identified. In addition, all safety representatives described that they may need more training and knowledge of direct-reading instruments to measure short-term exposure, if using these to identify risks and measures, and where these can be rented or purchased. However, the respondents had experiences of filter and long-term exposure measures. It also emerged in all the interviews that certain work-stations and situations, according to the respondents, are more related to wood dust risks, for example, work relating to saw, polishing and the use of compressed air. It was further suggested that safety training material, advantageously, could contain health issues relating to wood dust, in order to create awareness and change attitudes among workers and management. It could also be good to include research that shows the benefits of certain measures, such as the reduced use of compressed air, by a change of attitudes among workers.

4.3 Support and cooperation for effective safety training

The majority of the safety representatives described cooperation as important for the implementation of risks or measure identification, evaluation and attitudes, as well as for motivational change and safety training. Cooperation is important, both internally with workers and management, especially since management has the resources to initiate actual measures, and externally with occupational and health services (OHS) for effective support in safety training. Several of the safety representatives stated that they had good experience of OHS. For example, OHS could objectively assess the risks and measures, and additionally provide a professional report to both the employer and the employee. OHS can also support the evaluation of the safety training. Another support described in the interviews was regional safety representatives, especially in relation to identifying risks and measures. In addition, several safety representatives mentioned that it might be effective and rewarding for the execution of safety training and the other elements, described above, with clear support in the form of a template to show exactly how to work, before, during, and after the safety training.

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4.4 Evaluations for better safety training

Evaluations were described by all safety representatives as an important part of safety training to reduce dust. It was also described as important that managers constantly receive reports in connection with the evaluations. Evaluation reports should clearly demonstrate the results of safety training, and demonstrate that safety training is good. Surveys were described by the majority of the safety representatives as the best form of evaluation. However, it was considered important that the evaluations should be short and specific and that the objective was described in connection with the evaluation to motivate employees to respond thoughtfully and to make the safety training more effective. Group interviews were also described as a good form of evaluation, which also saved time. Many of the SMEs were comfortable in this kind of situation, where safety issues were discussed in groups. Individual interviews were experienced, however, as least effective, because the workers are not comfortable in that situation.

4.5 The work method

Based on the interviews and various theoretical elements used in an interview template, a method to reduce air contaminants by safety training was developed. The work method points out that it is important to consider the safety representatives as facilitators when safety training is performed. To have a clear discussion between management and safety representatives about the adaptations, early on, before the work method is started is important. This discussion could, for instance, concern conditions for implementing safety training, or opportunities for cooperation with OHS. Further, a template should have been distributed to the safety representatives to bring about understanding and support of how safety training can be performed, and evaluation methods and materials for the risk and action identification. Risks and measures are first identified by direct reading instruments, and these can then be used in the next phase when producing safety training material that should be short and specific and include health issues regarding wood dust, as well as clearly state the purpose of the safety training. Implementation should be carried out in small groups through group training, by means of, for instance, PowerPoint, problems solving or field-trips to other companies. The focus in safety training is on risks and control measures to reduce wood dust. Further, an evaluation is performed after the safety training, and this should be short and specific, and preferably in the form of group interviews or questionnaires. Individual interviews may get workers to feel uncomfortable, as emerges in the evaluation.

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5. Concluding discussion

A work method has been developed to promote safety training to reduce wood dust with safety representatives as primarily facilitators. The interviews revealed clearly that safety training is a measure that can and should be used more frequently in all SMEs to reduce wood dust. It was demonstrated that attitude change to control and reduce wood dust is important. Cooperation in the implementation of safety training for reduction of wood dust is also important, for example, management need to be aware of the dangers of wood dust, since they manage the resources used in the implementation of control measures. However, since every company has different conditions, this may create limitations for the presented work method. The majority of the safety representatives in the study described that the safety training should be tailored for each company. This discussion should be held earlier before the safety training, to see how the work method can be adapted best for the specific company. In future studies, the work method can be used in practice, both to reduce wood dust, and other forms of air contaminants and additional industries, but should be adapted for each company, after a tentative discussion between management and safety representatives.

By finding rewarding forms of collaboration between the wood industry, OHS, as well as regional safety representatives, training work can evolve. Cooperation practices, for example, can include having a clear discussion between safety representative and management, throughout the training process, and the various elements that are performed in connection with such evaluation and risk, as well as measure identification. This was also something that was pointed out in the interviews, and can also be confirmed by the previous literature (Buring et al., 1992). Cooperation practices can, for example, be performed by discussions before the work method is started to see clearly what forms of adaptation should be done, how the implementation can be most effective, and so on, as was pointed out in the interviews. It can also be particularly important with clear reports of the evaluation, to support cooperation between management, safety representatives and workers. A further important element both for cooperation but also for safety training is that it can be beneficial to conduct safety training for everyone in the organization; management, leaders, safety representatives and workers. This is to create an ongoing and informal discussion in the industry about wood dust, which one respondent described as important. Some respondents described that focus on one assignment for every employee, for a period in the industry, may contribute to the implementation efficiency of safety training. Further information is needed for safety representatives on how short-term exposure can be identified and used in safety training, by, for instance, direct reading instruments to avoid wood dust in wood industries. Safety representatives can, of course, take advantage of performing the analysis in cooperation with other parties, such as OHS, as described in the interviews. It is clearly stated that direct reading instruments may be beneficial for use in finding risks and measures to avoid wood dust and these can be obtained at a reaonable price (The Swedish Work Environment Authority, 2005).

In summary, the presented work method and the results used can promote measures to develop work safety training in wood industries. However, the work method has development potential and can be tested in practice and in other industries with other risks, knowing that adaptation should be made for each industry or company. A clear discussion before the method is performed is particularly important. The working method should be systematic and always include opportunities for improvements, based on the evaluations made. Given that the safety training should be short and concrete, as described, it becomes even more important that this is carried out systematically and frequently within the organization.

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Tool for Identifying Critical Control Points in Embedded Purchasing Activities in SMEs1

Working paper for the 3e USE conference, Groningen 2015

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Abstract

This paper discusses risk and uncertainty aspects and proposes an assessment tool leading to identification of critical control points (CCPs) within purchasing-oriented activities of small and medium enterprises (SMEs). Identifying such CCPs is the basis for developing SME purchasing instruments to support purchasing-oriented activities. The identification of such CCPs will be theoretically approached from a systems perspective using four management functions which are needed to operate as a viable system: implementation, control, intelligence and coordination. When applied to the development of purchasing instruments, these instruments can be used for supporting one of these four management control functions.

Key words

Small-Medium Sized Enterprises (SMEs); purchasing-oriented activities; critical control points (CCP).

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1. Introduction

Organizations need to purchase products and services in order to meet their objectives. These purchases involve risks and uncertainties whether or not this is acknowledged or ignored by organizations (Zsisidin *et al.*, 2004). To be able to cope with such purchasing risks and uncertainties instruments can be developed. Using supportive managerial purchasing instruments (in short *purchasing instruments*) for the function of purchasing can be interpreted as a way to reduce risks and uncertainties related to purchasing activities. Academic and practitioner purchasing literature describe numerous purchasing instruments (see e.g. text books of Van Weele (2010) or the purchasing chessboard consultancy handbook of AT Kearney (Schuh, *et al.*, 2014). However valuable these instruments may be, they implicitly relate to purchasing activities within bigger organisations (c.f. Ellegaard, 2006). As SMEs have different organisational settings and are not miniature-versions of large enterprises, purchasing in SMEs also differs (see Hagelaar *et.al.*, 2014). However, the manner in which purchasing is executed within SMEs has not been described in literature. Purchasing processes in small and medium sized enterprises (SME) tend to receive little attention in purchasing literature (Christensen, 2003; Ellegaard, 2006; Quayle, 2002). Hence from an academic perspective the management of purchasing within SMEs is rather a terra incognita. To start filling this gap a research programme into SME purchasing processes has been developed. The aim of this programme is to develop purchasing instruments for SMEs to strengthen their purchasing activities in relation to their intended or emerging business models. These instruments should aim at continuing, strengthening or positively influencing certain purchasing activities and hence the viability of SMEs (see in general Ford and Greer, 2005).

Purchasing instruments need to be supported by and embedded in the organisations' activities in order to perform well and be effective. Specifically for the SME-focussed research programme this means that the design of purchasing instruments must be in line with patterns of purchasing activities within SMEs (see in general Ten Have *et al.*, 2010). In our earlier research we identified purchasing activities in the form of Purchasing Oriented Patterns (POP) in SMEs. We defined a POP as an organized collection of purchasing activities which effectuate the value proposition to the customers of the SME. These purchasing activities and their interconnections all belong to an identifiable pattern (see Hagelaar *et al.*, 2015) which can explain competitive advantage (compare Barney 2001, 2012). Managerial support of purchasing activities entails that these activities are strengthened and guided into viable patterns (Berry *et al.*, 1995). Insight in purchasing patterns and especially in purchasing activities which cause risk and uncertainties related to achieve the organisation's objectives is then necessary to clarify at which points managerial support is needed. These points in need of managerial support, located in purchasing activities, are called critical control points (CCPs). A CCP is a concept from the domain of food quality management which denotes a point in a (production) process that is important for the ultimate quality of the final product. Once identified, these CCPs become focal points of measurements, evaluation and possible corrective actions to reduce risk of getting out of tolerance and hence the risk of not meeting the original objectives (Luning and Marcelis, 2009).

In this paper we propose an assessment tool to identify critical control points (CCP) derived from the assessment of risks and uncertainties when executing POPs within SMEs. The identification of such critical control points will be approached from a systems perspective and four managerial functions which enable a system to operate as a viable system: i.e. implementation, control, intelligence and coordination (Beer, 1995; see also the section 'Control and Management'). To be able to achieve objectives by means of purchasing activities, such activities specifically need to be controlled in the short and long term. This requires an insight in the operation of POPs within their organisational context.

In Section 2 we will first describe the study object i.e. Purchasing Oriented Patterns (POPs) and nature of SMEs, supply chains and environment. In Section 3 we will explore literature on management control and on management processes. In Section 4 we will discuss three basic assumptions underlying this research. In Section 5 we will construct an assessment tool for empirical research to determine where and what kind of support (CCPs) is needed in a series of purchasing activities. The paper ends with first conclusions.

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2. Purchasing activities: POPs in organisations, supply chains and environment

The assumption here is that to design purchasing instruments which enable control of organisations' purchasing activities, we need to understand the risks and uncertainties related such activities for SMEs. This implies that we need to include in our research the purchasing activities and also the environment in which these activities are executed. This again implies a system-oriented perspective underlying the development of purchasing instruments. By means of a framework (see Hagelaar *et al.*, 2015) Purchasing Oriented Patterns (POPs) are identified within the specific context of SMEs. This framework is developed on the basis of the Transaction Cost Theory (TCT), the Resource Based View (RBV) and nature of SMEs (see Hagelaar *et al.*, 2015). Combining TCT and RBV captures a major characteristic of purchasing i.e. the balance between the costs of necessary transactions and the added-value after completion of the transactions.

Transaction cost
The core of the Transaction Cost Theory (TCT) is the relationship between the degree of alignment or vertical integration between parties involved in transactions and the related transaction costs. Such costs are the supportive information, negotiation, coordination and monitoring costs necessary for conducting transactions between organisations. The degree of alignment varies in a continuum from several independent organisations operating in a spotmarket versus one fully vertically integrated organisation. The two central attributes which influence the choice of management control are asset specificity and uncertainty (Williamson, 1981; for an adoption to purchasing see Adams, 2005; Hoffmann *et al.*, 2011; Noordewier *et al.*, 1990,). With management control we mean ensuring consistency and transparency in management and oversight of an organization, to ensure an efficient and effective achievement of corporate objectives. This level of integration is *one dimension* in defining POPs for characterizing the relationships between the organisations' internal and external parties involved in purchasing activities.

Resource based view
The idea of alignment as promoted by the TCT perspective is also found in the Resource Based View (RBV) theory (Barney 2001). This theory discusses (Barney 2012) the added value of purchasing and supply chain management for competitive advantage of organisations. The basic theoretical reasoning is that only knowing how a product-market competition develops is not enough to understand sources for competitive advantage. One should also understand the suppliers' markets and the competition in these markets to anticipate competitive advantages in the downstream-oriented product market. In this reasoning, the purchase of certain resources is done on the basis of the expectation that these resources will realize added-value for customers after the organisation has transformed these resources into specific products or services. In this reasoning sales/marketing and the downstream side of an organisation is directly related to purchasing and the upstream side of an organisation. This chain-oriented view on competitive advantage by highlighting the aligned relation between upstream and downstream activities of an organisation should lead to competitive advantage. This means that the alignment should lead to value creation which is rare amongst competitors and possibly costly to imitate or substitute. The question then is: to what extent do the attributes of the resources and of the processes on how these resources are used (relating downstream to upstream), exhibit the competitive attributes mentioned. Thus, the added-value of resources is the *second dimension* of defining POPs for characterizing the purchasing activities from the perspective of the contribution of these purchased resources to the competitive advantage.

As discussed in Hagelaar *et al.* (2014) purchasing research within SMEs must consider specific nature such as informal organisation, less specialization in business functions and less available resources. SME owners focus more on the overall operation and less on specific business functions. The approach of SME management to inward-bound purchasing practices activities is often holistic; its approach to outward-bound purchasing activities is characterized by a relative dependent position in supply chains (Hagelaar *et al.*, 2014). This conceptual framework in our 2014 paper discusses the relation between patterns of purchasing activities and its purchasing performance. The POPs have been described (Hagelaar *et al.*, 2015) on the

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basis of the combination of the levels of internal and external integration (following the TCT) and specific added value (following the RBV). To explain the relation between POPs and performance, the TCT-related variables general uncertainty (macro and meso environment) and asset specificity (meso environment) are included. It introduces SME and Owner characteristics and Business Model as moderating variables (for more details see Hagelaar *et al.*, 2014). This leads to the framework of Figure 1.

In earlier research we identified managerial practices in the form of four SMEs-typical POPs (see Hagelaar *et al.*, 2015). The combination of *levels of value chain integration* and the specificity of supplier's added-value results in four ideal types of value propositions (Figure 2). The labels of each cell reflect the nature of the purchasing activities and hence the Purchasing Oriented Patterns (POPs) in terms of the relations with suppliers and the specificity of the supplier's added value.

We distinguish four POPs:
1. *Coordinated purchasing*: purchasing is interwoven with other functions (such as marketing, sales, development, production) in which agreements are established with nearly-integrated suppliers who deliver standard goods or services that fit the organisations' value proposition.
2. *Cross functional purchasing:* purchasing is interwoven with other functions (such as marketing, sales, development, production) in which value-added activities of nearlyintegrated suppliers are directly included to enable tailor-made contributions to the organisation's value proposition.
3. *Negotiating purchasing:* purchasing is, under market conditions, directed at negotiations with commodity suppliers on prices and qualities of products or services to enable specific deals from suppliers.
4. *Serve the organisation:* purchasing is, under market conditions, directed at ordering from commodity suppliers who deliver standard goods or services that fit the organisations' value proposition.

In the POPs three steps in the overall business flow of purchasing activities are identified (Hagelaar *et al.,* 2015): (1) outside-in, (2) inside, (3) inside-out. Each step is positioned around a specific transformation:
1. *outside-in* is positioned around the transformation of the added value proposition for the customer into (customer) requirements,
2. *inside* is positioned around the transformation of these (customer) requirements into specifications of resources,
3. *Inside-out* is positioned around the transformation of these resource specifications into the requisition of these resources.

We need insight in such POPs and especially in critical control points within such POPs to be able to locate possible needs for managerial support for dealing with purchasing related uncertainties and risks when pursuing the organisation's objectives.

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3. Management control and its basic functions

In developing purchasing instruments the management approach to purchasing activities is central. Purchasing activities are captured in POPs and management instruments need to support their viability. According to Beer (1995) a viable organization is defined as being effectively organized. Beer (ibid) as cited in Ten Have *et al.* (2010, 462) poses that an effective organization can be achieved by systematic management control which entails four functions: implementation, coordination, control and intelligence.

1. *Implementation* concerns with the daily operations with which products and services are produced.
2. *Coordination* concerns with the regulating system (task, authority, responsibilities) which secures the course of operations.
3. *Control* concerns with supervision and steering related to implementation and coordination.
4. *Intelligence* concerns with the system of adaptation to (substantive) environmental Changes

This has as a consequence that *in control* means that the organization itself is object to managerial control, but its context and contingencies as well. This approach towards control means that purchasing instruments will be positioned within the organisation's activities with the acknowledgement that these activities are also influenced by context and contingencies.

The four functions are related to each other in the overarching concept of management control. Management control combines the strategic, tactical and operational level, pays attention to both the long and short term, and steers and adapts organizational activities. The combination of the *time* dimension and the *steering* dimension results in Figure 3. Applied to the development of purchasing instruments for POPs, these instruments can be directed at supporting one of these four management control functions.

4. Basis assumptions related to identifying CCPs

This study focusses on locating and characterizing CCPs in POPs in order to develop purchasing instruments in a later stage of the research programme (see section Introduction). To locate and characterize the CCPs some basic assumptions underlie this study.

A **first assumption** is in line with the integral framework (see section Purchasing activities) and the integral approach to identifying CCPs. Both Hagigi *et al.* (2009) and Gordon *et al.* (2009) advocate a holistic view on risk management based on the argument that various events and situations can simultaneously influence several exogenous and endogenous elements of risk. Specifically for this study we developed an integral framework to study and explain POPs. This framework implies two statements which are important for identifying CCPs. The *first statement* is that the act of purchasing directly contributes to the value proposition of the organisation. Consequentially there even is a purchasing orientation in the most customer-oriented stage of the POP (the *outside-in* stage in which the value proposition is defined and executed). Supply risk management is thus not demarcated as 'just' being the direct interface between organisation and supplier but encompasses the three stages of the POP. The *second statement* is that POPs are influenced by internal and external factors (Hagelaar *et al.*, 2014). Changes in these factors can change the execution of POPs and their performances. These factors should then be taken into account to assess the risk exposure within the POP. This risk exposure contributes to the allocation and nature of purchasing instruments per POP. The consequence of this acknowledgement of the relation between POPs and their environment is that the risk exposure can vary. Hence there is no general overall list of risks linked to purchasing activities, but there will be a list of risks per POP. Consequentially the design of purchasing instruments will in principle be related to individual POPs.

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A **second assumption** is that dealing with particular risks when using appropriate purchasing instruments will improve the execution of a particular POP and with that will improve the business performance (see for similar reasoning on risk management; Gordon *et al.*, 2009). By using purchasing instruments an organization can pro-actively reduce uncertainty and risks and hence ensure and/or improve the desired business performance (see Zsidisin *et al.*, 2004, p. 410; Smieliauskas and Robertson 2004, p. 478).

Until this point we have not defined the concepts of uncertainty or risk. Although these often seem to be used as synonyms we will make a distinction between them:
1. With *uncertainty* we refer to the entrepreneur's (in this case the SME owner's or director's) *confidence* in his estimates or expectations. Uncertainty is defined as "the difference between the amount of information required to perform the task and the amount of information already possessed by that organization (Galbraith, 1973, p. 5; see for an adoption in the context of supply management Zsidisin *et al.*, 2004).
2. With *risk* we refer to the possible *outcomes* of an action, specifically to the loss that might be incurred if a given action is not taken (Liesch *et al.*, 2011). Risk combines two attributes i.e. probability and impact. Probability is a measure of how often a detrimental event that results in a loss occurs. Impact refers to the significance of that loss to the organisation. The level of risk is then perceived as the likelihood of occurrence of a detrimental event and the significance (impact) of that event (Zsidisin *et al.*, 2004, p. 397).

We argue that the joint study of *uncertainty* and *risk* in POPs will yield information on the nature (uncertainty) and impact (based on the outcome) of CCPs and thus on the nature and location of the use of purchasing instrument(s). As we aim to develop such purchasing instrument we will classify uncertainty from the management control perspective, being: (1) implementation -, (2) coordination -, (3) control – and (4) intelligence uncertainty. The earlier described four functions of management control (section Management: basic functions) for this research will be adapted as follows:

1. *Implementation uncertainties* relate to the daily operations with which purchasing activities are executed.
2. *Coordination uncertainties* relate to the regulating system (task, authority, responsibilities) which secures the course of the purchasing activities.
3. *Control uncertainties* relate to supervision and steering related to implementation and coordination of purchasing activities.
4. *Intelligence uncertainties* relate to the system of adaptation to (substantive) environmental changes which impact purchasing activities.

In this paper we classify risks according to possible negative outcomes of POPs embedded within SMEs: (1) not achieving the value proposition, (2) too high transaction costs in matching the value proposition to product/service specifications and procurement, (3) supplier failure.

A **third assumption**. As we study purchasing activities within SMEs we propose that the perception of the director/owner of uncertainties and risks related to POPs will be viewed as the organisations' uncertainties and risks. Ellegaard (2006, p. 273), based on Dollinger and Kolchin (1986) and Gadde and Hakanson (2001), posed that within SMEs the director/owner has an important role in managing the SME and is involved in purchasing activities. Although we acknowledge that perceptions of individual SME employees could also have an impact, with this assumption we theoretically and methodologically relate the individual level of director/owner to the organisation level.

We will take the perception of uncertainties and risks as our starting point for the identification of CCPs. Ultimately individual perception and assessment give meaning and significance to value adding purchasing activities and their embeddedness within the organisation and its environment (see for a general discussion on this issue; Liesch *et al.*, 2011). Moreover, we expect consistencies in uncertainty and risk perceptions when analysing the data gathered for the individual POPs.

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5. An assessment tool to assess CCPs in POPs

As stated on the assumptions on the theoretical framework for assessing CCPs, supply risk and supply uncertainty are linked to purchasing activities and must be interpreted from the perspective of the value proposition of a POP. For example, a purchasing ordering activity which leads to a potential delay of one day for the entire process will be judged differently in an organisation which is focussed on reducing costs or lead times compared to an organisation which is focussed on quality or innovation. The activities for each POP are captured in three main stages: *outside-in*, *inside* and *inside-out*. The outcomes of these activities are related to risks. Moreover, the framework also makes clear that a process is more than a just a flow of activities. There are more factors that influence the flow of activities in all three stages of the POPs. Risks can originate from the mentioned organisations' internal and external factors (for a more general reasoning in this matter see e.g. Zur Muehlen, 2005). Changes in these factors, individually or in combination, can cause alternations in the activities within the POP which again can cause an undesired outcome. As stated, these factors are also related to uncertainty. Hence the combination of a relatively high perceived level of risk and a relatively high perceived level of uncertainty leads to determining the nature and location of a CCP in a POP.

In a later stage of the overall research programme the purchasing instruments will be developed. The identified CCPs will be important for developing these instruments. Hence the instruments will be directly linked to an activity in one of the stages of a POP and to the nature and location of the instrument. The objective is to develop tailor-made instruments for specific situations. In line with this we now need to elaborate on the types of risks and uncertainties.

Risks
Risks are classified here according to possible negative outcomes of POPs embedded in SMEs: (1) not achieving the value proposition, (2) too high transaction costs in matching the value proposition to product/service specifications and procurement, (3) supplier failure. As stated earlier these risks relate to purchasing activities. To stay in line with these activities, this classification has emerged from the three stages of activities within POPs (subsequently: outside-in, inside, inside-out). The different risks classifications are then operationalized with the following (supply-related) indicators: design, quality, cost, availability, and manufacturability (for a further elaboration see Zsisidin *et al.*, 2004, p. 405). This leads to the following risk assessment grid (Table 1).

Risk classification

Risk classification Indicators	Value proposition (VP)	Transaction costs (TC)	Supplier failure (SF)
Design	Has the supplier the ability to contribute to design to meet VP	Too high complexity of design leading to too high complexity of supplier base	Setting too high demands for supplier (s)
Quality	Do products/services meet the quality standard	Too high monitoring costs	Too high amount of quality failures
Cost	Can suppliers contribute to acceptable costs	Too high costs because of renegotiations	Suppliers fail to produce against the agreed price
Availability	Can the supplier meet delivery specs such as time and amount	Too high monitoring costs for delivery	Suppliers' internal planning system fails
Manufacturability	Does the suppliers lay-out of facilities and equipment meet the VP requirements	Too high monitoring costs during production	Can the suppliers produce according to specifications

Table 1: Risk assessment grid - operationalising several indicators in risk classifications

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Uncertainties
Uncertainties are described from a managerial perspective and relate to a lack of information. The basic question concerning the four management functions therefore is: what kind of information do SMEs lack - does it relate to implementation, coordination, control or intelligence? And again linking to purchasing activities; in what stage do SMEs miss managerial information on what indicators (e.g. design, quality, cost, availability, and manufacturability). This combination of stages of purchasing activities and functions of management control leads to the following uncertainty assessment grid (Table 2).

Stages Mgmt. control	Outside-in	Inside	Inside-out
Implementation	Clarity on: - who needs to be consulted about the supplier base, - the issues which are of importance concerning the supplier base - the possible role of suppliers	Clarity on: - who, possibly suppliers as well, does what during the transition of VP into specifications - what issues are addressed by whom.	Clarity on: - who contacts the supplier and sources the goods, services - what issues are of importance during the sourcing.
Coordination	Clarity on: - who leads the outside-in operation including the role of purchasing and possibly supplier - the issues that need to addressed.	Clarity on: - who leads the internal transition from VP to specifications - the possible role of a supplier - what issues need to be addressed in that transition.	Clarity on: - who leads the actual sourcing process and possible feedback to involved people in the organization - and the issues that need to addressed.
Control	Clarity on: - a plan/way to act to match customers' VP to the organisations' offer to the customer including the role of purchasing and supplier - which evaluation criteria are of importance.	Clarity on - a plan/way to act to monitor the transition from VP to specifications including the role of purchasing and supplier - which issues need to be addresses during the monitoring	Clarity on: - a plan/way to act to monitor the sourcing process and the information exchange between supplier and organisation and internal stakeholders - and the issues that need to be addressed in monitoring
Intelligence	Knowledge on the relevant capabilities of suppliers	Knowledge on the relevant capabilities of involved employees	Knowledge on the operational capabilities of suppliers

Table 2: Uncertainty assessment grid - need for clarity on purchasing activities versus management control

Earlier in this paper we have posited that POPs are not merely a flow of activities in a POP but that internal and external factors can influence this flow of activities. These factors can influence the flow of activities in such a manner that they can cause a risk as described above. This has as a consequence that uncertainties can derive from those factors as well. Thus the assessment of uncertainties should incorporate the internal and external factors. It is assumed that these factors have a more general influence on the execution of purchasing activities. In this paper (Figure 4) we distinguish six internal and external factors which are directly related to a specific type of uncertainty or need for clarity.

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1. *Supply chain - asset specificity:* Clarity in the longer term on
the type and detail of specifications requested by customers
the type and detail of specifications delivered by suppliers
2. *Supply chain - stability:* Clarity in the longer term on
stability of the customer market
stability of the supplier market
3. *Macro environment:* Clarity in the longer term on
the stability of the political and economic environment
4. *SME characteristics - organic organisation:* Clarity in the longer term on
the support of the organization as a whole for executing the POP
5. *Characteristic of the owner - purchasing orientation:* Clarity in the longer term on
the positive attention of the owner for purchasing
6. *Business model:* Clarity in the longer term on
the viability of the business model

Figure 4: Uncertainties (with related needs for clarity) due to six external and internal factors

Combining the insights from Table 1 and 2, and Figure 4 leads to the assessment tool in the following Figure 5 which summarizes the factors used for assessing the purchasing CCPs within POPs.

Figure 5: Assessment tool for Purchasing CCPs - assessing levels of risk and uncertainties

6. Mixed research methodology
This research is currently being conducted via 11 case studies, a survey and a Delphi study. We use case studies to understand the mechanisms of how the processes and influencing factors can culminate to a certain level of risks and uncertainties. We conduct a survey to obtain a general picture with more data on the frequency and relative impact of risks and uncertainties. By using this mix of methodologies the nature and frequency of risks and uncertainties will be detected. We use the Delphi study for verification of our findings. This research hence uses a stepwise approach for the identification of purchasing CCPs and subsequent purchasing instruments.

7. Conclusions
1. The concept of Critical Control Points (CCPs) which focuses on risk and uncertainties can be used for management control of purchasing activities within SMEs. Management control can be divided in implementation, control, coordination, and intelligence.

2. These purchasing activities within SMEs can be classified into four Purchasing Oriented Patterns (POPs) depending on the level of organisational integration with the supplier and the added-value of the supplier's resource. These POPs are: coordinated purchasing, crossfunctional purchasing, serve the organisation purchasing, and negotiated purchasing.

3. Following supply chain thinking and customer-orientation these purchasing activities in the four POPs can also be related to three stages: outside-in, inside, inside-out.

4. The above conclusions are based on three assumptions: the holistic systems approach of purchasing within SMEs, the performance of a POP will improve with a risk-based approach, and the risk perceptions of the SME owner are essential.

5. Levels of risks are related to supply-related indicators of design, quality, cost, availability, and manufacturability when combined with possible negative outcomes of POPs: not achieving the value proposition, too high transaction costs in matching the value proposition to product/service specifications and procurement, or supplier failure.

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6. Levels of uncertainties are related to the functions of management control of implementation, coordination, control and intelligence when combined with three stages outside-in, inside or inside-out. Levels of uncertainties are also related to six internal and external factors.

7. Assessing the underlying factors of levels of risk and uncertainties leads to the identification of Critical control points (CCPs) in purchasing activities of individual POPs.

8. These purchasing CCPs can be used to establish purchasing instruments.

9. Further research uses a mixed-mode method and stepwise approach to determine purchasing CCPs within POPs, and consequently to establish purchasing instruments.

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The Nature of Embedded Purchasing Activities in SMEs: results from a Dutch multiple case study1

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Abstract

Aims: identify and explain purchasing-oriented patterns in Small and Medium Sized Enterprises (SMEs) via case study research.

Scope: Using a conceptual framework and empirical research this article proposes a series of purchasing-oriented patterns in SMEs. These patterns align activities to achieve the SMEs proposed value proposition towards customers and activities to purchase resources needed for realizing the value proposition.

Structure: This paper introduces the research topic. It discusses a conceptual framework and theory. It then continues with the methodology to collect and analyse case study data and describes empirical finding. It discusses these findings related to the framework and literature and ends with summarizing first conclusions.

Conclusion: The SMEs in the dataset use four types of purchasing-oriented patterns related to their customer value propositions These SMEs can strive for low transaction costs can but invest in extrinsic product attributes to realize their value proposition. Both the transaction cost theory and the resource based view help to explain the purchasing-oriented patterns. Further research is needed to strengthen and validate findings.

Key words
Small-Medium Sized Enterprises (SMEs); purchasing-oriented activities; case studies.

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1. Introduction

This research is part of an overall research programme called 'Valorisation of Purchasing by Small and Medium-sized Enterprises (SMEs). In this design-oriented research programme the need for support of purchasing activities executed by SMEs is researched and, according to the explored needs, purchasing management instruments will be developed. A first step in this overall research is reported here. This entails the identification of patterns in purchasing activities deployed by SMEs. After all, to be able to research need for support one first has to understand how purchasing activities in SMEs take place. Knowing how purchasing activities are executed enables the next step in the research programme; to identify the need for support of those purchasing activities.

Drivers to start the research programme are both societal and theoretical. The macro-economic significance of SMEs and the purchasing volume in the turnover of individual SMEs (Christensen, 2003; Ellegaard, 2006; Quayle, 2002) are both significant. It is estimated that purchased goods and services can account for 50-90% of company's costs of goods sold (Emiliani, 2010). Moreover, this topic is a rather scientific terra incognita. Little research has been done on purchasing and supply management (in short: *purchasing*) within SMEs (Christensen, 2003; Ellegaard, 2006; Quayle, 2002) and especially into patterns of purchasing activities. Although there is extensive literature on purchasing, this is based mostly on practices in large enterprises. Theory development and managerial instruments in the field of purchasing are, as a consequence, derived from large enterprise practices (Ellegaard, 2006). As SMEs have different organisational settings and are not miniature-versions of large enterprises, purchasing in SMEs differs from that in large enterprises (see Hagelaar *et al.*, 2014). We hence agree with Ellegaard (2006) and Morrissey & Knight (2011) that purchasing within SMEs has not been adequately studied to determine its latitude.

Purchasing research within SMEs must consider specific characteristics such as informal organisation, less specialization in business functions and less available resources. SME owners focus more on the overall operation and not on specific business functions. The approach of SME management to inwardbound purchasing activities is often holistic; its approach to outward-bound purchasing activities is characterized by a relative dependent position in supply chains (see Hagelaar *et al.*, 2014). From research it appeared that purchasing knowledge, skills and capacity in SMEs seem to be less developed (e.g. Morrissey & Pittaway, 2006). However, Pressey *et al.* (2009) concluded that a lack of formalized purchasing does *not* necessarily indicate bad purchasing skills. Ellegaard (2006, 2009) found that owners of SMEs are "effective" in their purchasing practices.

The basic idea underlying this research is that purchasing as a function, although present, need not be explicitly visible in the SMEs' structure (e.g. departments, specialized buyers) but is embedded in its business activities executed from the sales side to the supply side of SMEs. The aim of this paper is to identify patterns of purchasing activities executed by SMEs and capture these in so-called Purchasingoriented Patterns (POPs). We define a POP as an organized collection of activities which effectuate the value proposition to customers, the purchasing activities and the connection between these activities, all belonging to an identifiable pattern3. A POP is an abstraction that reflects a companies' series of activities from customer to supplier, from the orientation of the function purchasing; recognizing how purchasing is taken into account e.g. in the contacts with a customer, in internal activities and of course in activities with a supplier. A POP captures purchasing-oriented activities in its essence as they occur in reality. Developing such abstractions stimulates cross-sectional comparison between companies' purchasing activities. By means of identifying POPs it becomes clear how SMEs execute purchasing.

The paper discusses results from case study research in eleven Dutch SMEs. The research focuses on the purchasing processes embedded in the supply chain of a SME (c.f. Porter, 1985). The paper is structured as follows. We first discuss a conceptual framework and theory used in this research. We then continue with the methodology to collect and analyse data followed by the description of the empirical findings.

We contrast these findings to our framework and literature and end this paper with summarizing first conclusions.

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{3 This definition is in line with the definition of business patterns by Jackowski (2003, p. 4) as: *"a structured set of activities within the entity that are designed to produce a specific output in accordance with the business strategy".*}

2. Focussing on SME purchasing

To research purchasing activities in SMEs, we first acknowledge that purchasing is a boundaryspanning activity bridging needs of internal customers to services of accommodating suppliers. Thus, purchasing is the crucial activity connecting a company to its supply base (Knudsen, 2003; Kerkfeld and Hartman, 2012; Brewer, 2014) This boundary-spanning activity can be executed in different manners. According to maturity levels in purchasing, purchasing activities can vary from 'serve the company' types of activities (ordering goods) up to 'world class' purchasing in which intensive collaboration with suppliers leads to optimal performance of the overall company (see Van Weele, 2005). A level of purchasing maturity should fit, according to Rozemeijer and Van Weele (2007), with a governance structure with which a company manages the purchasing activities. Governance structure is described, from the perspective of company coherence, as a structure in which different parts of a company operate and are managed as one unit (Rozemeijer and Van Weele, 2007; in line with Williamson, 1985; see Section 3). The alignment between governance of purchasing activities and context of the company, determines the added value of purchasing for the company's competitive advantage (Rozemeijer and Van Weele, 2007). This reasoning implies a level of internal alliance between boundary-spanning functions like marketing and sales, and purchasing. This internal alliance is directed at market opportunities and customer value enhancement (see Piercy, 2008). This kind of integral view on companies is in line with organizational characteristics of SMEs. Specific for SMEs is the holistic, integral view on governing the company. Activities from different functions such as sales, R&D, logistics and purchasing are interwoven. A second characteristic is the dependence of SMEs from its direct chain environment both downstream as upstream (for a literature review see Hagelaar *et al.*,2014).

Following Piercy's (2008) statement on the internal alliance combined with the typical SME characteristics integral organisation and dependency downstream and upstream, purchasing activities seem to be embedded in a chain of activities which link sales and supply. Indeed, these internal crossfunctional alliances, directed at competitiveness and customer value, seem to link to the added value of purchasing which is reflected in the SME's needs as communicated towards suppliers. Thus, to understand how purchasing activities are executed, a chain perspective seems relevant. This opens the possibility for research to investigate contribution(s) of suppliers to a focal company's (FC) offering to their customer. Lambert and Cooper already stated that competitive advantage is gained on the chain level, not on the level of individual companies (Lambert and Cooper, 2000, 65) and as we would add, not on the level of stand-alone functional activities like e.g. marketing and sales.

Two major theoretical domains related to research into purchasing and supply chain management are selected as a basis for this research; Transaction Cost Theory (TCT) and Resource Based View (RBV). Brewer *et al.* (2014) concluded in their related study into purchasing, i.e. their research into the decision of outsourcing procurement, that these two theories can be seen as complementary. Defee *et al.* (2010) conclude that TCT and RBV account for 20% of theory-informed studies into supply chain management. The studies can be viewed as complementary as both discuss what activities should be undertaken within the boundaries of the company and what activities should be sourced from the supplier market. In general, TCT focusses on comparing costs of transacting in the market to costs made within a company (hierarchy) and RBV concentrates on comparing skills and abilities (i.e. resources) of companies in the market place (Brewer *et al.*, 2014). Attributes of resources are characterized by the extent in which they are valuable, rare, imitable and substitutable (Barney, 1991). From the perspective of identifying POPs both theories seem to be relevant. The TCT focusses on the costs which are brought by governance of the activities which result in the transaction; i.e. costs brought by collecting supportive information, negotiation, coordination, controll and monitoring within a company and in relation with a supplier.

Furthermore the RBV focusses on the resources of the focal company (FC) itself and the possible complementary resources of a supplier enabling the FC to design, produce and deliver goods and or services to their customer (see Brewer *et al.*, 2014).

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To study purchasing activities within SMEs this research is tailored to the specific characteristics of purchasing and of SMEs. From a theoretical perspective TCT and RBV are the pillars. This culminates in a research in which purchasing activities are assumed to be embedded in a chain of activities and can be explained on the basis of being part of this chain environment. Downstream by understanding the value proposition for the customer, and upstream by understanding how this value proposition is specified for suppliers and what the supplier contribution is to the company's value proposition.
In previous research work we introduced an overall framework to identify POPs and to explain the POPs by including influencing factors from the companies' context. Such context factors are the ones mentioned above; SME characteristics (a.o. informal organisation, less specialization in business functions, less available resources), characteristics of SME owners, chain characteristics (dependency, uncertainty, and asset specificity) and the value proposition (for more details see Hagelaar *et al.*, 2014 or Appendix I).

3. Theory and framework
Two domains of theory are identified to gain insight into POPs from a chain perspective: TCT and RBV (see Section 2; for an elaboration on the theoretical framework see Hagelaar *et al.*, 2014). Governance addresses the coordination of activities within a company and with their suppliers and customers. Transaction cost theory (TCT) prominently represents this domain whereas the Resource based view (RBV) focuses on the added value of resources for competitive advantage. Both theoretical domains render insight in the level of integration of activities within a company and externally with customers and suppliers. Both domains are combined to build a framework to identify patterns in the purchasingoriented activities of SMEs.

The core of Transaction Cost Theory (TCT) is the relationship between the *degree of alignment or vertical integration* and the related *transaction costs*. Transaction costs are the supportive information, negotiation and monitoring costs necessary for conducting transactions between companies. The degree of governance varies in a continuum from several independent companies operating in a spot-market versus one fully vertically integrated company. With *governance* in this context (Williamson, 1985) we mean ensuring consistency and transparency in management and oversight of an organization, to ensure an efficient and effective achievement of corporate objectives. Transaction cost will vary with the type of governance. A spot market type of governance has less transaction costs compared to levels of integration between a company and its supplier. In literature asset specificity emerges as the predominant influencing factor of the choice of a governance structure. (Williamson, 1985; for an adoption to purchasing see Adams, 2005; Hoffmann *et al.*, 2011; Noordewier, ibid; Brewer *et al.*, 2014).

Because of the nature of a POP in which customer and supplier are linked via aligned activities, we will choose two specific theories within the field of RBV, i.e. *Strategic factor market theory* of Barney (Barney 2012, Barney, 2001; Barney, 1986) and his *Attributes of resources approach* (Barney, 1991). Both Resource Based View (RBV) theories discuss the added value of purchasing and supply chain management for competitive advantage of companies. The basic theoretical reasoning is that knowing how product market competition is developing is not enough to understand sources of competitive advantage. One should also understand the suppliers market and the competition in the suppliers market to anticipate competitive advantages in the downstream oriented product market. In this reasoning, the purchase of certain resources is done on the basis of the expectation that these specific resources will gain added value in the product market after the company has transformed these resources into specific products or services. In this reasoning sales/marketing i.e. the downstream side of a company is directly related to the purchasing, upstream side of a company. This chain-oriented view on competitive advantage by highlighting the aligned relation between upstream and downstream activities of a company should lead to competitive advantage. This entails that the alignment leads to value creation which is rare amongst competitors and possibly costly to imitate. The question becomes then; to what extent do the attributes of the resources and of the process of how the resources are used (relating downstream to upstream) exhibit the competitive attributes mentioned.

Competitive advantage can be gained in different domains. We characterized these domains through the different value propositions as demanded by and offered to customers. In this paper we define value proposition (Treacy & Wiersema, 1996) as the promise the FC makes to realize a (particular set

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of) value(s) for its end customer(s). Often these are price, quality, performance, collection, convenience, etc. Treacy & Wiersema (ibid) distinguished three exemplars: (1) product leadership with a focus on the ability to make superior products, (2) operational excellence with an overall focus on lowest overall total cost, and (3) customer intimacy with a focus is on offering customers a total solution. These three exemplars furthermore enable a distinction for the FC between the core product and the extended or augmented product offering as e.g. used by Hoekstra *et al* (1999). Recent thinking (MacBride, 2013) furthermore suggest a relationship between agile and lean supply chains and the value proposition. The identification of POPs is based on the above presented theories; TCT, RBV and the Treacy and Wiersma threefold categorization of customers' value proposition. We assume that a value proposition is realized within the context of a company, derived from TCT and RBV, which will lead to a specific pattern of purchasing-oriented activities. In this pattern companies' internal parties and suppliers are related in a specific manner to execute the activities We acknowledge that POPs derive from companies' context factors following Rozemeijer and Van Weele (2007) who state that the context of a company can explain why a certain governance structure is deployed (see Section 2).

The combination of context factors are derived from TCT and RBV and used in the following framework. This framework4 assesses POPs theoretically and distinguishes the following factors:
- TCT's induced level of asset specificity; this ranges from low (in which there is a low need of specialized investments by the FC, the supplier or both in the purchasing-oriented activities to deliver the value proposition)), to high (in which there is a high need of specialized investments by the FC, the supplier or both to deliver the value proposition).
- RBV's induced level of resource position of the FC vis-à-vis their supplier, to deliver the value proposition to their customer; this ranges from weak (in which the FC needs precious (i.e. valuable, rare, non-imitable and non-substitutable) resources from a supplier to deliver the value proposition to their customer) to strong (in which the FC needs commercial available (i.e. non-valuable, common, imitable and substitutable) resources from their supplier to deliver the value proposition to their customer).

The combinations of *level of asset specificity* and the *level of resource position* renders a POP which enables the effectuation of a certain value proposition. Such a combination of levels enables (1) the identification of general characteristics of POPs and relate them to a value proposition (2) elaboration on the governance needed to reach the attached value proposition (3) the indication which party contributes what to reaching the value proposition. The matrix labels reflect the nature of POPs. Figure 1 presents the combination of the dimensions and defines the characteristics of the POPs. This reasoning leads to four POPs within the framework (Figure 1):

1. *Cross functional purchasing:* is characterized by a weak resource position of the FC (expecting a supplier to deliver precious resources) and a high level of asset specificity (expecting specific investments from supplier and FC) to reach a value proposition which is customer specific. To effectuate this combination of precious resources and high asset specificity a high level of integration of FCs' internal activities (purchasing activities are interwoven with other functions such as marketing, sales, development, production) and between the FC and the supplier is needed.

{4} This framework is derived and adapted from Brewer *et al.* (2014) and McIvor (2009).}

2. *Coordinated purchasing:* is characterized by a strong resource position of the FC (expecting a supplier to deliver commercial available resources) and a high level of asset specificity (expecting specific investments from the FC) to reach the value proposition of the customer. The specific investment of the FC implies a high level of integration of companies' internal activities. Between FC and supplier a level of integration is needed in the design stage of the product/service to connect the commercial available product/service to the specific investment by the FC.

3. *Serve the value proposition:* is characterized by a strong resource position of the FC (expecting a supplier to deliver commercial available resources) and a low level of asset specificity (not expecting specific investments from supplier) to reach the desired value proposition. A low level of integration of the activities of the FC and between the FC and supplier is needed.

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4. *Negotiating purchasing*: is characterized by a weak resource position of the FC (expecting a supplier to deliver precious resources compared to the value proposition) and a low level of asset specificity (not expecting specific investments from supplier). The combination of precious resources fromsuppliers and the low level of asset specificity (either from supplier or from FC) presupposes a value proposition including a product/service which is commercially available but with some small changes which make it possible to reach the value proposition.
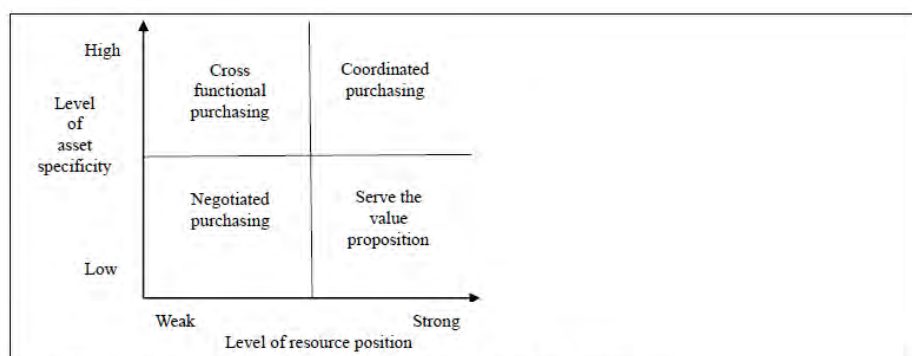
Figure 1: Framework of Purchasing-Oriented Patterns (POPs) as derived from theory

The Section 5 'Empirical findings' will discuss how these theoretical POPs are elaborated in the reality of SMEs and how these POPs are embedded in the supply chain of these SMEs; starting from the downstream customer's value proposition to the upstream supplier's contribution to that value proposition. The detailed POPs embedded in the supply chain will be called extended POP. But first we will discuss the methodology used in this research.

4. The case study methodology
Approach
When trying to distinguish and classify purchasing-oriented activities into POPs, research could use extant classifications by e.g. Van Weele (1998, 2010) or older classifications by Aljian (1958) and England (1970) as both cited in Wind (1970), or by Robinson *et al.*, (1967). However as e.g. argued in Hagelaar *et al.* (2014) and Torres & Julien (2005) and as originally stated by Cohn & Lindberg (1972): *small companies are not mini-big companies*. Hence their procurement activities will also differ (see also Ramsay, 2007). This is even more so due to the (extremely) wide variety in small companies (e.g. Morrissey & Knight, 2011).

The small extant body of literature on purchasing activities within small companies, e.g. Adams (2004, 2011), Ellegaard (2009), James *et al.* (2011, 2012), Morrissey & Knight (2011), Paik (2009) do not classify purchasing-oriented patterns5. This research hence cannot benefit from a priori guidance from extant research. The team therefore developed another analysis methodology and combined two basic approaches:
- A *deductive theory approach* in which the theoretically developed POPs are used to classify the cases.
- An *inductive grounded-theory approach* (cf Miles & Snow) in which the purchasing data is inductively analysed to explore (1) the identified POPs on how the internal and external purchasing activities are governed and (2) the relationship between the POPs and the value proposition.
The POP are identified via combining resource position and asset specificity. Management of the activities within a POP executed by different (internal, external) parties, is of importance because it glues these activities together. After all, following Malone and Crownston (1994) a manager's key tasks are: (1) align activities within organisations and between organisations; (2) ensure that this alignment is executed with a certain objective. Management is represented by coordination mechanisms as e.g. defined by Mintzberg. Meijaard *et al.* (2005) found these coordination mechanisms (direct supervision, standardisation, knowledge and mutual adjustment) applicable to SMEs.

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Case selection
This sub-section discusses the research design in data collection and analysis. The overarching aim of our three-year research programme on purchasing within SMEs is to develop specific purchasing instruments. To bridge the gap from the current state of limited knowledge and to develop these more applicable instruments we need to collect in-depth (rich) data from multiple case studies and data which facilitate more general statements from a quantitative survey and a Delphi study. This article focuses on results from case study research.
The company cases are selected on the basis of their value proposition. This criterion was deployed following the reasoning that how purchasing activities are organized is formed by how a company wants to realize its value proposition. When a value proposition can be considered as a goal/strategy of a company it can be assumed that a governance of purchasing activities will support that value proposition. This reasoning is in line with the interwoven character of functional activities within a SME as explained earlier. From this we assume a business driven manner of purchasing within SMEs (c.f. Rietveld, 2009). We selected 11 companies according to the value propositions: operational excellence, product leadership and customer intimacy (Treacy & Wiersema, 1995).

The interview questions were focussed on purchasing activities related to one specific key commodity.Such key commodities are those commodities which are most important in enabling the SME to create the value proposition to it's customers.

Data gathering
On the basis of the conceptual framework as described in Section 3, this paper describes case studies to explore the purchasing activities, and focusses on (1) recognize POPs in companies' activities, to underpin and strengthen their validity, and (2) analyse the internal and external governance, of the relation between POPs and their environment. (Information on the focal companies in the case studies can be found in Appendix II). The cases were investigated via multiple interviews. The thread of the interview was mapping the activities from the customer end of the FC up to contacts with suppliers of key commodities. When defining the process flow via process mapping the team used the following three step approach as e.g. described in Jacka *et al.* (2011).
1. Process identification: attain a good understanding of the steps in a process.
2. Information gathering: identify objectives, risks, and key controls in a process.
3. Interviewing and mapping: understand the position of individuals and design maps.
Based on Jacka *et al.* (2011) and Eisenhardt (1989) Figure 2 shows the five steps for collecting and analysing the data in more detail. *(Step 5 will be discussed in parallel and future papers).*

{5} But this research did reveal variables affecting the purchasing process as evaluated in Hagelaar *et al.* (2014)}

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1. Drafting a flow chart of primary activities within FC.
a. Goal: A flow chart per case (FC) is made of the activities from customer oriented initiation to resource requisition, and who were
involved from developing and/or selling the product to purchasing resources.
b. Method: individual case studies focussing on strategic/critical/main product offering & the upstream supply base.
2. Analyse the flow charts with the primary activities within FC
a. Goal: (1) to identify steps in the overall process flow between the supplier (base) and the customer(s), and (2) to (classify) the
coordination mechanism between the different steps. The coordination between different steps is typified by means of the coordination
mechanism as defined by Mintzberg
b. Method: individual case studies focussing on strategic/critical/main product offering & the upstream supply base.
3. Identifying natural configurations of the purchasing-oriented activities embedded in company's activities
a. Goal: to identify for each FC the configuration of the steps and the coordination between the steps.
b. Method: individual case studies.
4. Identifying POPs
a. Goal: to identify ideal-typical patterns (POPs) in the overall process/activity flows between supplier(s) customer(s). This is analysed by
using three criteria: (1) analyse similarities and differences between the observed natural configurations both in and between the case
studies, (2) internal logic of the sequence of activities (3) the frequency of specific patterns observed.
b. Methods: cross case analysis, analysis survey and cross methods comparisons
5. Validity testing of POPs (future steps)
a. Goal: to establish POPs as the basis for further research. Two criteria will be used in our next research step: (1) confirmation of the
configuration and internal logic of POPs (2) the level in which POPs occur in SMEs reality.
b. Method: Delphi study and survey.

Figure 2: The steps used for collecting and analysing case data

5. Empirical findings
Basic findings
Deductive and inductive analysis of FCs with the intention to derive POPs reveals the following:
1. From the analysis it appears that the FCs effectuate their value proposition in a targeted manner with as low as possible transaction costs. The activities through which the value proposition is realized encompass activities towards customer(s), the internal purchasing-oriented activities and the suppliers oriented activities. The value proposition seems to function as an aligning principle for the activities happening between the customer side and the supplier side of the company. In that sense one could state that purchasing is business driven.

2. We identified 3 steps in the overall business flow of activities: (1) outside-in, (2) inside, (3) insideout. Each step centres around a specific transformation: (1) *outside-in* centres around the transformation of the added value proposition for the customer into requirements, (2) *inside* centres around the transformation of requirements into specifications of resources, (3) *inside-out* centres around the transformation of specifications to requisition of the resources. Going from step 1 to step 2 the focus is changes from overall performance directed at the customer to the purchasing function.

3. In line with the two theoretical dimensions of POPs i.e. level of value chain integration and level of specificity of supplier's added value, we conclude that (1) the FCs realize their value proposition stand-alone or in cooperation with a supplier and (2) FCs require their suppliers to supply offerings on regular delivery conditions (price, time, transport) and regular products, or require special offers.

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4. Concluding from the cases, we witness a stability in the supplier base of SMEs.

Purchasing-oriented Patterns
Here we present the POPs with governance details and environment as derived from the case studies.

POP 1 Serve the value proposition
Table 1 below shows the variables as found in this POP. *(Example: IT turn-key design company).*

POP characteristics	FC6 ICT turn-key designer
VP	ICT Design and assembly of offices on a high quality level at a reasonable price
party added value	FC: designs and assembles
Added value supplier	Standard ICT software and hardware
Internal integration	Low: ICT designers design on the basis of the regular offerings of suppliers
Internal coordination	Standardization: checklist standard soft- and hardware
External integration	Low: general market conditions for ordering commodities
External coordination	Standardization: checklist on the website of the supplier
VP in terms BM	Operational excellence: standardization in commodities, low transaction costs internally and externally

Table 1: Extended POP 1- Serve the value proposition

Standardization in products and processes characterizes this POP in its governance and in its environment. In essence the FC delivers to their customers the commodities that they order from the supplier. The FC's adding value is assembling the separate parts into a functional ICT design for their customers. This leads to standardized, checklist-ordering which is in line with the intended value proposition. It results in the following POP (Figure 3).
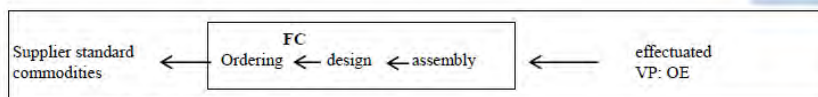
Figure 3: Extended POP 1- Serve the value proposition

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POP 2 Negotiated purchasing
Table 2 below shows the variables as found in this POP. *(Example: horse shoe manufacturer).*

POP characteristics	FC: horse shoes manufacturer
VP	Standard horse shoes assortment at reasonable prices in a competitive environment
party added value	FC: manufactures and delivers to hypo sector
Added value supplier	Standard quality iron, reliable delivery
Internal integration	Higher: internal exchange between marketing, production, procurement to be able to order right amount
Internal coordination	Mutual adjustment
External integration	Lower: agreement on price for a longer time
External coordination	Mutual adjustment on the basis of negotiation; standardization
VP in terms BM	Operational excellence plus: price is negotiated for (periodic) reduction and stability; low transaction costs because of ordering within contour of agreement

Table 2: Extended POP 2 - Negotiated purchasing

Standardization is also an important driver for the value proposition in this pattern. However negotiation gives an extra value based on delivery conditions. In this example it is price but it can also be negotiating regular product characteristics. In the latter case the effectuated VP will be on product leadership. The deviation from the regular delivery conditions and/or product characteristics gives this pattern its competitive advantage. It results in the following POP (Figure 4).
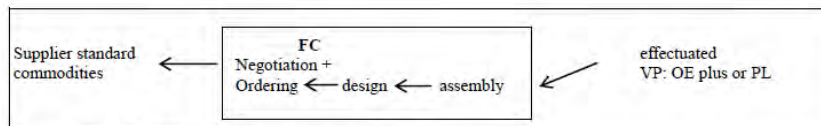
Figure 4: Extended POP 2 - Negotiated purchasing

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POP 3 Coordinated purchasing
Table 3 below shows the variables as found in this POP. *(Example: innovative IT company).*

POP characteristics	FC: IT innovation driven company
VP	Developing innovative software made applicable for practical usage at a reasonable price
party added value	FC + supplier: in cooperation developing the overall product
Added value supplier	Delivering applicable solutions on the basis of regular soft- and hardware, to enable the companies'innovative software function in practice
Internal integration	High: internal exchange between marketing, production, procurement to be able to develop software and relate to the supplier
Internal coordination	Professional knowledge exchange
External integration	High: external exchange matching regular soft- and hardware to innovative FC's software
External coordination	Professional knowledge exchange
VP in terms BM	Product leadership: joint development of innovative IT equipment

Table 3: POP 3 - Coordinated purchasing

The added value is jointly delivered by both FC and supplier. The product is based on standard components from the supplier but these must be matched with the FC's specific input into the design of the overall product. This specific contribution of the FC implies that knowledge and skills of the supplier are needed to integrate the suppliers' components to the FC components of the product. There will be transaction costs in this matching process and possibly in formulating specific delivery conditions. Additional transaction costs can occur when parties formulate an agreement for their cooperation. The customer value proposition will be Product Leadership when the matching process is dominant. Should there be other specific requirements for the delivery conditions (price, transport), the customer value proposition will be Product Leadership Excellence (PLE). It results in the following POP (Figure 5).
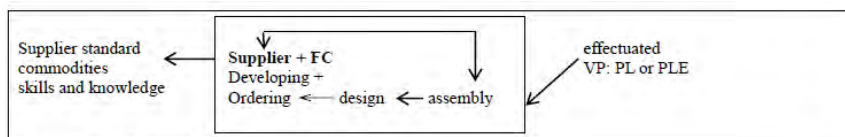
Figure 5: Extended POP 3 – Coordinated purchasing

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POP 4 Cross functional purchasing
Table 4 below shows the variables as found in this POP. *(Example: trailer designer and manufacturer).*

POP characteristics	FC: designer and manufacturer of trailers
VP	Designing and manufacturing trailers tailor made for specific requirements of customers
party added value	FC + supplier: in cooperation developing the overall product
Added value supplier	Designing and manufacturing axles which align to the specific trailer wishes of the customer
Internal integration	High: internal exchange between marketing, production, procurement to be able to develop software and relate to the supplier
Internal coordination	Professional knowledge exchange
External integration	High: external exchange matching regular soft- and hardware to specifically customized trailer
External coordination	Professional knowledge exchange
VP in terms BM	CI: tailor made trailer for specific customers' requirements

Table 4: POP 4 - Cross functional purchasing

In cooperation a FC and a supplier jointly design a product which the FC brings to the market. The product is based on knowledge and skills of each partner and their joint product development trajectory. Transaction costs occur in exchange of knowledge and skills in the course of the development trajectory. The development may lead to joint investments. Specific delivery conditions can be made for tailoring the supply. Extra transaction costs can occur in establishing the relationship between FC and supplier.

The actual customer value proposition is Customer Intimacy when the activities of the design process are dominant. Should there be specific requirements for the delivery conditions (price and transport) the customer value proposition can be Customer Intimacy Excellence (CIE). It results in the following
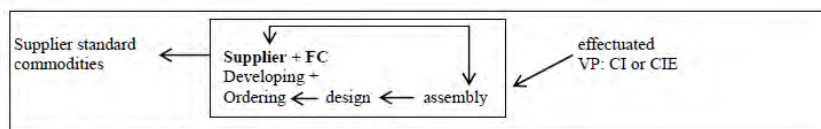
Figure 6: Extended POP 4 – cross functional purchasing

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6. Discussion

Transaction Cost and Resource Based View

At the basis of the POP lies the combination of TCT and RBV. TCT in the sense of the governance, level of integration within the chain and the added value of resources both in the sense of the intrinsic and extrinsic product attributes. This combination seems to capture the nucleus of the way purchasing activities are organized to reach the value proposition. This gives insight in how SMEs organize their purchasing activities in line with their value proposition.

Business driven purchasing

Although in literature Business driven purchasing as a concept is presented as a concept for the future, on the basis of these case study results we can conclude that it already is in action. This is in line with the characteristics of SMEs being companies with interwoven functional activities. This has as consequence that purchasing part of the detailed POP in its environment can only be understood and well explained by having the eye on the extended POP.

Supplier influence

In these four basic patterns we see that suppliers to a varying degree help to realize the value proposition for the final customer. In line with managing the customer decoupling points within a company's supply chain (cf. Romme *et al.*, 1992) this paper proposes a decoupling point indicating the impact of the suppliers in the chain. We would (somewhat boldly) define6 this as: *the extent to which a supplier impacts (influences, contributes to) the realisation of a value proposition by the FC for its end customers.* This supplier contribution will vary between a *high impact* where the specialised supplier and the FC jointly conduct the product offering to end customers, and a *low impact* where supplier conducts the product to the end customer and uses a commodity supplier. One explanation for the structure of these four types of demand chains can be the FC's external environment (cf see e.g. Welker, Van der Vaart, Van Donk, 2007). A possible environmental variable could be the dependency on a sole supplier. This dependency can result in an additional purchasing activity in order to safeguard the Operational Excellence value proposition, for instance arranging a long term contract. Another way in which the environmental variables can affect the FC appears from the ICT- turnkey company. Its customers appreciate the value proposition i.e. designing the ICT for their organisations based on standard components. These standard components enable this FC to realize a value proposition. The IT designers of this FC use a standard checklist (components available with several suppliers) to design an IT offering to customers. In daily practice the FC then orders necessary components with one of the two of its regular suppliers. These suppliers will deliver the components based on standard conditions. The FC has no explicit agreement with these suppliers the supplier market has sufficient other potential suppliers for these standard components and as the suppliers' terms of delivery have been incorporated in the FC's terms of delivery towards its customers. In this case the environment enables a streamlined operation for the FC without further transaction costs. Worded differently, the FC and his supplier (upstream) and customer (downstream) form a seamless chain. Within the dataset only this ITcompany exhibits such a seamless chain. The other FCs do not show such a seamless chain with regard to their purchasing-related activities. In such instances the FC for example arranges a long-term contract or the FC organizes transport from the supplier. We interpret these additional activities (see Hoekstra *et al.*, 1999) as necessary for realizing the value proposition to customers. Considering the FC's competitive environment and its scarcity in resources (Hagelaar *et al.*, 2014) we suggest that SMEs will try to avoid such 'extra activities' because of the extra transaction costs they entail. Transaction costs we found in the FC include extra man hours, specialist know-how or extra supporting equipment or control systems.

{6) In line with Romme *et al.* (1992) we would phrase this as: *Supplier Influence}*

Low transaction costs

In line with the simple organisation of Mintzberg (1971) the FCs in our dataset keep their technostructure and support staff as small as possible. In the FCs show some activities from these business functions (ordering products and aligning ordering with production planning within more or less explicit company policies). However these activities seem interwoven with the activities within the strategic apex and sometimes between the apex and middle management and operational core. The dataset shows that all activities are preferably executed within the operational core. In this manner it becomes understandable how the FCs 'cope with purchasing' without labelling certain

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activities as purchasing activities. The FCs integrate purchasing directly in their other primary activities (Porter, 1985). This is in line with our demand chain thinking from the value proposition. The purchasing activities appear to be aligned within the value adding primary activities. Hence it becomes clear that with everything an SME is said to *lack* (from a negative perspective) the FCs in our dataset do achieve certain results.

We could interpret the fact that FCs have stable suppliers (either deliberately planned or emerged over the years) for the FC results in stability at the upstream side of the FCs. This could explain the low priority SMEs in general have for the purchasing processes. The supply side has lower levels of risks and uncertainties compared to the downstream customer side. The FC sees itself in a dependant position towards the customer side in relation to financial turnover and business continuity of his company. The previous two paragraphs discuss ways to keep the span-of-control as low as possible as each addition would cause higher transaction costs and will only occur when this brings clear benefits. Having regular suppliers (emerged or planned) can be interpreted as realizing stability at the supply side of the FC. Restating the core of the transaction cost theory – when the

environment cause uncertainties or causes the need for asset specificity (investments in a specific supplier relationship), only then the FC will extend the span of control. The above observations can hence be explained from the theory of the transaction costs, including stabilizing the supplier base for reducing uncertainties with regards to the supply of critical goods and services needed for the customer value proposition. A simple solution here is selecting and maintaining a relationship with good suppliers without formal agreements.

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7. Conclusions

This empirical paper uses a conceptual model and framework as developed in the conceptual paper of Hagelaar *et al.* (2014).

1. This paper finds that purchasing-oriented patterns (POPs) within the FCs can be related to the customer value proposition of the FC. The paper distinguishes for types of POPs for critical purchasing activities.

2. The supplier influence downstream is comparable to the customer influence upstream.

3. Findings suggest that FCs can strive for low transaction cost but can also invest in extrinsic product attributes to realize their value proposition.

4. Findings suggest that POPs of the FC can be explained by both the Resource Based View and the Transaction Cost Theory. Findings suggest that a combination of deductive and inductive approach works in deriving purchasing patterns.

5. More research is needed to strengthen and validate the findings.

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Appendix 1 – *Conceptual framework from Hagelaar et al. (2014)*

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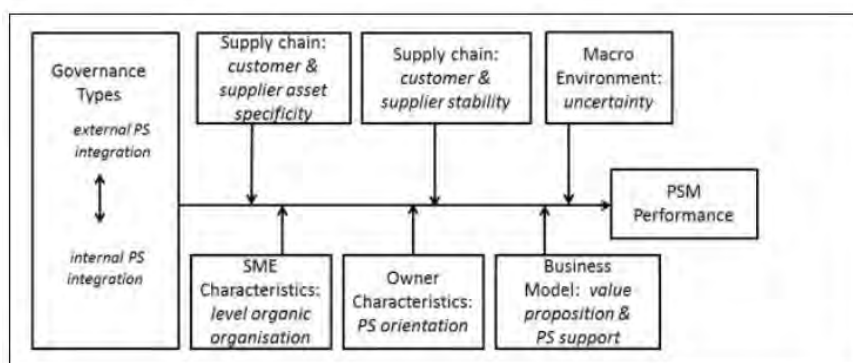
Social Acceptance of Sustainable Issues
A Discourse Analysis of how people speak about bio-digestion

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Abstract. For successful energy transitions, social acceptance of innovative technologies is essential. In order to determine the contributing factors, the acceptance of bio-digestion in The Netherlands was analyzed. A discourse analysis of 200 newspaper articles was conducted to answer the question: how do different parties speak about bio-digestion? Discourse analysis is suitable for making underlying concerns and dilemmas of people more explicit. Thus, one can be more in line with people's sensitivities in communication and policy, both of which play a crucial role in facilitating transition. The results show that there is little support for bio-digesters in residential areas. The relation between municipalities and residents is poor and asymmetric. The municipalities emphasize their role as experts, thus reinforcing incomprehension. Furthermore, they do not take responsibility and avoid confrontations, contradicting research on the significance of discussions when dealing with innovations (Leeuwis & Aarts, 2011).

1 Introduction

Social acceptance of new technologies is of great importance for a successful energy transition. Increasingly, the production of renewable forms of energy takes place in or close to residential areas. This can lead to tensions if the locals do not wish to have the new technology in their 'backyard' (Pol e.a., 2006; Siderius e.a., 1995).

An example of local energy production is a form of bio-digestion. There is an increasingly amount of different types of bio-digesters and these are growingly being placed in the vicinity of villages and residential areas. Practice shows that the successful placement of a bio-digester largely depends on public support. But what exact factors determine public support for introducing a bio-digester? Based on a discourse analysis of 200 newspaper articles relating to two different cases, the current study examined social acceptance around bio-digestion in The Netherlands and where the opportunities lie to create support and enhance social acceptance.

1.1.   A discursive psychological perspective

The analysis of the social acceptance was conducted for two contrasting cases in the North of The Netherlands: Coevorden and Foxhol. The method of the discourse analysis particularly emphasizes the way people do things with language. The approach is that of the discursive psychology, as described by Potter (1996). He argues that people always (and usually unconsciously) have a goal in conversations. In the most elementary sense, this interactional goal is to convince others of the "self-explanatoriness" of a particular reality. Rather than focussing primarily on the contents of the interaction and to take these as a reflection of people's inner states or feelings, discursive psychology focuses on what people actually do in the interaction.

Thus, discursive psychology lends itself to mapping of contextual aspects and relationships, unveiling underlying concerns and dilemmas of various stakeholders and visualizing different types of arguments. By doing so, you can become more in line with people's sensitivities in communication and policy, which is particularly relevant when it comes to social acceptance and the creation of support.

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The study aims at answering the following overarching research question:

How did different parties (residents, municipalities, operators) spoke about bio-digestion in Coevorden and Foxhol, in the period between 2007 and April 2014?

This results in three sub-questions:

- Which dominant patterns can we identify in the conversations in the two contrasting cases of Coevorden and Foxhol?

- What are the effects of these patterns?

- What role can be played by local governments to enhance social support for renewable energy forms?

2 Methodology

The present study includes both quantitative and qualitative methods for data collection and analysis. It was conducted in three steps: (1) the quantitative data selection, (2) the longitudinal media analysis and (3) the discursive analysis. Below we will briefly describe each step.

2.1 Establishing the initial dataset: quantitative data selection

As primary source for our study, we gathered all online articles, which were published on the two selected cases between 2007 and 2014. This resulted in a dataset of more than 2000 articles. For this phase, we based our selection criteria on a number of quantitative indicators.

Our main hypothesis is that there are certain periods of intensive public debate on controversial societal issues, during which the dominant actors and arguments can actually be found in the public debate (Vasterman, 2005, p. 513). Based on this assumption, we then conducted a first selection of the 2000 articles, during the course of which we could establish the most important moments for each case, about 1100 articles.

2.2 Combined selection step

Although the initial selection step significantly reduced the number of articles, there were still too many remaining articles to allow a (discursive) analysis. We thus performed a second selection, based on the following quantitative and qualitative indicators:

- The scope of the media;

- The degree of subjectivity of the displayed positions

- The amount of representation of broad social tenors;

- The extent of the discussions originated by the articles

Using these criteria we reduced the dataset to 200 articles, about 100 articles per case.

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2.3 Longitudinal media analysis

The longitudinal media analysis provides an insight into the development of the two cases, the most influential actors and their positions and arguments in the debate. Based on the articles selected in step one, we described for all cases 1) the key development(s) 2) dominant actors, 3) the positions they adopt in the debate and 4) the arguments they use to underpin their positions.

Describing the cases in such a systematic manner allows us to make interconnections between the various parts of the analysis (development, actors and arguments) for the two cases studied.

2.4 Discursive analysis

For each case, we used discursive analysis to identify and describe dominant patterns. Rather than to look primarily at the contents of the interaction and to take these as a reflection of people's inner states or feelings, discursive psychology focuses on what people do in the interaction. We thus assume that statements of those who are involved in a conversation are reactions in the course of an ongoing conversation. The meaning of statements made by residents and governments about bio-digesters are not to be taken as self-evident. Attention is paid to the way in which actors make sense when they communicate and to the actions they aim to reach with their statements. So what are the function(s) of the various statements on bio-digestion? It is important to approach the statements in their context.

In the description of discursive analysis, the dominant patterns are the starting point. We identify and describe the patterns, in order to show how people constructs them by the use of language. We also examine the effect that the patterns evoke. The meaning of a given statement depends on earlier statements and is attributed to it by the recipients. We see language in our analysis as a means by which actors jointly realize social activities, given that in the interaction with others, they create certain social realities (Edwards & Potter, 2001), in our case on bio-digestion. Through a discourse analysis we thus get a better understanding of what "effect" (consciously or unconsciously) is achieved by statements from those who are involved in the debate.

3 Analysis
3.1. Brief description of the cases

3.1.1. Coevorden
Several bio-digesters are situated in Coevorden. The media wrote the most about the bio-digesters at the Alte Picardiekanaal, which was launched in 2008 and aimed at delivering green electricity to 5,000 households. From the beginning on, there was a strong public resistance against the bio-digester. Most articles in the media were published in January 2012. At that time, residents of the neighborhood had to evacuated due to stench. In July 2012 owner Henry Kimman sold the installation. The much-discussed bio-digester was later restarted.

3.1.2.Foxhol
The debate in Foxhol is about one bio-digester that NPG Energy wants to build at the Avebe terrain. It is intended to be one of the largest bio-digesters of Europe. NPG Energy belongs to the duo Hartlief and Stel. On June 20 2013 the media wrote for the first time about plans for this mega bio-digester in the Avebe area. Immediately after, the inhabitants of Foxhol started a mass protest. An action committee was established to organize regular protests. In the end, the bio-digester will not be installed, as the license has not been provided.

The point of view of the locals is similar for both cases: 'we don't want a bio-digester in the neighborhood'. Their main arguments are noise pollution, stench and several risks to health and safety.

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3.2. Discursive analysis on the Coevorden bio-digester

In the debate about bio-digestion in Coevorden conducted in the media between 2007 and 2014, the different stakeholders took up strongly diverging positions. In the reviewed articles, the debate between the opponents of the bio-digesters (especially the surrounding residents) and the Coevorden municipality as the main defender of the bio-digester becomes rather visible. Similarly, the operators of the bio-digesters are often quoted.
In the following section we will describe the central patterns reflected in this case and will illustrate them with a few exemplary excerpts.

3.2.1 Surrounding residents: 'We do not want a bio-digester in the neighborhood'
The first identified pattern is related to the position of the surrounding residents: 'We do not want a bio-digester in the neighborhood', a statement that indicates their strong opposition. This becomes apparent in the majority of their testimonials. Through different ways in their language use, they make it clear that the bio-digester is not wanted:

> *"In the current situation the residents can never again sell their houses", states Tim Israel, the chairman of BOEC (Burgerbelang Omwonenden Europark Coevorden). (...) "Everyone knows how many inconveniences and problems the Klinkenvlier bio-digester in Coevorden has already caused. The new locations in the Europark are 100 times bigger and even closer to the residential areas."*
> *(Dagblad van het Noorden, 28th of September 2012)*

> "Op de nu ingeslagen weg kunnen bewoners hun huis nooit meer verkopen", zegt voorzitter Tim Israel van BOEC (Burgerbelang Omwonenden Europark Coevorden). (...) "Iedereen weet hoeveel overlast en problemen de biovergister bij Klinkenvlier in Coevorden al geeft. De nieuwe installaties op het Europark zijn 100 keer zo groot en staan dichter bij de huizen."
> *(Dagblad van het Noorden, 28 september 2012)*

In this excerpt, an argument against the installation of the bio-gas factory is clearly put forward: residents can "never again sell their houses" under the current situation. They can never again, instead of, for example, cannot, sell their houses. The extreme case formulation "never again" leads to extra conviction and its impact is stronger. In addition, the "residents" are specifically mentioned, indicating that this position is generalizable to all residents. It does, hence, not concern only single residents affiliated to the Burgerbelang Omwonenden Europark Coevorden (BOEC).

Further, many other expressions of dislike were used by the residents in order to express their resistance, as for example the word 'violation'. A particular use of contrasts was also noted, such as in 'a lovely villa district' as opposed to 'the stench problem'. Their concerns were thus heightened through the use of such contrasts.

Another way of showing one's opposition to the bio-digester was achieved by sketching personal experiences. The following excerpt exemplifies this:

> *A group of residents is sitting in the house of the couple Inge (67) and Jan Verbakel (68) to speak about the problems. (...) Gert Schreur (52): "A rural breeze is not bad, but this stench is unbearable. Winand Rombouts (68) confirms this. The couple Isabella (71) and Siem Schouten (71), who live close to the bio-digester, are often bothered by the stench. "We then must close the ventilation grid in the bedroom, because otherwise we cannot sleep", she reports.*
> *(Dagblad van het Noorden, 31st of January 2012)*

> In het huis van het echtpaar Inge (67) en Jan Verbakel (68) zit een groep bewoners over de problemen te praten. (...) Gert Schreur (52): "Een boerenlucht is niet erg, maar deze stank is ondraaglijk. Winand Rombouts (68) bevestigt dat. Het echtpaar Isabella (71) en Siem Schouten (71), dat dichterbij de vergister woont, heeft vaak stankoverlast. "Wij moeten dan de ventilatieroosters in de slaapkamer dichtdoen, omdat we anders niet kunnen slapen", vertelt zij. (Dagblad van het Noorden, 31 januari 2012)

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Different residents describe their experiences with the stench: "A rural breeze is not bad but this stench is unbearable" and "We then must close the ventilation grid in the bedroom, because otherwise we cannot sleep". Through outlining these experiences, the gravity of the situation is highlighted, pointing out that it is not simply about "whining". Surrounding residents show that they indeed can endure a bit of a smell ("A rural breeze is not bad") and herewith undermine the accusation that they are complaining without a reason. This thus suggests that this is an ongoing and serious problem.

However, through outlining these experiences something else occurs: surrounding residents construct themselves as 'experience experts'. According to Stivers et al. (2011) this happens more often when compared to (scientific) expertise.

3.2.2 Surrounding residents: 'We distrust both the municipality and the operators of the bio-digesters'
Another pattern that emerged was that the surrounding residents showed little trust in the municipality and the operators of the bio-digesters.

Municipality
In the statements of its opponents, the municipality was depicted as 'stalling', given the fact that no actual decisions were being taken. After the evacuation, the GGD investigation, the broadcast from the KRO reporter and the report from the Rekenkamercommissie, the municipality was constructed as being insensitive, incompetent or passive.

See for example the following excerpt in which the municipality is depicted as 'incompetent':
> *Neighbor Annemarie Rombouts claimed that the rekenkamercommissie did not carry out the investigation assignment accurately. "The report bears witness to unsatisfactory critique and incompetent investigation."*
> *Neighbor friend Jan Verbakel went a step further. "Fortunately, there have been no casualties so far. The citizens are certainly both physically and mentally affected. The responsible people for this should resign voluntarily." He was referring to the mayor and three city council members in Coevorden. (Dagblad van het Noorden, 7th of February 2013)*
>
> *Wijkbewoonster Annemarie Rombouts stelde dat de rekenkamercommissie de onderzoeksopdracht niet goed heeft uitgevoerd. "Het rapport getuigt van onvoldoende kritisch en deskundig onderzoek."*
> *Buurtgenoot Jan Verbakel ging een stap verder. "Gelukkig zijn er geen doden gevallen. Wel zijn burgers fysiek en psychisch beschadigd. De verantwoordelijken daarvoor behoren vrijwillig af te treden." Hij doelde op de burgemeester en drie wethouders van Coevorden. (Dagblad van het Noorden, 7 februari 2013)*

The report of the Rekenkamercommissie states that, from a technical and legal perspective, the municipality acted in an adequate manner. The resident in the Klinkenvier area Annemarie Rombouts clearly does not agree: 'the report bears witness to unsatisfactory critique and incompetent investigation'. This shows her belief that the municipality have not acted in a correct manner.

Another resident in Klinkenvier picks up the same issue: 'Fortunately, there have been no casualties so far'. According to him there could have had much worse consequences. It becomes evident that he holds the mayor and the city council members for responsible, as they should, in fact, resign. Such statements lead the municipality to be perceived as 'incompetent'.

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Operators of the bio-digesters
The confidence in the municipality is thus extremely reduced. This is also true for the confidence in the operators of the bio-digesters:

> *Residents are worried about which products actually go into the bio-digesters and they are concerned about the van Nijman company that was involved in several failures. (RTV Drenthe, 25th of April 2014)*

> *Bewoners hebben zorgen over welke producten in de vergister gaan en ze hebben twijfels over het ondernemerschap van Nijman, die betrokken was bij diverse faillissementen. (RTV Drenthe, 25 april 2014)*

Residents raise concerns regarding the company operating the bio-digester (Nijman). In a previous attempt, the company did not perform well and was involved in several failures. According to the residents, these failures thus represent a sign of bad management. The operator is herewith equally depicted as being 'incompetent'.

3.2.3. Municipality and operators of the bio-digesters: 'We did not do anything wrong'

A third pattern is related to the previous one. We distinctly noticed that both the municipality and the operators of the bio-digesters constantly reject accusations on the fact that they allegedly did not act correctly and that the citizens are not suitably informed. They repeatedly refer to previously made agreements. In addition, they often reinforce the relevance of a good exchange. Thus, they carefully engage in the debate from the beginning on.

Responsibilities are recurrently being shifted. On the one hand, many opponents blame, for instance, the municipality for the problems. On the other, the municipality often lays the responsibility elsewhere, not always on a concrete person, but also for example on an institution. This is visible in the following excerpt:

> *According to the city council member Geert Braam (PvdA) there was reference to a mechanical fault in the installation. For PAC chairman Bernard Ensink this fault serves as the main argument to advocate suspension of the bio-digester. (…) The municipality can now intervene". According to Braam the bio-digester cannot stop functioning all at once. (Dagblad van het Noorden, 10th of December 2009)*

> *Volgens wethouder Geert Braam (PvdA) was er sprake van een mechanische fout in de installatie. Voor PAC-fractievoorzitter Bernhard Ensink is de storing aanleiding om te pleiten voor stopzetting van de biovergister. (...) De gemeente kan nu ingrijpen." Volgens Braam kan de biovergister niet zo maar in een keer stilgelegd worden. (Dagblad van het Noorden, 10 december 2009)*

In the excerpts above we see how city council member Braam assigns responsibility twice to the installation of the bio-digester. First a 'mechanical fault' is mentioned and later he claims that 'the bio-digester cannot stop functioning all at once'. As a result, the accused cannot defend themselves, as surely the installation does not have the ability to talk. Furthermore, no one is being directly insulted, a phenomenon that we often find in the debate.

Due to this lack of entities being made accountable for the problems, confrontations seem to be avoided in the debate, leading to a standstill.

Thus, both the municipality and the operators of the bio-digesters consider that they have acted appropriately. A research report also speaks in favor of the municipality, by claiming that the municipality has acted legally. Yet, the 'Rekenkamercommissie' states that the municipality should have reacted more actively to the persistent complaints of the residents.

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At that moment, the municipality admitted for the first time that they have looked 'too professionally' at the case. Consider the following excerpt:

> *The main lesson that Coevorden teaches us is that more attention has to be paid to how citizens' experience nuisance. Mayor Bert Bouwmeester acknowledges that they have looked 'too professionally' at the case and that there should have been more understanding towards the emotions in the Klinkenvier area. (RTV Drenthe, 12th of March 2013)*

> *De belangrijkste les die Coevorden leert is dat er meer oog moet zijn voor hoe burgers overlast beleven. Burgemeester Bert Bouwmeester erkende dat er 'te vakmatig' naar de zaak is gekeken en dat er meer begrip had moeten zijn voor de emoties in de wijk Klinkenvlier. (RTV Drenthe, 12 maart 2013)*

The mayor acknowledges the accusation towards the municipality of Coevorden that they would have looked 'too professionally' into the matter. By admitting this, he constructs himself and the municipality also as an "expert" in the field of bio-digestion. Professionally means that someone has a lot of knowledge and skills. This is remarkable, since residents construct the municipality as incompetent (see previous pattern). The mayor acknowledges here not only an accusation, but also provides himself a favorable identity.

3.3. Discursive analysis on the Foxhol bio-digester

In the debate on bio-digestion in Foxhol that was held in the media between June 2013 and March 2014, different actors took strongly diverging positions. The news coverage especially shows a debate between the residents – who are against the installation of a bio-digester on the Avebe area -, the province of Groningen and the municipality of Hoogezand-Sappemeer. Also Hartlief and Stel of NPG Energy were regularly quoted.
We have identified four patterns that will be described in the sections below.

3.3.1. Residents: 'We don't want a bio-digester in Foxhol and we will do everything we can to stop its installation'.
Residents are absolutely against a bio-digester in the Avebe area in Foxhol. Ever since the beginning, residents claim to do everything in their power to stop the installation of the bio-digester. In several ways, they make it clear that a bio-digester is not desired. As is shown in the following excerpt, they repeatedly use personal arguments to express their resistance:

> *''It is hard to believe that this is possible so close to residential areas'', says Marian van Dijken. From her house she is overlooking the Avebe-area across the Winschoterdiep. ''Our house will soon be worth nothing.'' (Dagblad van het Noorden, 20th of June 2013)*

> *"Niet te geloven dat dit kan zo dicht bij woonhuizen", zegt Marian van Dijken. Zij kijkt vanuit haar woning in Kolham uit op het Avebe-terrein aan de overkant van het Winschoterdiep. "Ons huis is straks niks meer waard." (Dagblad van het Noorden, 20 juni 2013)*

Resident of Foxhol Marian van Dijken claims not to believe the possibility of placing a bio-digester so close to a residential area. Given the installation of the bio-digester, her house 'will be worth nothing'. By saying this, she uses her personal situation to enhance her argument that 'the bio-digester is placed too close to residential areas. If a bio-digester is placed, it thus becomes impossible to sell her house that is too close to the bio-digester. In her opinion, this is a serious consequence that seemingly justifies her point of view.

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In addition, the residents are reverting to action. They want to make the political parties come to sense by a well-underpinned story. The interesting thing about this is that the residents present themselves as 'experts' on the issue of bio-digestion. This is shown in the following excerpt:

> ''In practice, there are many examples of how it can go wrong. And then it goes terribly wrong'' claims one of the residents. And they know how to formulate sharply. ''How many times do I have to take my laundry off the line and wash it again because it smells like a corpse?'' says Marian van Dijken, an initiator of Samen Sterk. (Dagblad van het Noorden, September 3th 2013).

> "In de praktijk zijn er voorbeelden te over dat het fout kan gaan. En dan gaat het ook goed fout", aldus een van hen. En ze weten scherp te formuleren. "Hoe vaak moet ik m'n was van de lijn halen en opnieuw wassen omdat er een lijkengeur in zit?" aldus Marian van Dijken, een van de initiatiefneemster van Samen Sterk. (Dagblad van het Noorden, 3 september 2013)

Residents come up with a well elaborated story. Two examples of arguments are provided. It is claimed that 'in practice, there are many examples of how it can go wrong'. Someone else says 'how many times do I have to take my laundry off the line and wash it again because it smells like a corpse?' Instead of presenting themselves as lays (people that know nothing about bio-digestions), the residents appear as experts, speaking out of experience.

3.3.2. Province: 'We can't stop the coming of the bio-digester at this location

The province claims not being able to stop the coming of the bio-digester to the Avebe area in Foxhol. The responsibility for its installation is mainly being shifted towards the municipality. Their development plan allows a bio-digester at that location. This is also clearly visible in the following excerpt:

> Boumans' opinion is that the municipality of Hoogezand should have made a clear choice. Housing or heavy industry. "If you want this kind of business at this place, then you have to look at how they are related to the environment."(Dagblad van het Noorden, 11th of July, 2013)

> Boumans vindt dat de gemeente Hoogezand-Sappemeer een duidelijke keuze had moeten maken. Woningbouw of zware industrie. "Als je op deze plek dit soort bedrijfsactiviteiten wilt, moet je kijken hoe die zich verhouden tot de woonomgeving." (Dagblad van het Noorden, 11 juli 2013)

According to the representative of the Province Boumans, the municipality is responsible: 'The municipality should have made a clear choice. Housing or heavy industry. He accuses the municipality of not having looked well at how the business activities are related to the environment. This is done by means of an if-then construction ("if you like this kind of business at this place, you have to look at how they relate to the environment"). By doing this, a certain amount of logic is suggested: it is logical that you have to look at that when you are a municipality. He thus constructs the municipality as "naive".

3.3.3. Municipality: 'It is a provincial matter'

The municipality on the other hand, points towards the province. In their opinion, it is a provincial matter, as the province provided the environmental license:

> The local council approved the proposal of Lenders that the executive board has to do everything to change the minds of the province and operators and to find a more appropriate location. (Dagblad van het Noorden, 3th of September 2013)

> De gemeenteraad stemt in met het voorstel van Lenders dat het college van B en W alles op alles moet zetten om de provincie en de initiatiefnemers op andere gedachten te brengen en om te zien naar een geschiktere locatie. (Dagblad van het Noorden, 3 september 2013)

This excerpt shows that political parties approve the proposal to change the province's opinion and to find a more appropriate location. It seems that they see the province as an entity able to stop the installation of the bio-digester. In the meanwhile the province precisely states not being able to stop the installation of the bio-digester in Foxhol. As clearly shown here, responsibilities are constantly being shifted.

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3.3.4. Hartlief and Stel (NPG Energy): 'We do everything to minimize the inconvenience, but are not alone responsible for the problems of the residents'

The operators of the bio-digester, Hartlief and Stel, claim they wish to place their bio-digester in Foxhol, but simultaneously be a "good neighbor", by claiming they understand the concerns: "We understand the worries about stench and noise pollution". Further, they show how to dismiss these concerns, "the whole installation is covered and the liberation of unpleasant odors should be avoided by all sorts of filters".

Hartlief and Stel exert themselves in order to minimize the inconveniences. However, it seems that they do not feel alone responsible for the concerns of residents. The responsibility for this is also shifted towards the municipality and previous companies on the Avebe area. The following excerpt illustrates their point:

> "The municipality had place for us in the Avebe area in Foxhol. The development plan allows heavy industry at that place. "Companies that were located at the Avebe area in the pas caused a lot of inconveniences, but the development plan allows this". Hartlief: "The area is designated for it. We have agreed that such a thing is possible there." That the houses are so close to the location is a historical   development" (Dagblad van het Noorden, July 23th 2013)

> "De gemeente had plek voor ons op het Avebe-terrein Foxhol. Het bestemmingsplanmaakt zware industrie daar mogelijk." Bedrijven die in het verleden op de Avebe-   locatie waren gevestigd hebben daar veel overlast veroorzaakt, maar het bestemmingsplan staat dit toe." Hartlief: "Het terrein is ervoor aangewezen. We hebben met elkaar afgesproken dat zoiets op die plek kan. Dat woningen dicht op de locatie staan is historisch zo gegroeid." (Dagblad van het Noorden, 23 juli 2013)

One of the operators suggested the following: "The municipality had place for us in the Avebe area." By saying this, he shows implicitly that the municipality is also responsible for the inconveniences. They also refer to the development plan: that plan allows heavy industry. The effect of this is not only that the municipality is held responsible, but it is also indicates that the operators have acted according to the rules, given that the development plan allows a bio-digester. In sum, the operators refuse to take the full responsibility for being solely responsible for the project.

4 Conclusion

This study examined the social acceptance around bio-digestion, based on a discourse analysis of 200 newspaper articles relating to two different cases. When comparing the patterns found for both cases, it can be seen that they are very similar. When it comes to the residents, our research shows that they are strictly against a bio-digester in their neighborhood. They clearly present themselves in the debate as opponents and use different strategies (for example extreme case formulations, contrasts or negative personal experiences to highlight their resistance).

There is an undeniable negative image and no support. To create more support, an option would be to organize more open days. For residents, this can lead to a deeper insight into the concrete functioning of bio-digesters.

Residents construct themselves, for example by sketching personal experiences, as 'experience experts'. But the debate also shows that they indeed have great knowledge about bio-digesters. The relationship constructed in the debate, is not equivalent, but asymmetrical. The government and the operators of the bio-digesters emphasize the asymmetry of the relationship. However, research on asymmetries in other institutional settings showed that this leads to misunderstanding, due to the lack of attention given to the (experiential) expertise (Gabriel, 2004).

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One suggestion for municipalities would be to explicitly emphasize the knowledge of residents in mutual discussions and reducing their own expertise.

In addition, responsibilities are often shifted. Governments (provincial and municipal) hardly ever take responsibility for the bio-digesters. The province, municipality and operators all point to each other. Equally, confrontations are avoided.

The general consequence is that the debate about bio-digestion does not move forward. The government chooses to avoid it. This contradicts research on the significance of discussions when dealing with innovations (Leeuwis & Aarts, 2011). An advice to municipalities would thus be to engage with the different parties, instead of shifting responsibilities. Involving citizens at an early stage is also of great importance. This increases the chance of more beneficial change.

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Evidence based office design and configuration: putting people at the centre of the process.

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(A Middle East based Case Study)

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Abstract: This paper explores the continuing problems of lack of engagement, motivation and satisfaction with office environments. It examines why the one size fits all approach of open plan offices is failing and why people must be put at the centre of a "flipped office approach". Using a case study from the Middle East it examines the application of the authors' 10 P model and aligned vision. It demonstrates how research and consulting can translate evidence and detailed analysis into strategies, signposts and criteria to inform the office design process. Based upon 20 years of research development, this paper represents a practical exploration of consolidating research themes and evidence into data analytics. The paper will demonstrate how a research methodology has been adapted to collect data in three areas:

• Positive and negative attributes of productivity and their drivers;
• Activity analysis of what individuals and groups do whilst in the office; and
• Connectivity throughout the organisation (Formal/Informal/Social and Virtual)

The paper will evaluate the application of the research methodology within the case study, and illustrate the key findings and how they were translated into design strategies.

The data has been disaggregated to examine productivity aspects in terms of:

• Gender;
• Ethnicity; and
• Generation.

Analysis of the sub groups clearly demonstrates that "one size fits all" open plan offices are inappropriate and indicates the complexity and subtlety of individual and organisational preferences that have to be accommodated within informed office design.

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1 Introduction

There exists a considerable amount of literature examining the relationship between the physical environment of the workplace and occupants' perceptions, behaviours and productivity. This literature ranges from case studies, detailed research published in academic journals and design studies in commercial and trade journals. The focus of these studies varies significantly depending on whether they are couched in an architectural, facilities, real estate or design context.

The relationship between an office occupier and the work environment is a complex one and has been the centre of many research studies. Studies have included a range of different variables including evaluating the office type with occupier satisfaction and productivity (Leaman, Bordass 1999, Roelofsen 2002, Haynes 2008, Maarleveld, Volker et al. 2009, Been, Beijer 2014). Central to a number of studies has been the categorisation of work activities, which has mainly included concentration and collaboration.

Cellular office environments generally receive higher satisfaction rates and perceived productivity evaluations (Sundstrom, Town et al. 1994, Sundstrom, Town et al. 1982, Haynes 2008). When undertaking concentrated work office occupiers generally prefer a distraction free working environment. Ideally, this distraction free work should take place in a private work area so that they can focus on their work (Been, Beijer 2014).

The balance between workplace collaboration and distraction is a complex one. Whilst there are many benefits of collaboration through increased communication and interaction these can be offset if the collaboration is undertaken in an open plan environment, which distracts other office occupiers(Haynes 2008, Heerwagen, Kampschroer et al. 2004, Rianne Appel-Meulenbroek 2010)

Whilst evaluating the impact of the office environment on occupiers satisfaction and perceived productivity through a better understanding of work activity has been central to a number of research studies, there have been researchers that have tried to better understand the office occupier. This has required the office occupier to be categorised by a number of different variables such as gender(Kim, de Dear et al. 2013, Rothe, Lindholm et al. 2011, Choi, Aziz et al. 2010, Dinç 2009) and age of office occupiers (Rothe, Lindholm et al. 2012, Rasila, Rothe 2012, Haynes 2011, Joy, Haynes 2011). There is great variability in these studies, dependent upon the nature of the study, the professional context from which they are written, and the sector to which they are applied; there is no doubt that we still have a long way to go to fully understand the complex relationships involved and deliver proven, tangible productivity benefits.

To illustrate this gap our infographic 1, based on the most significant findings of the statistically robust Gallup 2013 study, sums it up very powerfully.

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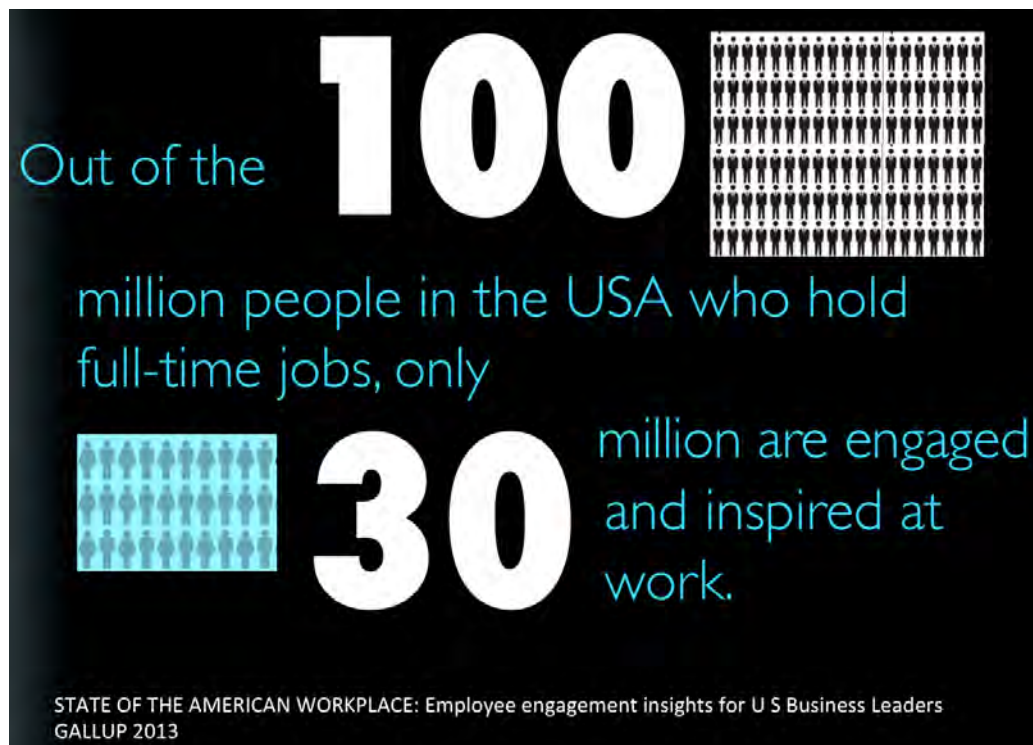
Infographic 1: The main findings from the 2013 Gallup Survey: State of the American Workplace.

The authors of this paper believe that the disconnect between the abundance of studies, research and application in this area and the dissatisfaction and lack of engagement evidenced by the Gallup and other studies is explained by two factors:

i) Not putting people at the centre of the process and focusing too much on static desk based solutions;

ii) applying one size fits all solutions to highly variable personnel, who are performing increasingly diverse range of activities within the office environment.

The authors believe, based on their research and consulting evidence, that a "*flipped office*" approach, focusing on individual people and their work activities, is required to address this disconnect and reduce the appalling engagement and satisfaction evidenced in the Gallup study.

It is the authors' assertion that these extraordinary lacks of progress, despite the plethora of studies, discussions, papers and other output around this topic are a direct result of two fundamental issues:

i) inherent disconnects in the procurement and management of real estate which impact upon the relationships between people and their environment, and

ii) the lack of detailed understanding, analysis and appreciation of the complexity of of the people dimension of space utilisation and configuration.

This paper aims to examine this complexity partially through the use of data collected within a significant evidence based consultancy project based in the Middle East.

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2 Escalation in the dissatisfaction with open plan offices.

Numerous academic reports from around the world have evidenced the negative aspects of open plan offices. Many studies have recently provided strong evidence, based on large sample international studies, that the advantages in terms of reduced space and costs and increased connectivity are offset by the disadvantages of distraction, noise and health. See for example the study by Kim and De Dear (2013), which strongly collaborates our own observations across the world.

Although increased informal and spontaneous communicative connectivity is one of the fundamental outcomes that open-plan configurations seek to promote (Brookes & Kaplan, 1972), it is widely reported that they negatively affect cognitive processes and performance of certain activities and may also contribute to cognitive overload and resulting stress and increased absence due to sickness. (e.g., Baron, 1994; Cohen, 1980; Evans, Johansson, & Carrere, 1994; Oldham, Cummings, & Zhou, 1995; Paulus, Annis, Seta *et al.,* 1976; Stokols, Smith, & Prostor, 1975; Sundstrom, Town, Rice, *et al.,* 1994).

Many studies have identified the link between open plan offices and cognitive overload and or over stimulation leading to negative outcomes including perhaps most significantly withdrawal and disengagement. (e.g., Cohen, 1980, Desor, 1972; Paulus, 1980). The authors believe there is a connection between this negative aspect of open plan offices and the results of the 2013 Gallup survey.

The observed linkage is that distractions in the environment lead to a sustained increase in cognitive effort, which when combined with the increasingly complex and diverse work activities of contemporary employment, lead to cognitive overload. In other words an individual's finite information processing capacity is

exceeded, and engagement in work activities , concentration, motivation and work activity performance reduces (e.g. Baron, 1994, Brookes & Kaplan, 1972; Craig, 2010, Hedge, 1982; O'Neill, 1994; Sundstrom, Herbert, & Brown, 1982; Sundstrom & Sundstrom, 1986; Sutton & Rafaeli, 1987, Oldham & Brass, 1979; Oldham & Rotchford, 1983) Oldham & Brass, 1979), have been consistently associated with

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The issue has also been increasingly and significantly reported in the mainstream Press globally demonstrating a strong and vocal dissatisfaction with open plan offices. A few examples are set out in the table below.

Publication	Title	Date	Principal Issues
The Sydney Morning Herald AUSTRALIA	Workers complain open plan offices have serious flaws	16/03/2014	Cites Stockholm University study linking increased sick leave to open plan offices from stress, elevated blood pressure and spread of infection.
Bloomberg Innovation & Design US	Ending the Tyranny of the Open Plan Office	01/07/2013	Cites the US based Gensler study that states the collaboration-friendly environment with minimal cubicle separations "proved ineffective if the ability to focus was not also considered," "When focus is compromised in pursuit of collaboration, neither works well."
The Daily Mail UK	Open-plan offices DON'T boost productivity: Study rubbishes economic benefits after workers say layouts are disruptive and 'outperformed' by enclosed rivals	24/08/2013	Cites the Sydney University study of 42,000 US office workers in 303 buildings the researchers concluded that open-plan layouts are disruptive due to 'uncontrollable noise and loss of privacy' and were 'clearly outperformed' by enclosed private offices.
The Daily Telegraph UK	Open plan offices suck. Why people are finally waking up to it	27/02/2014	Cites the Stockholm survey And the linkage of health issues to **– Spread of Viruses and infections** **– Background noise** **– Lack of visual privacy** is **– Reduced control of personal space**

Table 1: Table to illustrate recent main stream press articles illustrating dissatisfaction with open plan environments.

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3 Activity based working, which recognises differences in employee behaviour, is the new approach

The authors believe that these approaches do not go far enough in their understanding of the complexity of the people dimension.

Companies such as Cushman & Wakefield, discuss in their Introverts v Extroverts publication the importance of recognising people have different characteristics which are not supported by "one size fits all" solutions especially open plan offices. Susan Cain in her excellent book Quiet: The Power of Introverts in a World That Can't Stop Talking, discusses the negative impact many open plan offices have on introverts despite their growing strategic importance within organisations.

The Cushman & Wakefield publication looks at the evolution of Activity based working from

Traditional   to ⟶ **Open Plan**   to ⟶ **Activity Based**

It characterizes them in terms of:

Traditional	Open Plan	Activity Based
Clear and Strong Hierarchy	Flatter structures	Recognising Autonomy
Rigid Space Standards	Team Based	Designing in Connectivity
Based on offices	But "one size fits all doesn't work"	People move to work setting that supports
	Diverse personalities	their activities.
	challenge these solutions	Based on an analysis
	Based on homogeneous	of activities
	Spaces / cubicles	

However, we believe that many current approaches do still not put people at the centre stage and focus on their activities not their personalities, work styles or psychometric profiles to deliver sufficiently personalised solutions. Simplistic work activity based solutions do not necessarily capture the complex interpersonal, social and collaborative activities that are essential for productivity and performance.

The idea of workplaces being responsive to the activities that workers undertake, and the need for space that empowers worker autonomy to select work environments that support ever complex and diverse work activities is not new. Many of the ideas emanate from the idea of autonomous working and the interplay between autonomy and interaction. Probably the best known is Frank Duffy's/DEGW's characterisation of four quadrants, based on the variables interaction and autonomy (Laing *et al.,* 1998). Where*:*

Interaction is the personal face-face contact that is necessary to carry out office tasks. As the amount of interaction increases, there is more pressure to accommodate and support such encounters.

Autonomy is a degree of control, responsibility, and a discretion each office worker has over the content, method, location, and tools of the work processes (Duffy, 1998, p. 60).

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But the four quadrants approach masks the increasing complexity, volatility and variability of work. Activity or 360 degree based solutions are growing in popularity and are being advocated by many consultants including for example the global real estate firm, CBRE. (2013). They state that "the biggest mistake we see in current 'so called' contemporary office design is a complete underestimation of the need to create focused places to work" and "the future office needs a much greater diversity of settings – all carefully established through a robust process of understanding work practices and behaviours". They indicate that whilst some traditional settings including conventional meeting rooms and work stations may still be necessary, new types of work areas such as reflective space, focused space, team-based work settings, standing settings, quiet focused rooms and phone rooms need to be integrated into workplace design.

CBRE have put into practice what they preach in their Tokyo office . Basing the solution around their activity based model that defines four main work activity groupings as:

Amongst Team

Working Together

Creative

Focus.

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It then provides the following work settings for staff to choose to locate within defined "neighbourhoods" based on business areas.

Places to Work			
Neighbourhood Desk A place to work amongst your team in your local neighbourhood.	**Team Desk:** Choose to work here when you need to collaborate with colleagues within or across teams -- - projects, pitches, planning etc.	**Quiet Pod:** To be used when you do not want to be distracted. Come here when you really need to focus and be left alone for a few hours.	
Places to Work or Meet			
Booth When you need quiet and do not want to be distracted, or when you need to be noisy.	**Work Meet:** Work – private place to work/ temporarily use as an office (when a booth is not available); Meet – group conference calls, group working sessions, discussions, brainstorming		
Places to Meet			
Meeting Room There are five bookable meeting rooms that can accommodate up to 12 pax.	**Video Meet:** One 8 pax meeting room has twin screen video conferencing capability	**Stand Meet:** Cafes provided with standing height tables that encourage quick conversations, collaboration and brainstorming.	**Café**: a place to have team meetings, celebrations and an alternative place to work in a relaxed atmosphere.

Table 2: The CBRE definitions of activity based work settings deployed in their Tokyo office.

(Information taken from CBRE (2013) Spotlight On: CBRE's new way of working.)

The initial feedback of staff working in the office is positive and even long standing local employees who initially were challenged by the cultural shifts inherent in the new way of working have expressed very positive reactions.

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This initiative is applauded and the surveys and evidence that has gone into the design. However, we believe that the detailed understanding of activities and the differences between gender, generations, cultures and psychometric behaviours remain at an immature stage.

Our research suggests that the variability of work is often underestimated and that the individual needs of people based around their gender, ethnicity, age and psychometric profile are not yet fully integrated into workplace design.

This may still lead to compromise solutions and are in our opinion contributing to the persistent negativity often found in workplace studies and recently dramatically evidenced by the Gallup (2013) poll.

There has been a lot of press coverage and research articles produced around the youngest generation of workers – generation Y. The research undertaken so far appears to mixed results, with some authors arguing that generation Y workers are no different than any other generation and some authors arguing that they have different needs and preferences(Haynes 2011).

Research undertaken by Rothe et al (2012) used a case study approach and identified that generation Y office workers liked open plan office environments. However, the research also concluded that generation Y office workers acknowledged the limitations of open plan but considered the benefits outweighed the negatives (Rothe, Lindholm et al. 2012).

Similar to Rothe et al (2012) Joy and Haynes (2011) adopted a case study approach to not only understand generational differences in the workplace but also to understand how different generations worked in the same workplace. Their research found that with regards to team-based working environments there was no difference between the generations. However, differences did emerge between the generations with regards to knowledge working preferences for formal/informal meeting spaces. These findings mean that some work activities such as team-based working can be undertaken in a multi-generational environment (Joy, Haynes 2011).

4. The theoretical background and research history

The research design for workplace productivity evaluation is fundamentally based on the Ph.D. thesis of Dr Barry Haynes. The thesis consisted of a study, which aimed to develop, and validated a theoretical framework for the evaluation of perceived office productivity. The framework consisted of components, which represented an evaluation of both the physical office environment and the behavioural office environment. Adapting such an approach allowed insights into the dynamic nature, or connectivity, of office environments. The main objective of the research was to investigate the effects of the office environment on its occupant's perceived productivity(Haynes 2007, Haynes 2007, Haynes 2007).

The PhD's study's strength is that it is based on two sizable data sets. One dataset consisted of 996 respondents and the other consisted of 422 respondents. The data collected consisted of data about the physical characteristics of the office environment and data pertaining to the behavioural environment(Haynes 2009).

The data was analysed for specific work patterns, which enabled meaning and understanding to be developed for different office workers. Principal component analysis was used to reduce the initial variables to 4 main components. The components being office layout, comfort (which represented the physical office environment) and interaction and distraction (which represented the behavioural office environment)(Haynes 2008).

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In all of the four work patterns evaluated it was found that interaction was perceived to be the component to have the most positive affect on productivity and distraction was perceived to have the most negative. It was therefore concluded that it is the behavioural components of the office environment that have the greatest impact on office productivity. The findings demonstrated that it is the dynamic elements of the office environment, interaction and distraction that are perceived as having the greatest positive and negative influences on self assessed productivity (Haynes 2008).

The implication of these research findings mean that to truly appreciate office productivity there was a need to be better understand the behavioural environment. This can only be with the obtained by undertaking a "people centric" approach to workplace evaluation research. The research methodology for evaluating office productivity and workplace performance has been subsequently undertaken in a number of private and public sector companies. This paper has added to the workplace productivity survey some additional data collection methods, which include utilisation, activity and connectivity.

4.1 Examining the problem.

As introduced earlier in this paper, the authors see two interconnected problems with multiple disconnects as the root cause of the continuing dissatisfaction with office space and widespread negativity against open plan office space.

1) The development and procurement of space contains fundamental disconnects between the various stakeholders. Whilst this is outside of the study of this paper it serves as the backdrop for many of the problems examined and observed in multiple cases by the authors.

John Worthington of Hassell Design Agency was quoted at a conference in Melbourne stating that " *For many who practice architecture, the building is the project. But for the client and user, the building is just a means of achieving the wider project – the success of the organisation.*" This quote sums up the problem of stakeholder disconnects inherent in the provision of offices. Unless a user is building their own facility and has embedded their user needs within the briefing process, all of the issues discussed in this paper will amount to nothing more than "retro-fit" solutions. The authors have first hand experience of this when analysing user perceptions and trying to apply the design guidance from their methodology to new speculative accommodation, including iconic buildings where the design compromises rather than compliments the productivity, satisfaction and connectivity desired by the client.

2) We do not take sufficient notice of the importance and complexity of the people dimension to space configuration.

The authors talk about the "85% rule" in their consulting work, based on a number of studies that put people as the most significant factor in business operations and costs.

This is based on, for example, the CABE report, the impact of office design on business performance, which records a breakdown of business costs as

Salaries of occupants	**85%**
Building construction	6.5%
Furnishings and furniture (capital cost)	1.25%
Cleaning security etc.	1%

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In countries employing "ex-pat" labour ,such as the UAE, these costs are even more significant as the cost of churn rises significantly due to international hiring costs and end of contract benefits. It is often assumed that salary and other benefits are the prime motivators of individuals, but many studies resonate with Maslow´s research and suggest that the relationship with work is much more complex and that this is also changing with younger generations valuing both eth location and environment of work in some cases higher than financial benefits.

As an example, Cisco (2011) in their connected world technology report identified that 66% of Cisco workers globally placed a higher value on workplace flexibility than salary.

There is a final worrying disconnect that evidence shows is that employees are increasingly aware that the physical workplace is a driver of productivity and satisfaction. In the Driving Shareholder Value in the Workplace Study by Johnson Controls and CoreNet Global (2013) the survey recorded 78% of respondents had such an awareness. If this is contrasted with the 70% lack of engagement and inspiration from The Gallup study it would appear that there is, what we describe as, a fundamental *"frustration gap"*.

Infographic 2: The main findings from the 2013 Johnson Controls and CoreNet Global : Driving Shareholder Value in the Workplace

Coupled with this frustration gap is evidence that many organisations are currently undertaking or planning expensive workplace change programs. Cushman & Wakefield Research (2013) demonstrates that around 64% of respondents in their global survey were looking to implement some form of radical change often open plan based in some cases incorporating activity based solutions. Our question is do these organisations have sufficient and detailed evidence to deliver appropriate and effective solutions?

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The Cushman & Wakefield 2013-2014 Workplace Transformation Study also supports our assertion of a disconnect between the complex needs of employees and the design based solutions presented.

In this survey the most significant drivers if workplace change are human ones

Human Resource Factors   **38%**

Strategic Factors   37%

Financial / Cost factor   24%

Yet the recorded solution strategies are:

Open plan/ reduced office space   **11%**

Flexible layouts and furniture solutions   10.7%

Increased meeting rooms and collaboration spaces   10%

Increased social and collaboration spaces   7.1%

It is our view that these disconnects and emphasis on *"one size fits all solutions"* and the continuing use of open plan settings without the proper detailed regard for the complexity of human needs and activities in the workplace contribute to the disengagement and lack of productivity improvements observed by Gallup (2013) and other studies.

5 The research and consulting philosophy deployed in the case study

The underpinning philosophy behind the authors' approach is one based on the research findings of Dr. Barry Haynes, and its application by both authors most recently in the Middle East. Developed originally as a "7 P" model (Haynes 2007) and set out in the authors text book Corporate Real Estate Asset Management (Strategy and Implementation, (Haynes and Nunnington 2010), it has been developed into its current "10P" approach. The aligned vision of the revised "10 P" model is described in further detail in later papers (Haynes (2012).

The approach starts with **PEOPLE, the first and most important "P"** putting them at the centre of each study and aiming to collect detailed analytics which facilitate an alignment process to align them with:

- the **P**aradigm of the client organisation (their history, values and culture);
- their **P**urpose (their mission, vision, goals and strategy);
- the **P**rocesses they undertake (the activities that all the people undertake individually and collectively;
- their market **P**osition (their brand identity and market positioning);
- their optimised **P**rocurement strategy (delivering and envelope that best suits their needs);
- their optimised **P**lace configuration, (buildings in the right location, with the right specification, layout and configuration) incorporating
- sustainability approaches to respect the **P**lanet.

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The authors believe that detailed understanding of the people, their activities and relationships between the 8 "P"'s listed above coupled with correct strategic alignment will lead to the final 2 "P"'s of the model – **P**roductivity and **P**erformance.

To ensure that a best match between office occupiers and their office environment is achieved, there needs to be an alignment of both the physical environment and the behavioural environment (Haynes, 2008a, b). Whilst the physical environment is still an essential component of office design, it has been identified that it is the behavioural environment, more than the physical environment, that has the most impact on people's perceived productivity (Haynes, 2008a, b).

This can be demonstrated graphically as:
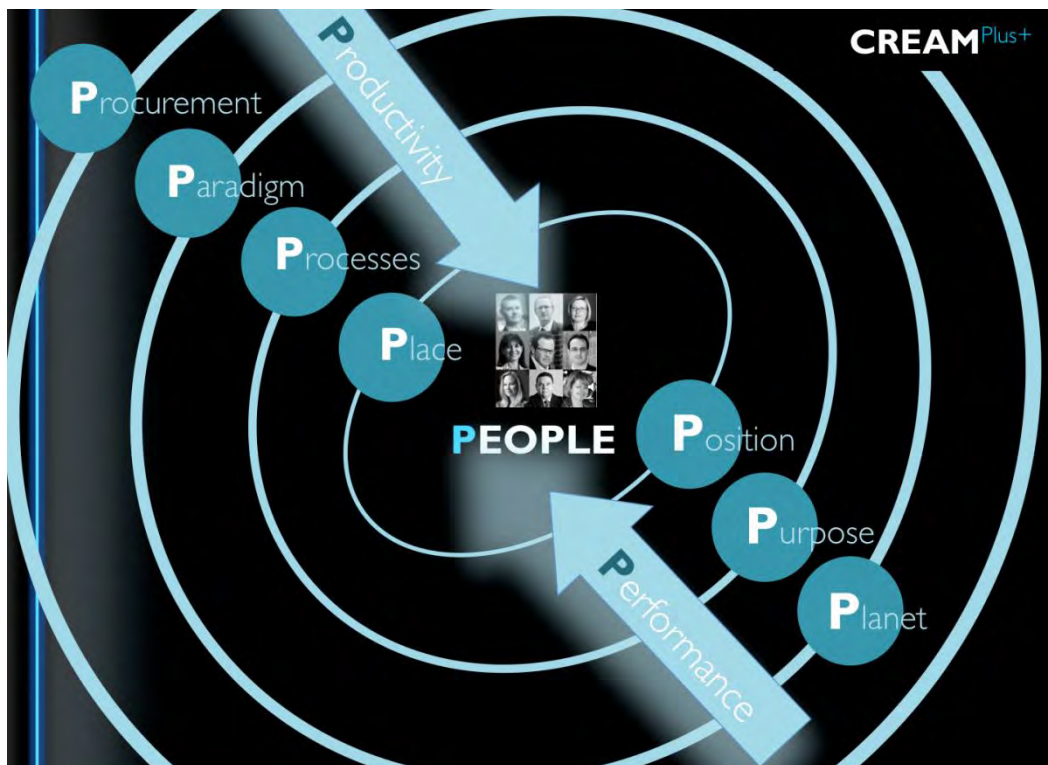
Figure 1: The Optimum Productivity and Performance Alignment Vision

The theoretical framework proposes that optimum alignment can only be achieved when all the components in the framework are in alignment. Optimum alignment is required between, planet, position, purpose, place, paradigm, processes and people. It is at this optimum point that the CRE strategy delivers added value to the business through enhanced occupier productivity and organisational performance. This case study examines the first steps in the process of application of the revised theoretical framework.

6 Introducing the Case Study

6.1 A data driven solution

Gensler, one of the leading architects to recognise the disconnects, discuss in their top trends shaping design publication how data informed design, using data analytics to integrate data in silos and give clients new perspectives their philosophy resonates with the approach used by the authors.

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In the Gensler (2013) Corporate Real Estate Challenges Survey, 95.2% of respondents recognized that the workplace had an impact on employee productivity. However, only 30% of respondents indicated they knew how to measure this impact.

In order to deliver the appropriate detailed information to architects, designers and contractors to deliver a data driven solution a toolkit is used which has 3 main components. Whilst the main components of productivity remain constant and rooted in the main research undertaken by Dr. Haynes over the past 16 years, the toolkit has evolved to incorporate new components and to disaggregate the data into more granular people centred levels of analysis. This includes, as will be discussed in the case study, data that compares preferences by:

- **gender**
- **generation**
- **cultural background**
  and with the latest version of the survey

- **psychometric typologies**

For each client the toolkit is tailored to deliver an appropriate solution, with the Middle East case study the study was tailored to examine the current perceptions of employees based in several cities in the UAE and very different accommodation. In particular in order to disaggregate data effectively in terms of activities and collaboration it is necessary for each client to accurately define both the macro and micro classifications of roles and or job types in order to get accurate and meaningful data in how departments, sections, teams and individuals interact, collaborate and share activities.

We do this using what we have defined and registered as the **CREAM**$^{Plus+}$ **TOOLKIT** comprising four areas of analysis:

- **utilisation**
- **productivity**
- **activity**
- **connectivity**

and the following constituent parts:

- an internet delivered perception survey for employees;
- a comprehensive utilisation study of existing accommodation;
- a work-function analysis of each employee;
- a connectivity analysis of physical and virtual interactions;
- detailed meeting room analysis;
- a pre-space planning spreadsheet incorporating work style requirements; connectivity components and a checklist against key corporate drivers and ambitions; and
- provision of a baseline to enable robust benchmarks and performance indicators to be established.

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7 The Survey Instruments

7.1 The Productivity Survey: the productivity survey has six main components:

Component 1:
Q1-2   A snapshot analysis of current office types and desired office type given a free choice. This question is used as a control to show snap decisions compared to considered choices.
Component 2:
Q3-5   A profile of the survey respondents. This allows for detailed disaggregated analysis of the composition of the survey respondents is provided by gender, age (generation) and nationality. In the latest survey also by psychometric profile.
Component 3:
Q6-7   Macro level work activity analysis. Questions 6 and 7 examine at a macro level respondents activities at their workstation   [either working individually or collaboratively]; their current   perception of workspace   flexibility; and the time spent being productive and creative. It complements the separate   real time Utilisation and Collaboration Survey, which drills down into work activities at a   more granular level in 30-   minute periods. Question 7 asks the same question in the context of how people would like to work and the   differences in responses give an excellent indication of the variation between what is   currently provided and what respondents perceive as an appropriate balance of activities to   improve and optimise productivity.

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Component 4:
Q8-10 Productivity impacts.
These questions provide the core analysis of the three key impacts identified in previous   published research as having significant impact upon productivity and performance.
These are:
The impact of office facilities (e.g. storage, quiet areas and informal meeting areas). (Q8)
The impact of Environmental issues [or "hygiene factors"] (e.g. lighting, ventilation and noise). (Q9)
The impact of significant variables; as identified in extensive research; explored with previous clients; and published in, inter alia, Haynes, B.P. (2007) Office productivity: a theoretical framework, *Journal of Corporate Real Estate,* 9(2) 97-110. (Q10)
The perception of relative importance of office environments as a factor of office productivity.
Q11   Relative impact of office environments on work performance.
Q12   Free text comments on how current office environments impact upon performance.

Component 5:
Q14-18 Macro level meeting room use analysis.
These questions provide a macro level analysis of the current use of meeting rooms across the portfolio in terms of duration and size of meetings. They also examine the facilities people believe would enhance meeting performance and a snapshot of desired meeting durations. This analysis can be used to collaborate other analysis provided by meeting room logs and Survey 2: The Utilisation and Collaboration Survey.

Component 6:
Q19-20 Ranking lists of Facilities and Amenities perceived to improve workplace productivity.
These questions provide an opportunity for respondents to rank what facilities would improve motivation; productivity; and positivity in the workplace and what amenities would improve work/life balance which has a proven impact upon office productivity.

Table 3: The components and questions of the productivity survey

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7.2 The Collaboration Survey.

The collaboration survey integrates with Outlook to prompt a three-click verification of what the respondent is doing against a drop down list of activities, which are tailored to each client.

 If the activity is collaborative the system records

- who the collaboration is with
- where the collaboration takes place;
- what type of collaboration (e.g. video conference, confidential meeting etc.); and
- if the interaction is formal, informal or social.

8 Major observations from Middle East based case study application of the toolkit:

As the authors' work with clients is subject to confidentiality and non-disclosure orders, the data produced here is a summary of more than one Middle East client and has been generalised to extract significant observations without the specific client detail being revealed. The purpose of this paper is to use the case study information to explore the necessity for more detailed people based analysis to inform strategic, operational and design decisions in delivering productive workplaces. We believe the observations validate both our philosophy and our assertion that the goal of seeking increased productivity and performance in the workplace requires a far more sophisticated and granular approach to data capture, analysis and interpretation.

What does the **CREAM**^Plus+ **TOOLKIT** deliver?

The use of this toolkit underpins the creation of a strategic brief, which delivers unprecedented data, evidence and direction for consultants employed to implement an effective solution. This process minimises the potential for error or misunderstanding in the design, layout and configuration of the business environment. Very positively received by design consultants, it acts as the **"bridge"** between client and designer, providing rich evidence based analysis to ensure aligned configuration of space that puts people at the centre of the process.

The results have some significant findings:

- The detailed analysis of responses to the percentage of time working collaboratively shows that the case study organisations are highly connected organisations with over 50% of the respondents indicating that 40-100% of their time is spent working collaboratively. In crude terms this indicates 50% of the workforce spend over 50% of their working week collaborating. **This is extremely significant** and compared to other companies surveyed this is much higher and underlines the need for space planning that **facilitates and empowers** employees for both **planned and spontaneous collaboration.** The collaboration observed is both highly complex and varied indicating that traditional single or open plan offices would not support the work activity profile.
- The converse observation to the above is the small amount of time spent working individually in offices or at workstations. Again compared to previous organisations surveyed the percentage time spent working individually is significantly lower than the benchmark data average. This is also extremely significant and suggests that many offices/workstations are underutilised. In addition, because responses from later questions suggest that the workspaces do not support work activities it is likely that **work is being undertaken in inappropriate settings that are likely to be limiting if not adversely affecting productivity.**
- The diversity of tasks is also significantly high compared to other studies with nearly half (49.5%) of respondents indicating a high or very high range of tasks. This indicates a need for high levels of **flexibility and autonomous working** to be provided within the space design to accommodate

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a wide range of work activities, not just a standard PC or lap-top docking station based workstation.

Comparison of current and desired profiles reveal little change in the overall work preferences although there are some significant shifts within the detailed analysis, including:

- Whilst the percentage of time being productive remains static the desire to be much more creative is much more significant. **The data suggests that across the organisation the current workspaces are not supporting creativity and/or creative ways of working.**
- The amount of desired flexibility increases significantly (high flexibility 34.1% to 47.7% and very high flexibility 5% to 15%). That is an overall movement of combined current high and very high flexibility from 39% to 63%. **This is an extremely significant number and reflects a dynamic workforce that is demanding a workspace that promotes significantly increased flexibility and autonomy.**

The activity tool produced very detailed profiles of what workers were actually doing, where and if undertaking a collaborating activity who with, where and how. The results from this survey are extremely complex and exhaustive and will form the basis of future studies and papers. They provide a detailed network of activities, collaborations and connectivity, which is used to underpin many of the clients design decisions.

Figure 2 below indicates the high degree of variability of activities between generic job groupings. The Directors and Administrative staff for example almost have a reciprocal profile of activities.
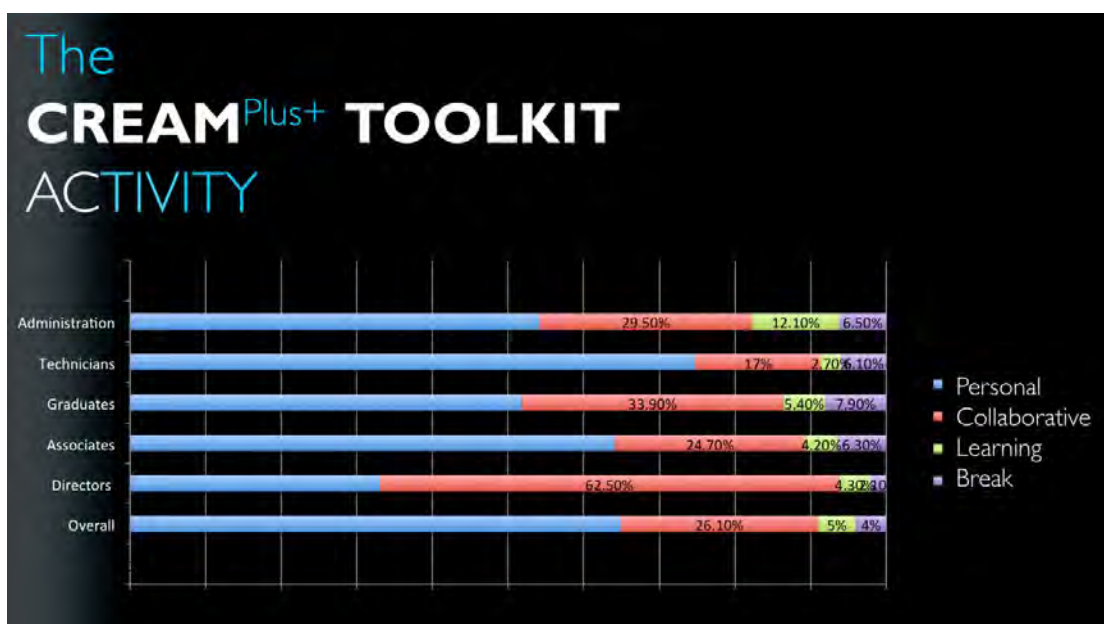
Figure 2: Generic activity distribution from the Middle East based case studies

Drilling down into the collaboration activity detail, Figure 3 illustrates further distinct variations between the types and amounts of collaboration activities each generic group undertakes. In practice the consultant's reports provide a rich profile of collaboration activities at a sub-departmental level not just at a macro level of job functionality.

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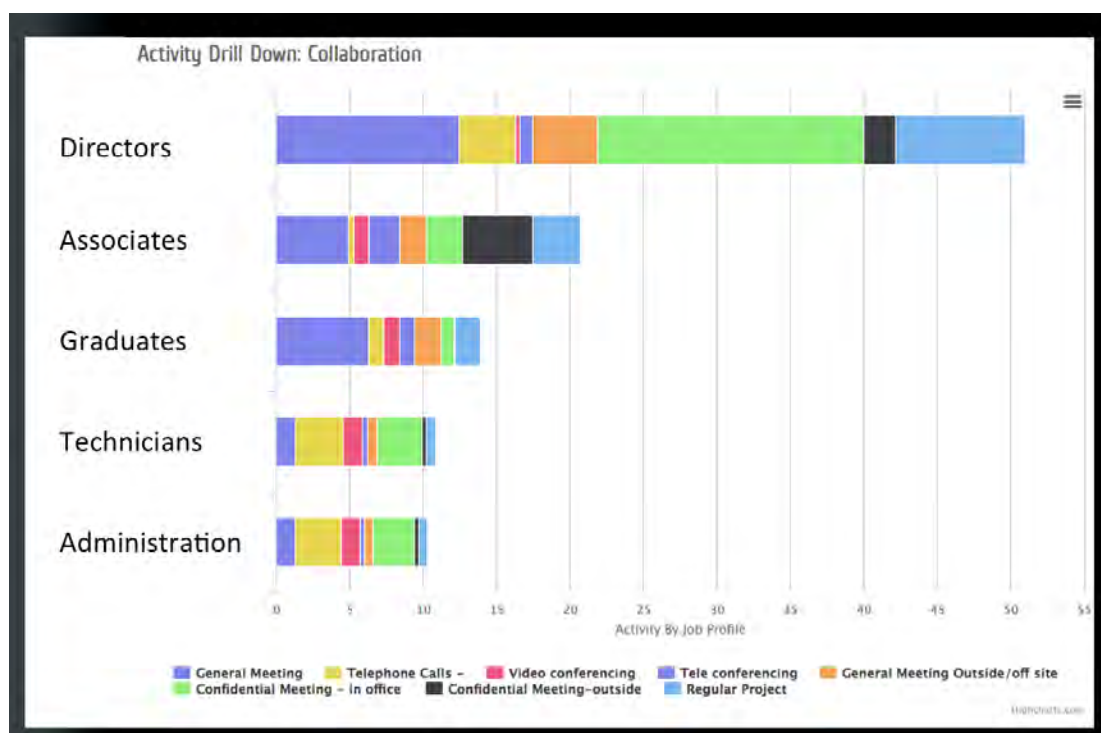
Figure 3: Detailed collaborative activity distribution from the Middle East based case studies

When examining the perception of what is contributing to positive and negative impacts upon productivity It is clear that "hygiene factors", such as natural and artificial lighting and office cleanliness, are more than acceptable across a significant part of the current portfolio. This is likely to be attributed to the fact that many of the client's properties are in modern facilities

Ranking	Positive Factor	No of positive respondents
1	External Noise	59
2	Natural Lighting	48
3	Artificial Lighting	46
4	Office cleanliness	41

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Ranking	Negative Factor	No of negative respondents
1	Distractions from noise, conversations, movement	125
2	Smoking Indoors	122
3	Office decoration and ambience	95
4	Noise from equipment	90
5	Physical comfort – ergonomics of work station	90
6	Inadequate Ventilation	89
7	Inadequate natural light	80

Table 4: Table to illustrate ranking of most positive and negative aspects of facilities within current environments.

Examining the negative responses indicates, there is, as observed in many previous studies, a very significant concern with distractions and disruptions caused by noise, conversations and circulation within, presumably, existing open plan multi-person office environments. Consistent with the key research in this area (e.g. Haynes B.P. The impact of office layout on productivity, Journal of Facilities Management, 6 [3] 189-201) distractions are identified as the most significant barrier to productivity.

Smoking indoors (which is not prohibited by legislation in the UAE) is also seen as a very significant negative issue for both male and particularly female respondents.

The oldest generation is generally less negative across all the dimensions studied, with the exception of distractions. Distraction is consistently the most significant cause for concern across all three generations.

Ranking	Positive Factor	No of positive respondents
1	Work Interaction	71
2	Physical Security	49
2	Privacy	44
3	Social Interaction	44
4	Overall atmosphere and ambience	38

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Ranking	Negative Factor	No of negative respondents
1	Interruptions	121
2	Lack of Privacy	107
3	Crowding	98
4	Lack of Creative Physical Space	78
5	Overall atmosphere and ambience	57

Table 5: Table to illustrate ranking of most significant positive and negative factors within current environments.

The strong sentiment that social interaction is a positive influence on productivity is reinforced by the data in other parts of the survey. This demonstrates that many employees in the region are frustrated by the lack of opportunities for social informal meeting space, and that they see the opportunities for productivity and creativity facilitated by environments that promote less formal interaction.

Analysing both the positive and negative factors and correlating them with responses from other parts of the survey, show a strong link between the need for privacy, a feeling of space, and environments that promote creativity with the factors which negate a positive working environment. The most significant of these factors were interruptions from noise, circulation and crowding. The fact that work interaction is seen as the most positive influence undermines the potential tension between creating spaces that promote interaction and creativity but subdue disruption and a sense of crowding. Again this is entirely consistent with other studies using the same tool and with published research (e.g. Heerwagen, J.H et al. Collaborative knowledge work environments, Building Research and Information, 32[6] 510-528). It also sets an essential design prerogative where open plan space is specified in the final space plan.

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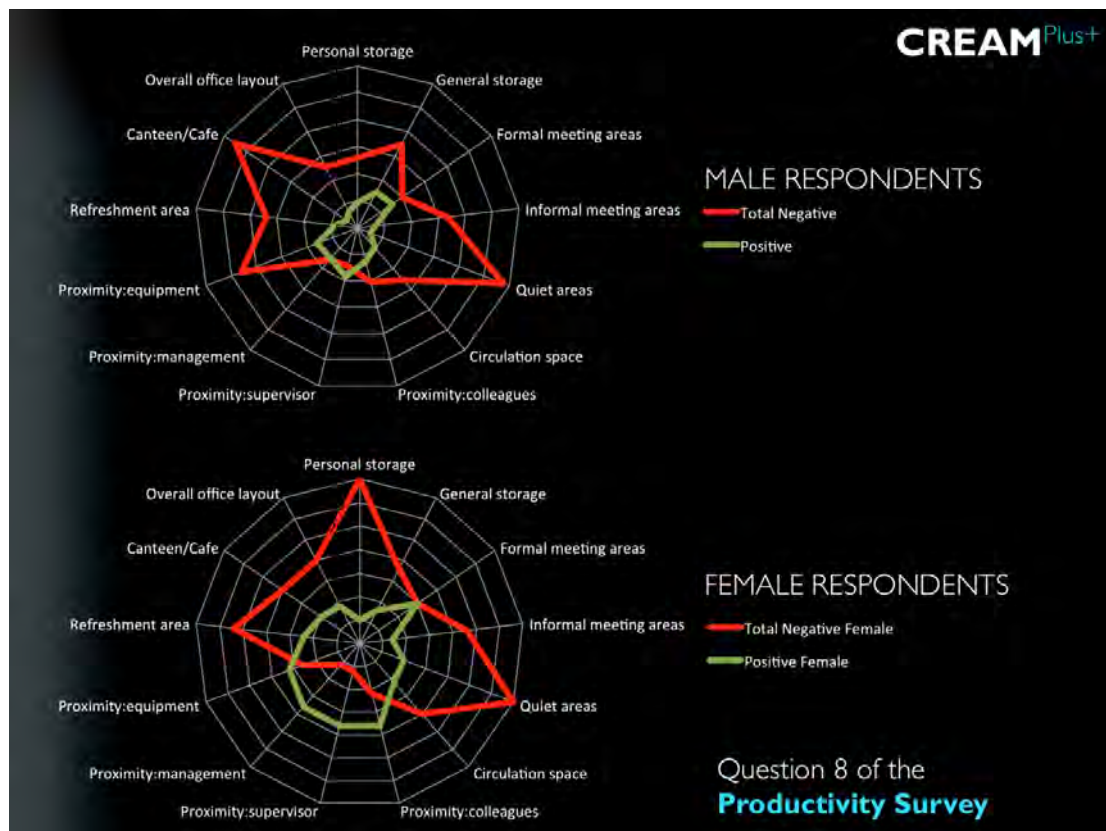
Figure 4: Spider diagram based comparisons of responses from male and female respondents from the Middle East based case studies

Male Respondents   Female Respondents

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Figure 5: Further spider diagram based comparisons of responses from male and female respondents from the Middle East based case studies

Figures 4 and 5 are results from only two questions in the survey but demonstrate the significant variations in the negative and positive response profiles between males and females.

The most significant differences across all questions in our Middle East based surveys are illustrated in table 4.

Attribute	Male	Female
Personal Storage	Low Negative Scores	High Negative Scores
Canteen / Café provision	High Negative Scores	Low negative scores
Proximity of Management	Low Positive Scores	High Positive scores
Proximity of Supervisors	Low Positive Scores	High Positive scores

Table 6: Table to illustrate most significant differences in male and female respondents.

One of the multi variate observations is that female respondents, particularly those from a Middle Eastern background prefer a localized refreshment area with a degree of privacy whilst male respondents from the same culture prefer a large social space. This is just one example of combining the analysis of the data across several categories of respondents in this case gender and culture.

As with other studies such as Kim, de Dear et al (2013) the data demonstrates that thermal comfort, air quality and office cleanliness were also more significant to female respondents than male respondents.

Previous studies in relation to differences between generations have also revealed some significant variations in the preferences of respondents (Puybaraud, Russell et al. 2010, Haynes 2011, Bennett, Pitt et al. 2012).

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Joy and Haynes (2011) found that there was little difference between any of the generations when it came to team based work environments and therefore these environments lend themselves to being classed as multigenerational working environments. In addition, Rothe et al (2012) found that generation Y office workers believed that overall benefits open plan office environments outweighed the limitation of open plan.

However, an area where the difference were found between generational preferences were work activities undertaken in formal/informal meeting spaces (Joy, Haynes 2011)

One of our observations across many studies is that Generation X and Generation Y are more comfortable with blurring the boundaries between work and pleasure and are more amenable to using social workspaces and blending technologies to integrate work processes, networking, using informal meetings and working in teams. One of the things that surprised us in the analysis of our data set is the consistent negative responses across all generations (and cultures) to distractions in the workplace from people (i.e. colleagues). It is often assumed that Generation Y and Generation Z as they enter the workplace are capable of managing distractions and noise as they appear to be able to seamlessly manage formal, social and other interactions and are frequently observed working whilst listening to music etc. However, our evidence suggests that they may be using technology to manage the disruptions and that they are equally susceptible to the distractions created in open plan offices as older generations.

Our other observation across several studies in the Middle East is that younger generations especially generation Y are far less tolerant of adverse temperature and lighting conditions than older generations. A significant difference between Baby Boomers and Generation Y occurs in terms of Generation Y respondents requiring high standards of natural and artificial lighting and comfortable temperature control to feel productive compared to Baby Boomers.
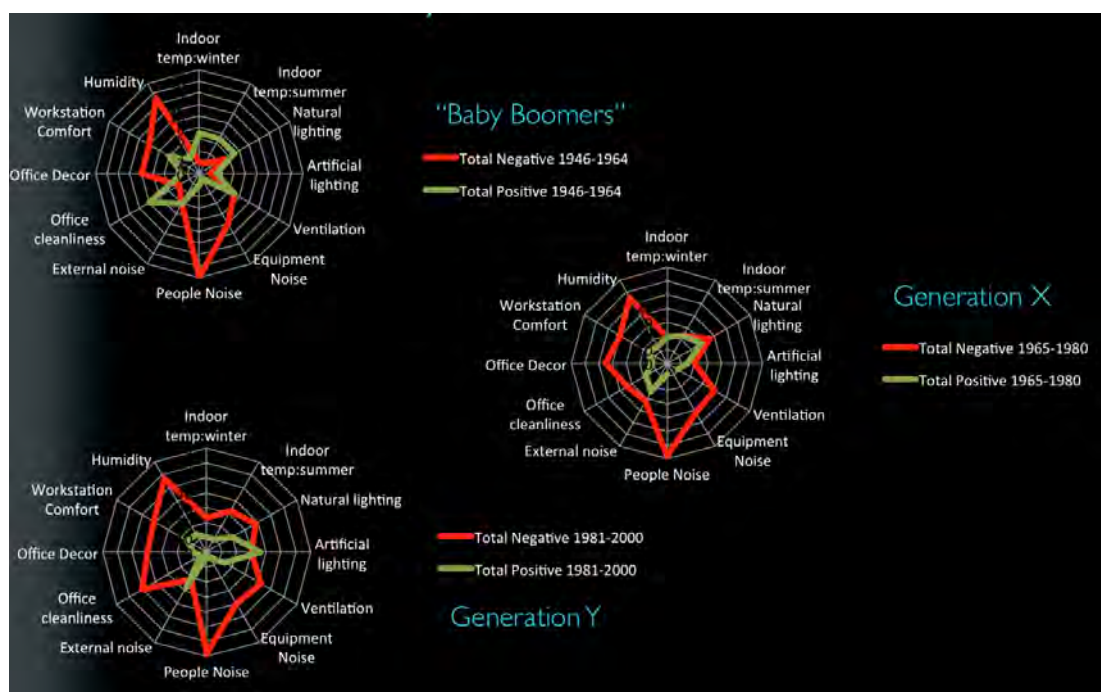
Figure 5: Spider diagram based comparisons of responses from three generations of respondents from the Middle East based case studies.

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9 Towards a benchmarking approach

The authors use their toolkit to provide pre intervention analysis. In the example of the Case Study, this represented two reports one of 50 pages and one of 25 pages giving rich, detailed analysis, data and recommendations to the architects responsible for the space design and layout contract. The survey is then deployed post occupation to measure the differences across all the dimensions and record the adjustments in positive and negative responses. Further evaluation can be used to support adjustments and improvements to further enhance the productivity and performance of the organization.

Whilst the pre and post occupancy evaluations provide invaluable information, data and evidence to support the change process and measure impact it does not provide any relative measure of the organisations performance.

The authors are about to launch a Middle East wide benchmarking study in collaboration with the Middle East Council of Offices to provide a baseline study across all dimensions of their toolkit which can again be broken down by gender, generation, culture and psychometric profile. This will allow future clients to be able to not only measure their performance pre and post intervention but to be able to measure their performance against country or even city specific benchmarking data and it is hoped this will lead to further detailed research outputs and more sophisticated consulting services.

In the future therefore for every question in the survey it will be possible to provide for clients and/or research purposes an analysis which shows pre and post interaction responses and how these compare to an appropriately selected benchmark. An example of this is provided below.
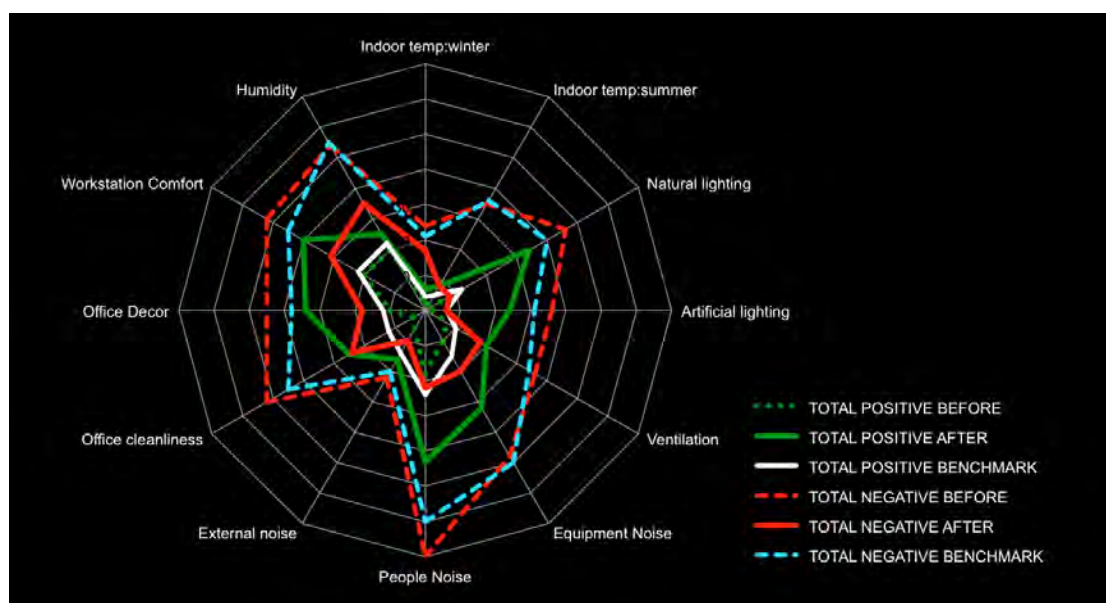
Figure 6: Indicative spider diagram based comparisons of pre and post intervention with an illustration of the proposed benchmark baseline comparative data.

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10 Conclusions

This paper has explored why despite a large output of studies, research and consultancy operations there remains significant lack of engagement, motivation and satisfaction in offices worldwide.

The authors attribute that to three important issues for further discussion and analysis:

i) the need for a *"flipped office"* approach that puts people at the heart of an aligned vision;

ii) the widespread disillusionment with the one size fits all approach inherent in open plan offices; and

ii) the need for greater granularity in the collection and analysis of people centred data which recognises that activity based solutions can only be successful if they integrate the significant differences in preferences observed in this and other studies based on gender, age, culture and psychometric profile.

This paper has argued that creating a one size fits all office environment is a fundamentally flawed concept. To use an analogy, it is like five students providing there hat sizes for a graduation event. Their hat sizes consist of five, six, seven, eight and nine. The graduation organisers believe it too complicated to order five different sizes so decide to order the average hat size of 7. Unfortunately, this hat size will only fit one of the five graduates. And whilst the graduation organizer feels they have been very efficient they have not been very effective with 80% of the students being dissatisfied.

Each individual office worker is unique and in effect they have their own particular needs and preferences for their office environment. To better understand these needs there is a requirement to further categorise people so that greater meaning and understanding can be developed.

Given the complexities of the differing needs and preferences of office workers it is understandable that open plan office environments have failed. However, the solution to this problem is to *"flip the office"*. Instead of a designer believing they can design the perfect open plan environment, why not allow the office occupiers to design their own office on an hourly, daily, weekly basis. Through activity-based working office occupiers should be allowed to pick and mix the appropriate workspace for their immediate work activity. This does mean that there will need for a range of different work settings which will include quiet areas to allow focused work, collaborative areas which will allow group and team interactions and socializing areas which will allow relaxation and socialisation.

There is still a need for further research into different categories of office workers needs and preferences as it is this data that will provide the necessary information for office designers to make an informed decision on the appropriate percentage of allocation of the different work setting areas.

This paper has reported the initial findings of the application of a research-based methodology to large organisations in the Middle East. They confirm significant differences between responses based on age, gender and culture and the need for careful examination of these differences in planning the design and configuration of office layouts. Future publications will focus on the detailed statistical analysis of the data and comparison with the collection of a detailed and extensive dataset to act as a Middle East wide benchmark.

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Drivers' opinions concerning working conditions in forest fuel production

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Abstract. Forest fuel production is a sub-branch in forestry that has increased during the last decade, both in Sweden and in other parts of the European Union (EU). Forestry is a risky branch and knowledge about working environment conditions in forest fuel production is limited. The aim of this study is to raise knowledge about drivers' opinions concerning working conditions in forest fuel production. A questionnaire was answered by 34 drivers. The drivers experience their work as risky. They use personal protective equipment to different degrees in their daily work. Cut damage and slipping are the most common accidents and incidents. Most of the drivers experience the mental and the physical workload as low or moderate. Regarding the findings in this study, two main work environmental issues can be raised: The drivers experience major problems outside the cabin compared to inside, which increases the risk that they stay in the cabin during most of the workday. The new work tasks within forest fuel production may increase the fact that forestry is one of the most risky branches.

1 Introduction

Forest fuel production is a sub-branch in forestry that has increased during the last decade both in Sweden (Skogforsk, 2011) and in other parts of the European Union (EU) (Magar et al, 2011). Biomass from the forest is important and accounts for half of the renewable energy consumption in the EU (European Commission, 2013). The demand on energy from renewable resources, with a significant supply from forest and wood, is predicted to increase in Europe in the coming years (Mantau et al, 2010). Sweden and Finland have been at the forefront in forest fuel production (Routa et al., 2013), while the rest of Europe is following (Röser, 2012). Forest companies in Sweden are often entrepreneurs (97,6%) or micro enterprises (2,2%, have 1 to 9 employees) (SCB, 2015). Workers in this sub-branch are often private contractors, part of a family company, or employed in small (micro) enterprises.

Forestry is a risky branch, and is together with the agriculture and fishing industries the second most risky industry in Sweden (Swedish Work Environment Authority, 2014). In Europe, forestry is seen as a risky sector and workers are exposed to heavy physical workloads, noise, vibrations, biological hazards and chemicals (European Agency for Safety and Health at Work, 2008). Knowledge about working environment conditions in forest fuel production is limited (Björheden & Hedlund, 2011).

Forest fuel operations share many work environment and ergonomic problems with mechanized forestry in general, but also involves specific risks, such as exposure to noise, dust and spores, and whole-body vibrations (Björheden & Hedlund, 2011). Case studies have also identified risks such as monotonous working postures, accidents, and small insufficient cabins (Hedlund & Andersson, 2012), as well as exposure to noise and vibrations (Rottensteiner et al., 2013; Suchomel, Belanová et al., 2011).

Statistics concerning work environment in Sweden are not detailed enough regarding forest fuel operations. Statistics concerning forestry work are included together with agriculture and fishing (Swedish Work Environment Authority, 2014). There are some case studies which have identified different types of risks, but no studies have been found about the drivers' opinions about the total work environment situation.

1.1 Aim

The aim with this study is to raise knowledge about drivers' opinions concerning working conditions in forest fuel production.

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2 Method and material

A questionnaire was developed in collaboration between researchers in Sweden and Finland. Some of the questions were modified from the Finnish study "Changes in work and working conditions 1997-2009" (Kauppinen et al., 2010) and from the Ergonomic Checklist for Forest Machines (Almqvist et al., 2006). Other questions are constructed based on experience and knowledge about the work situation in forest fuel production. The final questionnaire contained questions about personal protective equipment, disorders of different types, accidents, incidents, physical and mental workload, and solo work. The respondents were also asked about age, sex, profession and machines used.

The questionnaire, together with an answering envelope, was primarily distributed through a forestry company to forest fuel entrepreneurs and drivers in Sweden. Logisticians at the forest company were contacted by phone and asked if they could distribute the questionnaire to their network of companies. They were also asked to choose drivers working with stump removal, forwarding or chipping of forest fuel. Some questionnaires were also sent to entrepreneurs in the researchers own network. All entrepreneurs sent the answered questionnaire directly to the researchers. The logisticians, and the entrepreneurs in the researchers' own network, were reminded twice during a two-month period.

The answers were transcribed to a data file and double checked. The answers were analysed all together, but also grouped into the different categories; stump removal, forwarding or chipping. The degree of inconvenience has been considered noteworthy for mean values above 2 on a scale 1-5. The personal rated data 4 or 5 has been considered notable as inconvenient to a high extent. Differences between inside and outside the cabin have been identified when differences in group mean value were above 0.5.

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3 Results

The questionnaire was answered by 34 drivers; one of whom was a woman, and two were of unknown gender. Their ages varied between 19 and 70 years, with a mean 43.3 years. Almost half of the drivers had during the last two years worked with chipping, and as many with forwarding (see Fig. 1. next page).
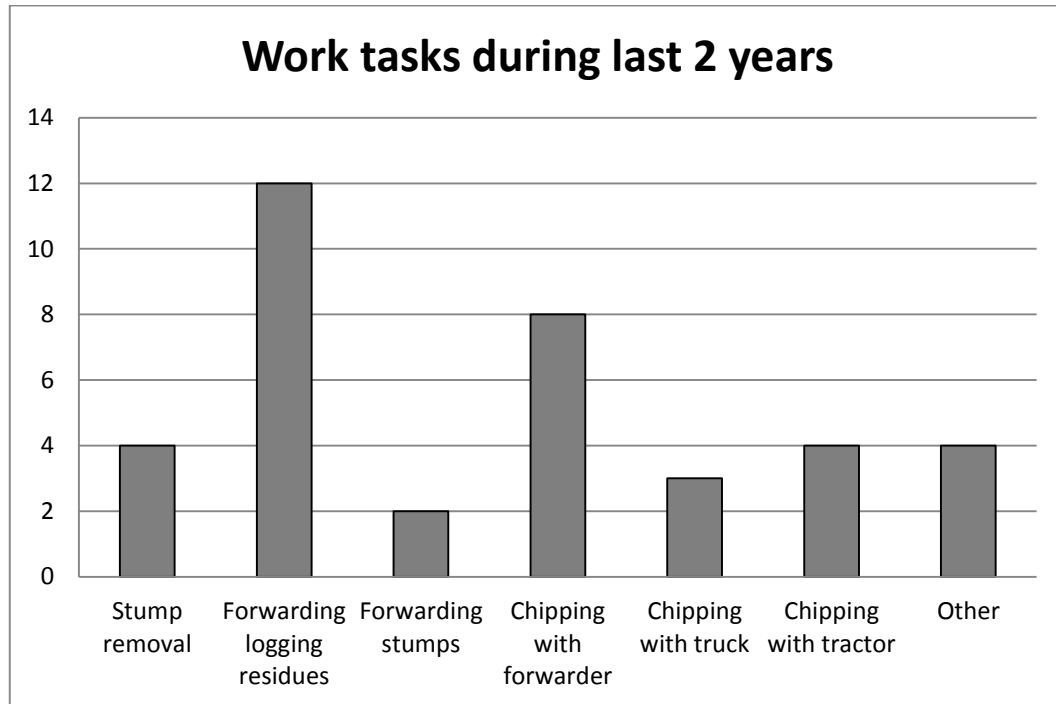
Fig. 1. The drivers work tasks during the last two years (more than one answer is possible)**.**

All of the drivers, except one, wore safety shoes daily (see **Fig. 2**). Also protective gloves, protective clothes and hearing protectors were used daily by many of the drivers. Hearing protectors were used by all chipping drivers, most of them daily. Respiratory protector and protection glasses were seldom or never used by more than half of the drivers.

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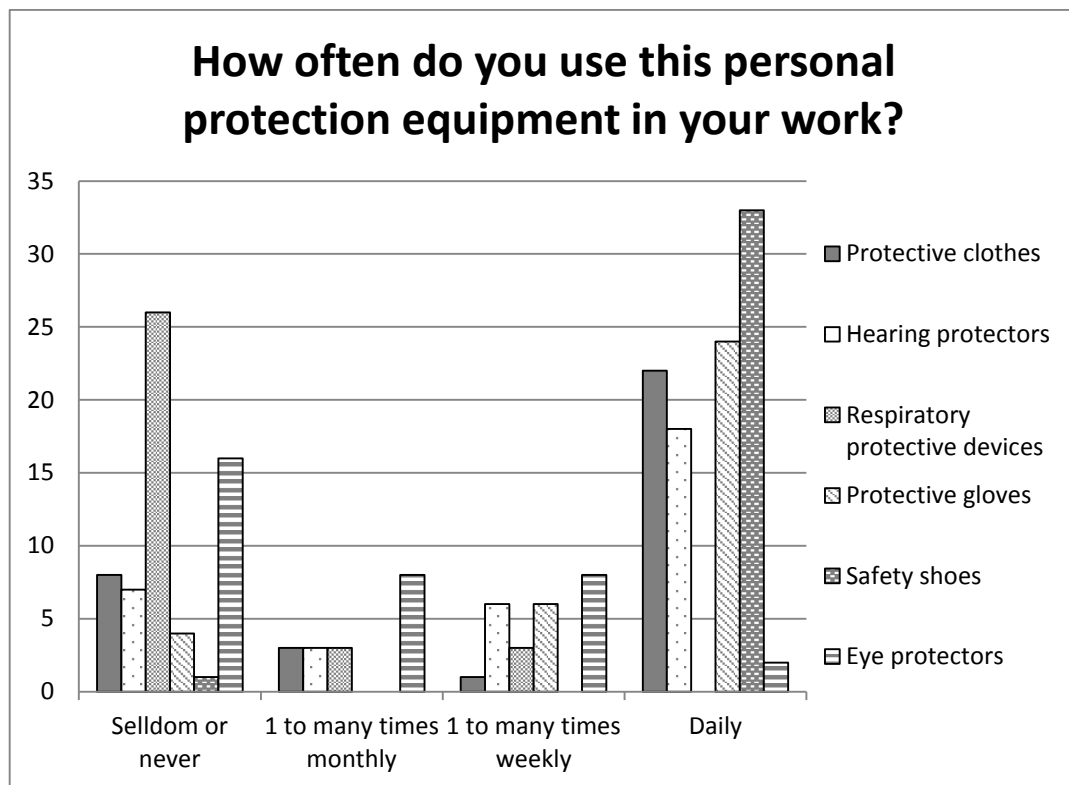
Fig. 2. The drivers' use of protective equipment.

Drivers working with stump removal are bothered in the cabin by heat and bad lightning, or by glare. A comparison between conditions inside and outside the cabin shows that they are more bothered inside the cabin by heat and dust, irritating breathing or eyes, and more outside by dust, not irritating breathing or eyes.

Forwarding drivers are bothered outside the cabin by noise and chill or drafts. Some drivers are to a high extent bothered outside the cabin by noise, chill or drafts, and bad lightning or glare. The drivers are to higher extent bothered outside the cabin than inside concerning noise, chill or drafts, and heat.

Drivers working with chipping are bothered outside the cabin by noise, chill or drafts, and dust irritating breathing or eyes. Some drivers are to a high extent bothered by noise inside as well as outside the cabin. The same applies to dust, both irritating and non-irritating, mold and bad lightning or glare outside the cabin. The drivers are more bothered outside the cabin than inside, concerning noise, chill or drafts, and dust.

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How big is the risk of accidents for you in your work?
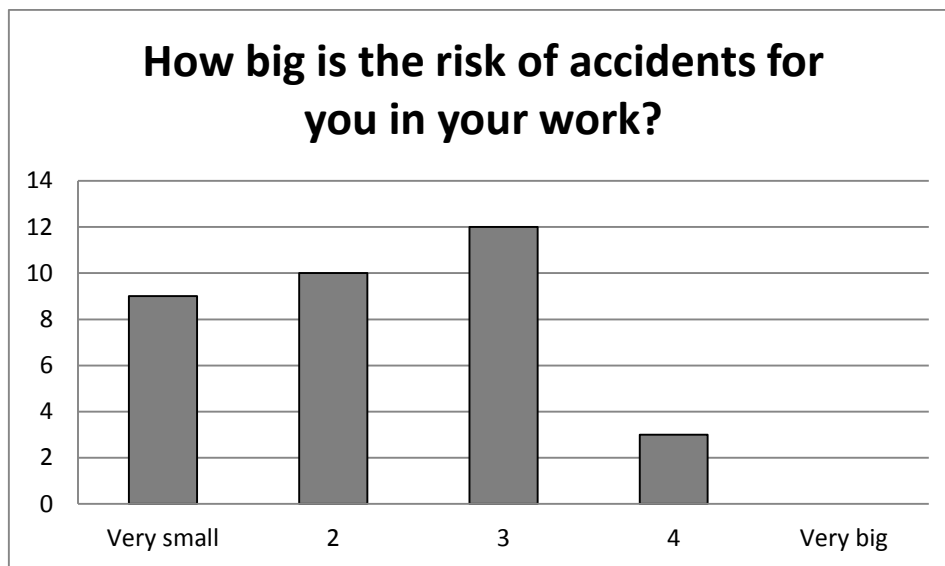
Fig. 3. The drivers' opinion about risk of accidents.

Most of the drivers say that there is a risk of being involved in accidents at work (see **Fig. 3**). Drivers working with chipping state the accident risk much higher than the other two groups. One-third of the drivers have experienced incidents. The highest prevalence is among the drivers working with chipping, where half of them have experienced incidents. Even though almost 20% of the whole group of drivers has been involved in accidents, none have had any sick leave due to work, during the last two years. Also the drivers working with chipping are more vulnerable here, than the other groups.

What kind of accidents and incidents have you encountered?
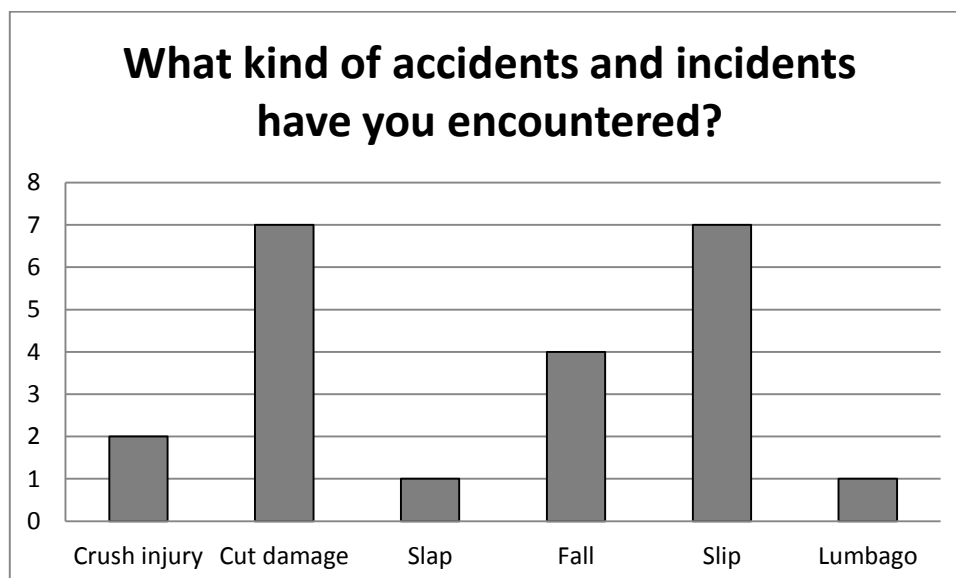
Fig. 4. Description of occurred accidents and incidents.

Cut damage and slipping are the most common accidents and incidents (see **Fig. 4**). Cut damage occurs especially to drivers working with chipping. Forwarding drivers and drivers working with chipping have experienced slipping to the same degree.

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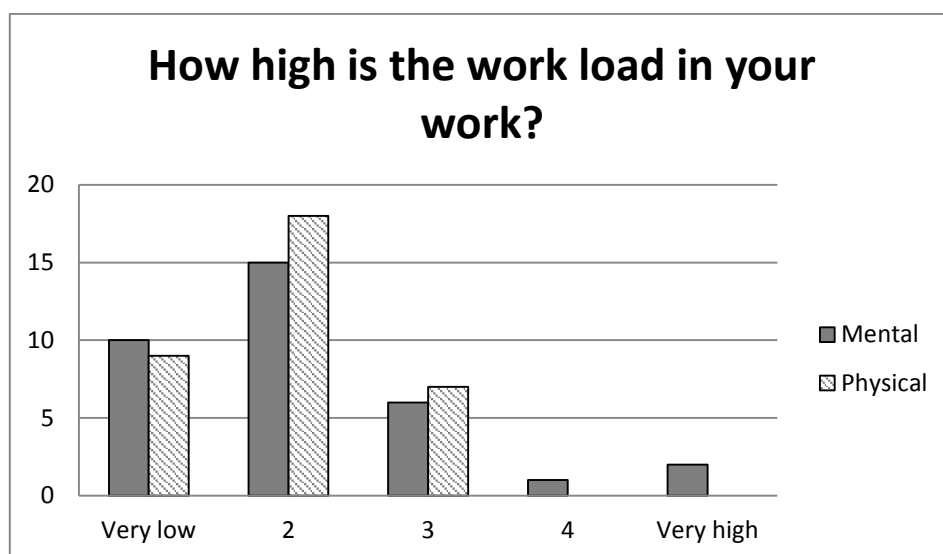
Fig. 5. The drivers' opinions about mental and physical workload.

The drivers rate the mental workload higher than the physical workload (**Fig. 5**). Three of the drivers rate the mental workload as high or very high. Two of those work with chipping.

Mostly the drivers work alone and are satisfied with solo work. Only three drivers rarely or never work alone.

4 Discussion

One experience from the study is that it is difficult to reach drivers working with forest fuel production, even if Sweden is one of the leading countries in Europe in this field (Routa et al., 2013). An explanation for this is that this sub-branch includes entrepreneurs and micro enterprises. The ability to reach drivers deteriorated when contact was mainly handled by an intermediary. There are at least four steps that could have failed: the distribution of the questionnaire from the logisticians to the companies; the distribution of the questionnaire from the company owner to the driver; the driver did not complete the questionnaire; or the answer was not delivered by mail. Even though the number of answers is low, some indications and trends can be discussed. The findings are in line with the researchers experiences from discussions with drivers in other projects.

The aim with this study is to raise knowledge about drivers' opinions concerning working conditions in forest fuel production. The drivers have answered that they use personal protective equipment to different degrees in their daily work. Since many of the drivers working with chipping are bothered by dust outside the cabin, probably during maintenance work, is it surprising that so many seldom or never use respiratory protective devices and eye protectors. Many drivers experience the environment as noisy, which implies a need for hearing protection. The results indicate that the drivers working with noisy work tasks apply the knowledge of how to protect themselves.

The drivers experience their work as risky. That is in line with earlier reports about forestry as a risky branch (Swedish Work Environment Authority, 2014; European Agency for Safety and Health at Work, 2008). Chipping is a quite new and growing work task in forestry, and in this study it is pointed out as the most risky work task in forest fuel production. This correlation needs to be taken seriously and addressed, in order not to encounter even more accidents and injuries in the forestry industry as a whole.

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Cut damage and slipping are the most common accidents and incidents, according to the drivers in this study, and can result in serious cases. This, in combination with solo work, is an environmental problem that has to be addressed in different ways: Primarily, by reducing the risk of occurrence by, for example, using protective gloves and ergonomic stairs (Almqvist et al., 2006). Secondly, by having an organization prepared to identify and take care of drivers when accidents occur.

Most of the drivers experience the mental and the physical workload as low or moderate. There can be different explanations as to why a pair of chipping drivers experienced a very high mental workload. The researchers' experience from earlier case studies is that this work task implies disturbing noise from the surroundings, a large, open risk zone around the equipment, due to flying pieces, and a demand that the chipped material is clean from stones and other pollutions, etc.

Regarding the findings in this study, two main work environmental issues can be raised.

•   This study shows that working with forest fuel is associated with different risks, where the drivers experience major problems outside the cabin. It is well known that monotonous working postures are unhealthy and are common in forestry. The experienced difference between the environment inside and outside the cabin increases the risk that drivers stay in the cabin during most of the work day.

•   The new work tasks within forest fuel production may increase the fact that forestry is one of the most risky branches.

Acknowledgement

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SME´s internationalization: The role of organizational capabilities on strategy in the German MedTech industry

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Abstract. The aim of this research is to find out which specific factors influence the strategic approach of German MedTech SMEs, how organizational capabilities are related to their strategic approach and what influence they have on the strategy execution in international ventures. Based on theoretical reasoning and on an empirical investigation, a conceptual model of international expansion in this industry leads to understand the behaviour of such SMEs and evaluates important ingredients of success and identifies those that appear to be most prevalent.

1 Introduction

The academic literature often refers to the three main strands of theories, namely the stage theory, contingency theory and the resource-based view, which describe basic patterns in the context of internationalization.

"A small company is not just a little big company". Thus firm size plays an important role when resources are limited and knowledge is concentrated on single persons. Organizational capabilities are crucial to develop singular managerial experience and skills, knowledge of foreign markets and business practices into organizational knowledge and the process of decision making and strategic execution in the context of internationalization is complex and determined by many different factors. Some scholars group them into classes such as external environment, internal environment and product-market structure. These factors may be endogenous or exogenous and either positive triggers that encourage international involvement, or negative influences that discourage it. There is some disagreement within the literature in terms of the relative significance of internal versus external contingency factors. Some researchers have conceptualized environment as one of the key constructs of understanding organizational behaviour and strategic approach depending on the competitive setting of the business. In contrast other researchers focus on internal factors, particularly in an organizational and managerial context. Nevertheless the findings suggest, that whilst there are some common processes and patterns among firms´ internationalization, the variations can be explained by the contingency theory. But this neglects the specific industry context in which the firms operate as an important factor in their internationalization process. Recent research in the context of the MedTech industry for example emphasizes that economic success is more driven by regulatory knowledge than by technology or product know how.

2 The impact of capabilities on strategic fit

Through the lens of the resource-based view capabilities are valuable and rare. Following the knowledge based theory firm´s capability to manage internal competencies enables the transformation of knowledge into value creating processes (Dosi & Marengo, 1994). But there is a discourse on the impact of capabilities on strategy and firm´s success. According to Murray et al. (2010) it is important to develop a level of strategy fit that is consistent with organizational resources. Atuahene-Gima and Murray (2004) highlight the influence of organizational capabilities in the context

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of the development of such a strategy, whereas according to Lee and Beamish (2009) empirical research on the relationship between these two constructs has produced mixed results. Lages et al. (2007) even sees little empirical evidence of strategic impact of capabilities on strategy and performance in the context of internationalization, Hence Theodosiou and Katsikea (2013) considers firm's capabilities as a specific field of interest for future research.

Summarized strategic fit of firm's strategy according to resources both in development and execution can be seen as a strategic capability. Furthermore this construct is an antecedent for competitive advantage and economic success. Organizational capabilities may have an influence on the relationships of this construct and therefore internal organizational capabilities such as organizational learning, coordination mechanism and relationship capabilities are from particular interest.

3 Relevance of the research

Consequently SMEs in the MedTech industry face a fundamental challenge. They are strong in domestic and EU markets, but compares to other high-tech industries they are under-represented in the largest and in the growth markets. In contrast high product development costs with respect to a distinctive innovation strategy force companies to increase turnover. Consequently this means to recover investments via internationalization, but this is often constrained by resource limitations or challenging environmental factors.

In case these SMEs will not find a way to successfully internationalize their business, they will disappear from the market sooner or later. This would have an economic impact, since the MedTech market is of major importance not only for the healthcare system but for the industrial development in Germany as well (Wintermantel, 2009). There would be as well a social impact, since the access to better treatments and the rapid progress on medical technology for the benefit of the patients in the context of the demographic challenges require maintaining supply, innovation and competition in MedTech for the future. The findings help to gather a deeper understanding and new insights regards the behaviour of SMEs in international ventures, contribute to evaluate the impact of organizational capabilities and practitioners, business support providers and governmental sources can use this knowledge to assist firms operating within healthcare industry.

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The CQI as a predictor of resident satisfaction in nursing homes

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Abstract. The CQI is a mandatory questionnaire in the Dutch elderly care. We assume that the satisfaction of residents of nursing homes is predicted by the fulfilment of 5 basic needs according to the Social Production Function theory, 2 physical needs (comfort and stimulation) and 3 social needs (affection, behavioural confirmation and status). The CQI is tested by using it to predict the general satisfaction of residents, which it does for only 1/3 of the variance. We conclude that the CQI is not a strong predictor and, using the CQI, that social aspects are missing.

1 Introduction

In the Dutch healthcare system, patient experience research is mandatory for elderly care homes (nursing homes). Every other year the Customer Quality Index (CQI) is used to survey the experiences of the residents. The results are used in two ways: first of all to compare the quality of the different homes, used by the health and safety inspection to pinpoint high-risk locations. The second goal is to help the public in choosing their respective home, by publishing the results on a government website.

To compare and publish, the CQI for patients in long-term elderly care measures 12 variables (Asmoredjo, J., de Boer, D., & Delnoij, D., 2012): meals, atmosphere among residents, cleaning, interior, privacy, activities, staff quality, social treatment by staff, staff availability, joint decision making, information, and safety. Lastly the general satisfaction is measured through the Net Promotor Score (NPS).

Comparing and publishing are however not the only possible outcomes of patient experience surveys, they can also be used to improve the quality of care. In surveying all nursing homes every 2 years, a lot of data is collected. These data can be used to find important predictors for the satisfaction of patients. Knowing what factors influence the satisfaction of residents, nursing homes can adjust their policies to create an ever better environment for the residents.

This paper focusses on what factors in the CQI are important predictors of general satisfaction among residents. Based on a theory concerning quality of life, hypotheses will be given. For patients living in a healthcare clinic (i.e. elderly homes) the quality of life is strongly dependent on the quality of care. We therefor assume that their general satisfaction with the nursing home, as measured in the CQI, is closely related with their life satisfaction. This assumption is supported by previous research (Jenkinson, Coulter, Bruster, Richards, & Chandola, 2002).

2 Satisfaction in nursing homes: theoretical and empirical background

2.1 Empirical background

Many social scientists have researched the influence of different factors on the general satisfaction of residents of nursing homes (Abusalem, Myers, & Aljeesh, 2012; Burack, Weiner, Reinhardt, & Annunziato, 2012; Chou, Boldy, & Lee, 2003; Johansson, Oléni, & Fridlund, 2002). Johansson et al. (2002) compare 30 different studies on the subject using the model of Henderson (Henderson, 1966). Reviewing these 30 studies, they tested the model of Henderson and categorised all results into five domains: physical surroundings, communication with staff, information by staff, participation in activities, and medical quality. Research by Jenkinson et al. (2002) shows similar outcomes, they find

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physical comfort, emotional support and respect as the most important predictors. Again a combination of physical and social factors.

Notably, none of these papers give an explanation for the relative weights of different factors. Most authors simply give a model in which they show the different factors, without explaining why. By using a theory to explain these differences, we can not only hypothesise the predicted weights, but also find missing factors.

2.2 Social Production Function Theory

As described in chapter 1, we assume that life-satisfaction is closely related to general satisfaction in a nursing home. We will therefor use a theory of life-satisfaction to predict resident satisfaction in nursing homes. In choosing a useful theory of life satisfaction, 3 criteria should be kept in mind according to Gerritsen, Steverink, Ooms and Ribbe (2004). First of all, the theory should be based on human wellbeing in general. *"When starting from a perspective that is comprehensive and based on human beings in general (…) it is possible to determine which dimensions are affected by the residents condition, and which are still intact and may therefore contribute to the residents' quality of life"* (Gerritsen et. al., 2004, p 612)

The second criterion is that a theory not only describes the various factors, but explains their influence on life-satisfaction. The third and final criterion, as described by Gerritsen et al. (2004) is that a good theory leaves room for individual differences. Two people in the same environment, can have different experiences. Individual preferences and background may influence outcomes. Based on these 3 criteria, Gerritsen et al. (2004) conclude that the Social Production Function theory (SPF) by Lindenberg (1996) is a good and useful theory.

The Social production Function theory (SPF) states that quality of life is based on two universal needs; social and physical needs. These two universal needs can be divided into five sources; comfort and stimulation (both physical), affection, behavioural confirmation and status (all social).

Comfort is described as the absence of physical displeasures such as pain, hunger and fatigue. By having resources such as food, a comfortable chair and medical aid, comfort is achieved. Stimulation is the desire to do things, to not be bored. Although it is a physical need in the SPF, it can also be fulfilled by social resources such as playing a game with someone (Steverink et al., 1998).

Affection is the desire to be valued for who you are. This can be felt in either romantic relations, family ties or friendships. Affection is being special, just for who you are, not what you have of what you have achieved. Behavioural confirmation is the need to feel normal, to fit in. Knowing one is not "weird" is a highly valued resource. Status, on the other hand, is the desire to be special. Were affection is being special for who you are, status is being special for what you are or what you have.

An important element of the SPF theory is the element of substitution. When one of the 5 needs is less abundant in one's life, this can be substituted by another. When stimulation is difficult to achieve because of a medical condition, one does not automatically lose their quality of life. It can be substituted by investing more time in for instance good friendships or a loving relationship.

2.3 Theory of the critical phase

A derivative of the SPF is the theory of the Critical Phase (Steverink, 2001; Steverink et al., 1998). This theory describes the fulfilment of the 5 needs throughout one's lifetime. As a child, people have plenty of resources concerning affection, comfort, stimulation and behavioural confirmation. From the moment a child goes to school, status can be achieved. From this moment on, all needs can be met in one way or another. On average, status grows during one's career and diminishes at the age of retirement (65 in the Netherlands).

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A need is met when there are more resources than restrictions. For status this usually happens after retirement, but this can be substituted by for instance affection. Spending more time with the grand-children would be a way to do this. Or it can be substituted by stimulation, taking on a new hobby such as painting. But because of old age, more and more restrictions appear for all needs. Some hobbies such as tennis become more difficult because of physical aging. In figure 1, a hypothetical curve of the different needs is shown. Above the horizontal line is where restrictions become bigger than the resources, leaving a need unfulfilled.

The first need to go unfulfilled (in general) is status, after that behavioural confirmation and stimulation get difficult. When those 2 fail, affection and comfort are all that remains. This phase is what Steverink calls the Critical Phase. It usually occurs when physical handicaps prevent one from independent transport, making it difficult to see friends and undertake activities.
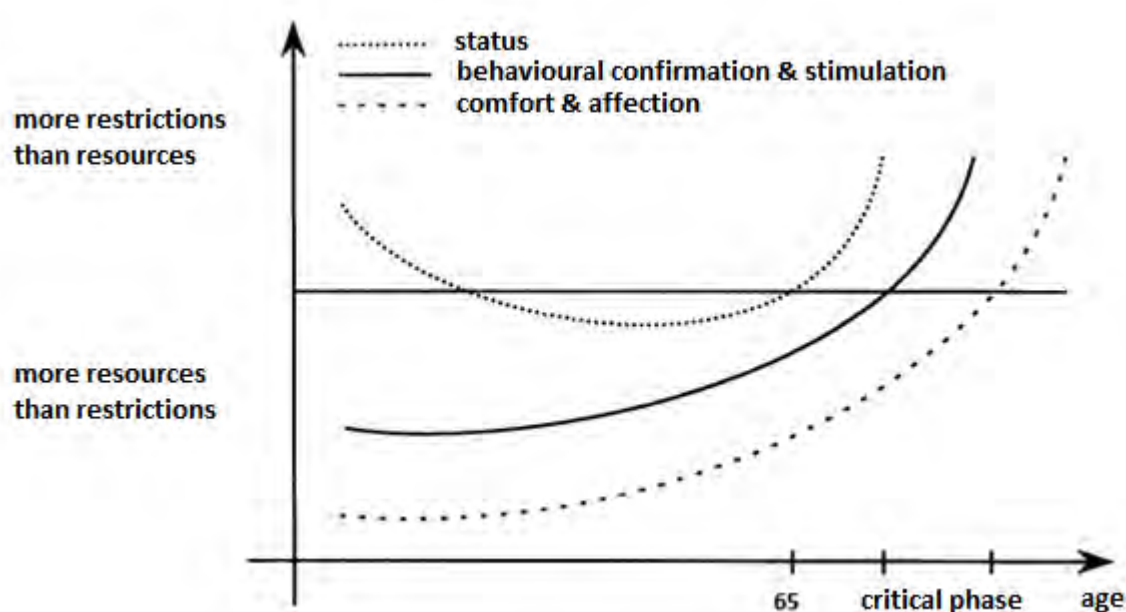
Fig. 1. Hypothetical curve of ease to fulfil needs. Source: Steverink (2001).

2.4 Hypotheses
Considering the SPF theory, we can assume that a questionnaire measuring all 5 needs, is a strong predictor of residents satisfaction. In general we thus hypothesize that the CQI is a strong predictor of general satisfaction. If not, aspects are missing in the questionnaire.

The critical phase, is generally the moment that people start to consider moving to a nursing home. Comfort and affection still remain, leaving a considerable portion of the quality of life intact, but one is at risk of losing them. Especially when the partner dies, affection and comfort are at risk of being restricted, then the quality of life is at risk.

Considering this, comfort and affection should at least be secure in a new living environment, otherwise a move would not be helpful. Therefor we assume that comfort and affection are positive predictors of resident satisfaction.

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Many people, both elderly and their family, hope that the quality of life even improves after moving to a nursing home. Not only because of the medical care, also because of possible new friendships, fitting activities. Considering the SPF theory, we can state that they hope that behavioural confirmation and stimulation might be restored. We therefor assume that behavioural confirmation and stimulation are positive predictors of resident satisfaction, but less important than affection and comfort.

Status, lastly, might be difficult to achieve in a nursing home, but not impossible. There are plenty of examples where residents still perform on stage with music of theatre. So for those few who still achieve status, it will add to their satisfaction. The last hypothesis is that status is a positive predictor of satisfaction, but less so than affection, comfort, behavioural confirmation and stimulation.

3 Methods

3.1 Data collection and control variables

Data has been collected in 7 nursing homes in the north of the Netherlands. In every nursing home 30 residents where interviewed by trained interviewers, collecting a total of 210 respondents. Data-collection has been performed to the standards of the Dutch ministry of health.

One the nursing homes was in the middle of a renovation, influencing the results. This location was excluded, leaving 180 valid interviews. All interviews with less than 50% of the questions answered where removed, leaving 173 valid interviews. Average age was 82,7, with a standard deviation of 10,3. The sex of the residents is unknown. How long residents have lived there for is coded on a 5-point scale, 1= less than 6 month, 2= between 6 month and a year, 3= 1 to 2 years, 4= 3 to 5 years and 5 = more than 5 years. Perceived health is also measured on a 5-point scale, 1= very bad, 2= bad, 3= average, 4= good, 5= excellent. Averages and standard deviations of control variables can be found in table 1.

Table 1. Descriptives of control variables

	N	Min.	Max.	Average	Std. Dev.
Length of residence	156	1,00	5,00	3,46	1,26
Age	157	48,00	101,00	82,73	10,30
Perceived health	157	1,00	5,00	2,52	,84

3.2 Analysis

All 12 scales have been divided into the 5 basic needs. Some resources (and thus scales) are multifunctional, meaning they are a resource for more than 1 of the 5 needs. The interior for example, is partly comfort and partly behavioural confirmation. Choosing your own interior makes one feel normal, while having a nice and comfortable interior gives physical comfort.
Table 2 shows how the 12 scales have been divided into the 5 basic needs. Notably, most of the scales are of a physical nature. Comfort has by far the most 'unique' resources, while all but 1 multifunctional resources have a big physical component. Affection, stimulation and behavioural confirmation have fewer resources, status not one. Consequences hereof will be discussed in chapter 5. All variables have been used in a regression analysis, the bèta's thereof will be used to compare the relative weights of the scales.

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4 Results

All variables have a 4-point scale, 'interior' has a standard deviation of 0 (all resident can choose their own interior) and is thus not used in the regression analysis.

Table 2. Descriptives of independent and dependant variable(s)

Variable (scale)	N	Min.	Max.	Average	Std. Dev.
Multifunctional					
Interior (1-4)	145	4,00	4,00	4,00	,00
Staff availability (1-4)	142	1,00	4,00	2,98	,96
Staff quality (1-4)	151	1,25	4,00	3,60	,53
Information (1-4)	140	1,00	4,00	3,48	,90
Comfort					
Meals (1-4)	154	1,00	4,00	2,99	,90
Cleaning (1-4)	154	1,00	4,00	3,39	,92
Privacy (1-4)	149	1,00	4,00	3,93	,34
Safety (1-4)	149	1,00	4,00	3,46	,95
Affection					
Atmosphere (1-4)	132	1,00	4,00	3,29	,86
Social treatment (1-4)	153	1,00	4,00	3,50	,66
Stimulation					
Activities (1-4)	135	1,00	4,00	3,73	,61
Behavioural confirmation					
Joint decision making (1-4)	138	1,00	4,00	3,30	,77
General satisfaction (0-10)	136	3,00	10,00	7,90	1,17

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Table 3. Results of regression analysis

	Model 1		Model 2		Model 3		Model 4		Model 5		Model 6	
	β	p	β	p	β	p	β	p	β	p	β	p
Control variables												
- Length of residence	-,10	,39	-,14	,23	-,12	,31	-,11	,32	-,12	,30	-,14	,19
- Age	,31	,02*	,17	,23	,01	,92	,00	,99	-,05	,72	-,08	,55
- Health	,15	,20	,04	,75	,05	,69	,03	,79	-,00	,99	-,02	,88
Multifunctional												
- Staff availability			-,10	,43	-,07	,55	-,11	,40	-,08	,51	-,01	,91
- Staff quality			,29	,04*	,13	,41	,03	,85	,13	,44	,26	,15
- Information			,27	,03*	,25	,04*	,26	,03*	,19	,10	,21	,05*
Comfort												
- Meals					-,00	,99	-,01	,93	-,01	,92	-,06	,64
- Cleaning					-,00	,99	-,01	,94	,04	,73	,06	,57
- Privacy					,06	,64	,06	,62	-,05	,68	-,07	,57
- Safety					,41	,00**	,36	,01*	,35	,01**	,36	,01**
Affection												
- Atmosphere							,12	,34	,08	,55	,16	,90
- Social treatment by staff							,15	,32	,00	,99	,01	,95
Stimulation												
- Activities									,30	,03*	,36	,01*
Behavioural confirmation												
- Joint decision making											-,25	,07
R2 (adj)	,08		,20		,29		,29		,34		,37	
F change			4,24**		2,93*		1,37		4,72*		3,53	
N	63		60		56		54		53		52	

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We assumed that all 5 basis needs would be a positive predictor of the general satisfaction of residents and that the CQI would be a good predictor of general satisfaction. With an adjusted R2 of 0,37 with all variables included (model 6), the CQI is not a strong predictor of the general satisfaction. The first hypothesis is therefore not supported by the data, meaning that certain aspects are missing. In chapter 5 we will discuss the different options and how to correct them.

The predicted order of weights of the different needs is not found in the data. The best predictors are activities, safety and information. Comfort has 1 significant predictor (safety), affection has none. Stimulation has one significant predictor (activities) but behavioural confirmation has none. Status, lastly, I not even included in the questionnaire.

5 Discussion
We assumed that the CQI would be a good predictor of general satisfaction for residents of a nursing home. This assumption was made on the basis that the questionnaire was designed for this specific purpose; to evaluate and improve satisfaction among residents. The fact that only 37% of variance is explained by the CQI, means that it is not complete. Apparently, the authors of the CQI did not manage to capture the needs of elderly residents in 32 questions. The first question here would be, what aspects are missing then? The second question being, why are they missing?

We know from earlier research that the general satisfaction of residents in a nursing home is closely aligned to their life satisfaction (Jenkinson et al., 2002). We have choses a theory of life satisfaction that applies to all stages in life, assuming that it's not the needs of people that change, it's their ability to fulfil them. This theory, SPF, states that in the basis people have 5 basic needs: comfort and stimulation (both physical), affection, behavioural confirmation and status (all social). As noted earlier, stimulation is a physical need that can be fulfilled through social resources. Of the 5 needs, 4 can thus be met through social resources.

The CQI measures 12 aspects, of which only 3 are purely social, while 9 have a physical basis. So, what aspects are missing? We can probably assume that they are social resources. Residents of nursing homes have 3 types of social interaction: with family, with other residents and with the staff. Of these 3 social groups, residents and staff are seen daily, while family is only met when they visit. We can therefor safely assume that the atmosphere among the residents and the social interaction with the staff are important resources for their life satisfaction. These aspect are now measured with 1 question each, on a 4 point scale.

It is advisable to add questions about the amount and quality of social interaction in nursing homes, to create a better predictor if the general satisfaction among residents of nursing homes. This is ground for further research, what social aspects can complete the CQI questionnaire? What influence does staff satisfaction have on residents?

The second   question we posed at the start of this chapter, was why are these aspects missing? As said, the CQI is a national questionnaire used as instructed by the national health ministry. We contacted them with the earlier findings, that there are too few social aspects in the CQI. They reacted by saying that social interaction, with fellow residents and with staff, can't be guided by policy makers. It is, in their view, a coincidence whether the social atmosphere is active and friendly.

The second hypothesis was that a hierarchy can be found within the 12 5 basic needs. Comfort and affection being the most important, behavioural confirmation and stimulation being middle range and status being at the bottom. We did not find this hierarchy. The CQI was not designed around the SPF theory, so the division into the 5 needs is not absolute. To test the theory it would be best to create a questionnaire based on the SPF theory. But that wasn't the goal. The goal was to test the CQI as a predictor of general satisfaction.

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Evaluation for adequate driving and resting time of the commercial bus drivers

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Abstract. The present study aimed to provide a basis for policy of commercial bus drivers' adequate working time. For this purpose, we investigated the working conditions of bus drivers and evaluated adequate driving and resting time in a day. The present study was composed of literature review, interview for work conditions of bus drivers, questionnaire survey, and measurement of biomarkers for bus drivers. We identified work conditions such as work schedule, type of bus driving and bus, and others through interview for bus drivers. Based on the information from this interview, we determined the number of study subjects for questionnaire survey. In the future, we will analyse the information of literature review, interview, and measured biomarkers including salivary cortisol, blood pressure, heart rate, physical activity, energy expenditure, fatigue and risk index, and maximum acceptable work time. We hope to show you all result from the present study, and the result could be helpful to establish a policy for the safety of the public, as well as health promotion or bus drivers.

Introduction

Long working hours is considerable problem in the workplace that could have a negative impact on workers' health. The health conditions associated with long working hours include obesity, cardiovascular diseases, sleep disturbances, men illnesses such as depression and anxiety, and occupational injuries.
Statutory working hours in Korea had been 48 hours a week before 1989. Statutory working hours was decreased from 48 hours to 44 hours a week in 1989, and from 44 hours to 40 hours a week in 2006. In spite of these changes, working hours of workers in Korea were the longest among the countries of the Organization for Economic Cooperation and Development (OECD) until 2007; they were the second longest from 2008 to 2010.

Regulation for working hours is stipulated in the Labour Standards Act in Korea. Statutory working hours regulated in the Labour Standards Act is 40 hours a week and 5 day workweek. This Act has allowed extended working hours up to 12hours a week. But transportation, sales, finance and insurance, telecommunications, advertising, medical, and other sectors are exception of this regulation. The workers in these sectors are allowed to work more than 12 hours of extended hours a week. This is one of the causes for Korean workers' long working hours.

In 1979, International Labour Organization (ILO) recommended the work conditions through the convention No.153: hours of work and rest periods (road transport) convention. According to this convention, the maximum total driving time, including overtime, shall exceed neither 9 hours per day nor 48 hours per week. Furthermore, no driver shall be allowed to drive continuously for more than 4 hours without a break, and drivers shall be entitled to a break after a continuous period of 5 hours of work. But commercial bus drivers in Korea work extremely long hours because transportation sector is the exception of the regulation for working hours in the Labour Standards Act. Their working hours are different according to the type of work. Some bus drivers work 8 hours a day, but others work up to 17 hours a day. Almost bus drivers are complained of fatigue, poor concentration, sleep disturbances, gastrointestinal problems, and others. Commercial bus drivers are responsible for the safety of the public. So, their fatigue due to long working hours may cause a significant accident accompanied by injuries of the general population, as well as their health problems.

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It is important to establish a policy for preventing commercial bus drivers' fatigue to prevent the significant accidents and ensure the safety of the public. This is also important for health management of bus drivers. The present study aimed to provide a basis for policy of commercial bus drivers' adequate working time. For this purpose, we investigated the working conditions of bus drivers and evaluated adequate driving and resting time in a day.

Subjects and Methods

The present study was composed of literature review, interview for work conditions of bus drivers, questionnaire survey, and measurement of biomarkers for bus drivers. We identified work conditions such as work schedule, type of bus driving and bus, and others through interview for bus drivers. Based on the information from this interview, we determined the number of study subjects for questionnaire survey.

This is an ongoing study now, and only a part of literature review and interview for work conditions of bus drivers were done currently. Questionnaire survey and measurement of biomarkers for bus drivers do not start yet. Questionnaire survey will take place from May to July 2015, and measurement of biomarkers for bus drivers will take place from June to September 2015.

Study subjects

Subjects for questionnaire survey were determined in consideration of the type of work and bus driving. There are several types of work in bus drivers which were 2 shifts a day, shift every second day, 2 working days and 1 rest day, 4 working days and 2 rest days, and others. The type of bus included city bus, regional bus, intercity bus, express bus, and local bus. Study subjects included drivers of city bus, regional bus, intercity bus, and express bus. Drivers of local bus were excluded from the present study. Total number of study subjects for questionnaire survey was 1,200.

Subjects for measurement of biomarkers were also determined in consideration of the type of work and bus driving. Subjects for measurement of biomarkers were determined in 24 bus drivers. These drivers included 2 city bus drivers engaged with 2 shifts a day, 2 city bus drivers engaged with shift every second day, 3 regional bus drivers, 6 intercity bus drivers of short, medium, and long distance, 6 express bus drivers of short, medium, and long distance, 2 full-time and 2 part-time city bus drivers.

Literature review

We reviewed the research article for bus drivers' health problem, work conditions for bus drivers, working hours including driving and rest time for bus drivers, and others. Furthermore, we also reviewed the reports about work conditions for bus drivers published in Korea. The information from the literatures and reports about bus drivers was useful to design the detailed methods for the present study.

Interview for work conditions of bus drivers

We visited commercial bus companies for interview. The companies we visited were city bus company, regional bus company, intercity bus company, and express bus company. We interviewed with bus drivers about their work conditions. The contents of interview included daily working hours, work schedule, daily times and hours of bus driving and resting, and duties during standby. Commuting method and time were also included in the interview.

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Questionnaire survey

The contents of questionnaire survey consisted of general and work-related characteristics of subjects. The general characteristics included age, gender, height, weight, education, smoking, alcohol consumption, leisure-time exercise, daily sleep hours, and past medical histories. The work-related characteristics included daily and weekly working hours, monthly number of working days, work schedule, daily time and hours of bus driving and resting, time of on and off work, method of commuting and commuting time, and others. We are planning to conduct the questionnaire survey from May to July 2015.

Measurement of biomarkers for bus drivers

Biomarkers we are planning to measure in bus drivers include salivary cortisol, blood pressure, heart rate, physical activity, and energy expenditure. We will use ambulatory blood pressure monitor device to measure blood pressure, and actiheart to measure heart rate, physical activity, and energy expenditure. Actiheart is chest-worn monitoring device that records heart rate and physical activity (Fig. 1). Measurement will be conducted in the rest day and consecutive working days. Salivary cortisol will be measured 4 times a day in the rest day and the next working day. Blood pressure will be measured every 15 minutes during activity and every 30 minutes during sleep for 2 days (a rest day and next working day). Heart rate, physical activity, and energy expenditure, which can be measured by actiheart, will be measured in the rest day and consecutive working days. The whole measuring days depends on the type of driving and bus of the subjects (Table 1, Fig. 2). All subjects will be recommended to write the work and sleep diary during the measurement.

Subjects for measurement of biomarkers were also determined in consideration of the type of work and bus driving. Subjects for measurement of biomarkers were determined in 24 bus drivers. These drivers included 2 city bus drivers engaged with 2 shifts a day, 2 city bus drivers engaged with shift every second day, 3 regional bus drivers, 6 intercity bus drivers of short, medium, and long distance, 6 express bus drivers of short, medium, and long distance, 2 full-time and 2 part-time city bus drivers. We will interview with each subject before measuring biomarkers. Measurement of biomarkers for bus drivers will be conducted from June to September 2015.

Fig 8. Actiheart used to measure heart rate, physical activity, and expenditure

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Table 9. Measurement of biomarkers for bus drivers

Work schedule	Working hours per day	Cortisol and BP measurement	HR, PA, and EE measurement
2 shifts in a day	9 hours	1 R and 1 W	1 R and 5 W
work every second day	17 hours	1 R and 1 W	3 R and 3 W
2 working days and 1 rest day	14 hours	1 R and 1 W	2 R and 4 W
4 working days and 2 rest days	14 hours	1 R and 1 W	2 R and 4 W

BP, HR, PA, and EE mean blood pressure, heart rate, physical activity, and energy expenditure, respectively.

R and W mean rest day and working day, respectively.

Fig. 9. Measurement of biomarkers for bus drivers

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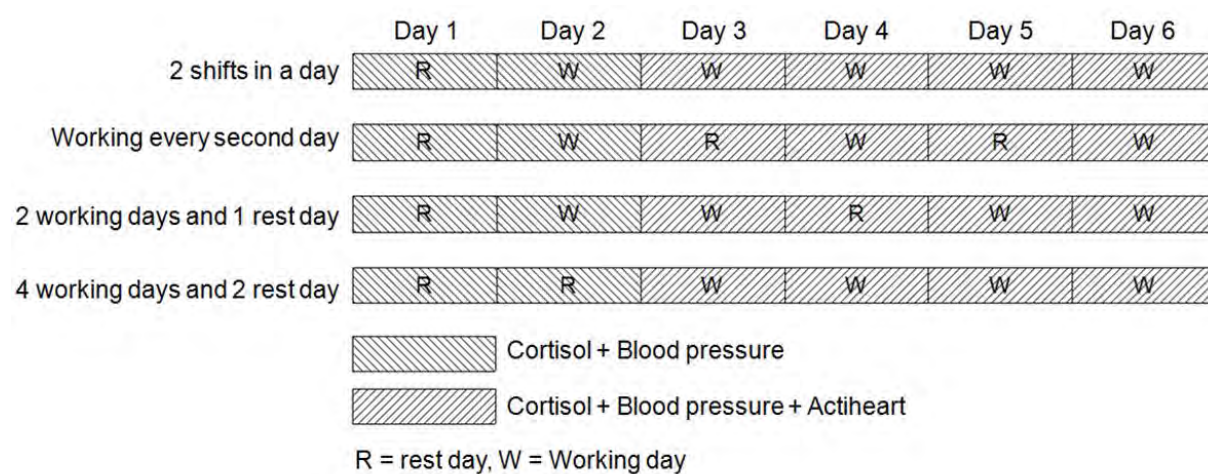
Fatigue and risk index

Fatigue and risk index is a tool for assessing the risk arising from fatigue associated with work patterns for safety critical workers, which was developed by Health & Safety Executive (HSE) in 2006. Fatigue and risk index includes six factors associated with fatigue: the length of the shift, the interval between shifts, the number of rest days, the quality of the rest breaks, the variability of the shifts, and the time of day.

Fatigue index means the average probability of being sleepy on duty, which takes a value between 0 and 100. Risk index means the relative risk of the occurrence of an incident during working. Risk index of 1.0 represents the average risk on a typical two-day, two-night, four-off schedule, involving 12-hour shifts starting at 08:00 and 20:00.

The information required for calculating fatigue and risk index can be derived from the interview with the subjects and work diary written by the subjects. We will calculate fatigue and risk index of the subjects for measurement of biomarkers. Fatigue and risk index will be analysed in time series.

Relative heart rate

Relative heart rate (RHR) is good index to represent workload intensity. RHR can be calculated by following formula:

$$RHR\ (\%) = \frac{HRwork\ - HRrest}{HR\ \max - HRrest} \times 100$$

HRwork means the average heart rate during working, HRmax means the maximum heart rate, and HRrest means the resting heart rate. RHR is an indicator of physical workload in the workplace. Maximum acceptable work time (MAWT), which means the maximum amount of time for which the worker can sustain a given workload without fatigue, can be estimated with RHR. We will calculate RHR and estimate daily MAWT of each subject for measurement of biomarkers.

Heart rate, physical activity, and energy expenditure

We will be able to gather the information of heart rate, physical activity, and energy expenditure, and identify the change and pattern in the information for the entire duration of the measurement. We are planning to compare the heart rate, physical activity, and energy expenditure changes and analyse the patterns.

Results

Literature review and interview for bus drivers

There are many types of work schedule for bus drivers in Korea. Among them, 4 types account for the most part: 2 shifts in a day (DD), work every second day (DR), 2 working days and 1 rest day (DDR), and 4 working days and 2 rest days (DDDDRR). Working hours per day are about 9 hours in DD, 16 – 17 hours in DR, and 12 – 15 hours in DDR and DDDDRR. The average working hours per day were the longest in DR work schedule, whereas the average working hours per week and month were the longest in DDR or DDDDRR work schedule (Table 2).

We have reviewed the reports about work conditions for bus drivers published in Korea (Table 2). The information from the literatures and reports about bus drivers was useful to design the detailed methods for the present study.

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Table 10. Working hours of bus drivers according to work schedule

Work schedule	Working days per month	Working hours per day	Working hours per week	Working hours per month
DD	24.6	9.1	51.2	222.5
DR	14.1	16.3	52.8	229.4
DDR or DDDDRR	19.6	12.7	56.7	246.6

DD, DR, DDR, and DDDDRR mean 2 shifts in a day, work every second day, 2 working days and 1 rest day, and 4 working days and 2 rest days, respectively.

Table 3 shows daily working hours, driving hours, standby time, and number of standby of city bus and intercity bus drivers. In the city bus drivers, the average standby times per once were 19 minutes in DD work schedule, 29 minutes in DR work schedule, and 39 minutes in DDR or DDDDRR work schedule. Standby does not equal to rest break. Bus drivers should do such as simple bus maintenance and washing a bus. In the case of occurring the traffic jam, they must start their next bus driving soon after arriving at the final station. They have no separate time for lunch, so they should even have lunch in their standby time.

In the intercity bus drivers, they almost worked DDR or DDDDRR work schedule. The standby time per once was slightly longer than city bus drivers. Unlike the city bus drivers, intercity bus drivers need not do work which city bus drivers should do, so they can take a break or have a meal in their standby time.

Table 11. Driving and rest break time per day of city bus and intercity bus drivers

Type of bus and work schedule	Working hours	Driving hours	Total standby time (hours)	Number of standby	Standby time (min)
City bus					
DD	8.8	7.2	1.6	5.1	19
DR	17.3	14.6	2.4	5.4	29
DDR or DDDDRR	14.8	11.5	3.3	5.0	39
Intercity bus					
DDR or DDDDRR	15.2	11.6	3.5	5.2	40

Table 2 shows daily working hours, driving hours, standby time, and number of standby of city bus drivers. The average standby times per once were 19 minutes in DD work schedule, 29 minutes in DR work schedule, and 39 minutes in DDR or DDDDRR work schedule. Standby does not equal to rest break. Bus drivers should do such as simple bus maintenance and washing a bus. In the case of occurring the traffic jam, they must start their next bus driving soon after arriving at the final station. They have no separate time for lunch, so they should even have lunch in their standby time.

Questionnaire survey

The questionnaire survey will be carried out from May to July 2015. We are planning to show the result of questionnaire survey in the future.

Measurement of biomarkers for bus drivers

Measurement of biomarkers for bus drivers will be conducted from June to September 2015. Biomarkers scheduled for measuring include salivary cortisol, blood pressure, heart rate, physical activity, and energy expenditure. Salivary cortisol will be measured 4 times a day for 2 days (a rest day and the next working day). Blood pressure will be measured every 15 (during activity) or 30 minutes (during sleep) for 2 days (a rest day and the next working day). We are planning to show the results of salivary cortisol and blood pressure for 2 days as figures such as the graphs of broken lines. Heart rate, physical activity, and energy expenditure will be measured by actiheart. These will be measured for 6 days, so we can show the temporal variation of them.

The information derived from the interview and biomarker measurement can be used to calculate fatigue and risk index. We are planning to show fatigue and risk index through graph of broken lines

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such as Fig. 3 and 4. We have calculated fatigue and risk index in city bus drivers and intercity bus drivers with the information derived from the interview for bus drivers. Fig. 3 shows the calculated fatigue and risk index in city bus drivers, and Fig. 4 shows the calculated fatigue and risk index in intercity bus drivers.
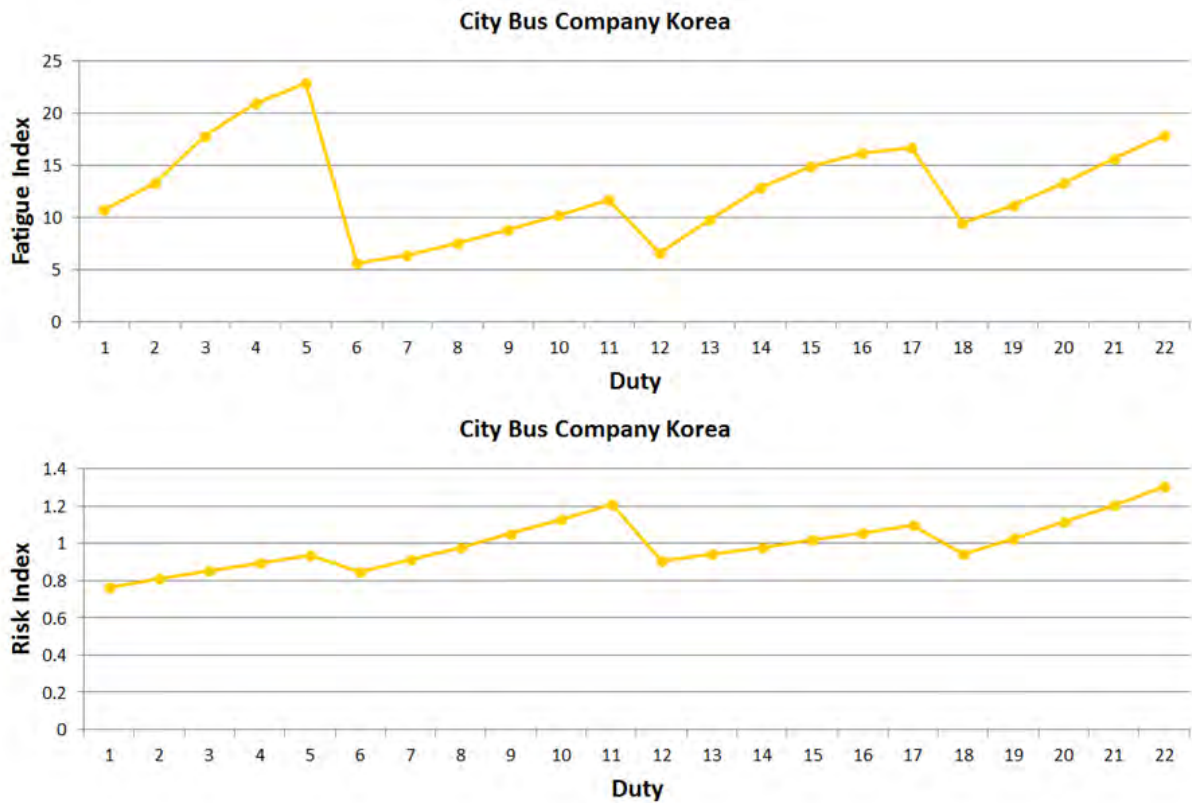
Fig, 10. Fatigue and risk index of city bus drivers

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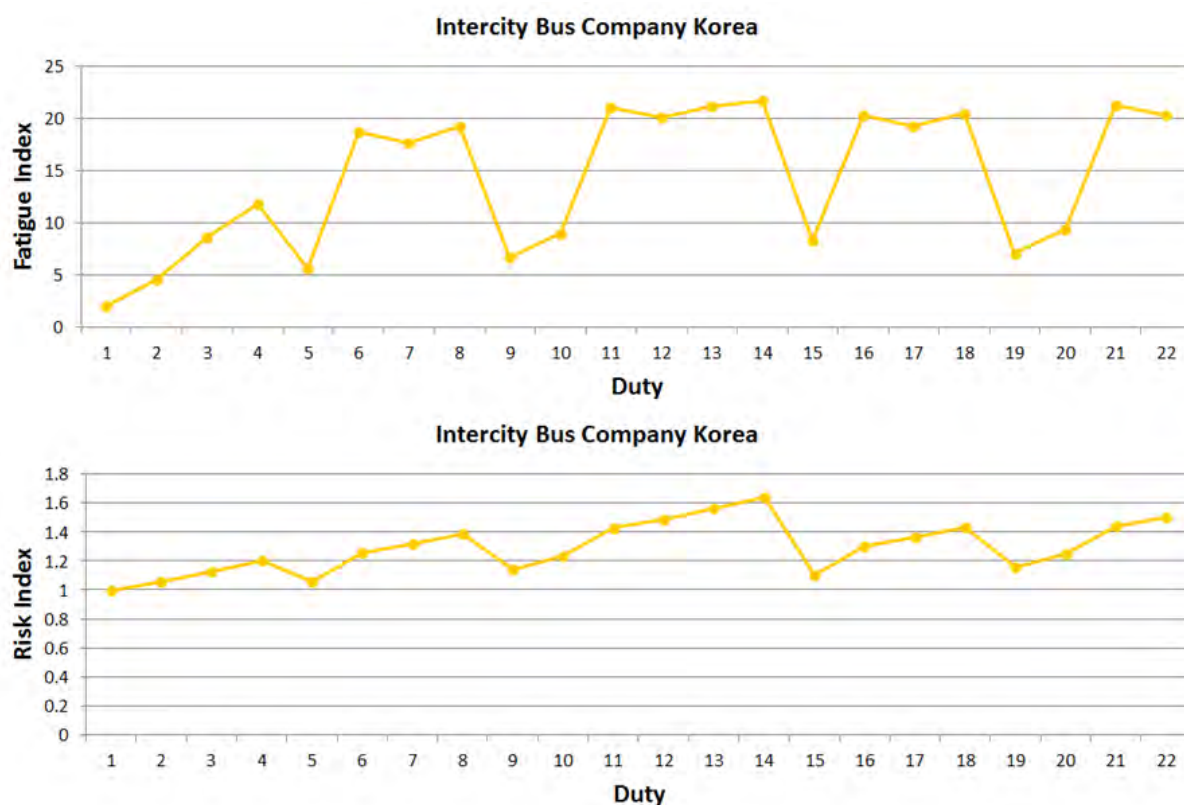
Fig. 11. Fatigue and risk index of intercity bus drivers

We will calculate RHR, and estimated MAWT with the information from biomarker measurement. We are planning to show the result of RHR and MAWT through a table.

Discussion

The present study is ongoing study. Right now, we cannot show the significant result except literature review and some part of interview. In the future, we will analyse the information of literature review, interview, and measured biomarkers including salivary cortisol, blood pressure, heart rate, physical activity, energy expenditure, fatigue and risk index, RHR, and MAWT. We hope to show you all result from the present study, and the result could be helpful to establish a policy for the safety of the public, as well as health promotion or bus drivers.

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The transfer of employee-oriented CSR in multinational SMEs: An explorative study on the values of owner-managers within international business

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Abstract.

By assessing four cases, this paper develops propositions about the transfer of employee oriented corporate social responsibility (CSR) practices within multinational SMEs. Specifically we explore whether an individual owner-manager can add value within a foreign subsidiary by means of normatively-based, employee-oriented CSR. Based on four case-studies we suggest that not only motives but also the skills of the owner/manager as an institutional entrepreneur are critical in dealing with institutional variance.

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Introduction

On October 17, 2010, a spontaneous walkout of truck drivers took place at a Dutch multinational transport company in protest of sudden new redundancies following earlier redundancies only a year ago. Employees accused management of maximising profit at their expense by shifting work to the company's Hungarian subsidiary. In this subsidiary, large numbers of new truck drivers were hired while at the same time Dutch drivers were laid off. The Dutch trade union confederation FNV considered this to represent 'social dumping' (Van der Veen, 2010). This incident highlights that globalisation and regionalisation seem to encourage a purely instrumental view on employees entailing that employees are considered exclusively as resources. Heeding employees' needs and interests then is relevant only to the extent this enables employees to fulfil their role as resources more profitably to the firm. Such an instrumental view leads to possible negative consequences for employees in the form of, for example, rising employment insecurity (Crane & Matten, 2004; Legge, 1995; Peng & Pleggenkuhle-Miles, 2009).

This study focuses on the value systems of the owner-manager with regard to employees' role and position in their firms that are amenable to introduction and transfer of socially responsible policies towards employees across various national institutional settings. Based on Jones' (1980) definition of CSR, socially responsible here is defined as taking into account – beyond what is required by law or union contract – the needs, interests and well-being of employees in all decision-making processes affecting the situation of employees. The result of similar policies is the creation of mutual value for both firm and employees (De la Cruz Déniz-Déniz & De Saá-Pérez, 2003)This paper confronts this instrumentally based view on employment relations with a value-based view on employment relations. The key argument here is that a value-based employment relations policy in the form of employee-oriented CSR leads to mutual value creation for employees and firm (Faleye & Trahan, 2011). Employee-oriented CSR can be defined as an employee-relations arrangement perceived by employees to be founded on the combination of management's conviction based on other-regarding values that employees are a central stakeholder group whose needs and interests should be considered as an end in itself and on management's awareness based on self-regarding values that employees are key to the firm's success. It is argued that such a policy leads to positive employee outcomes such as increased employment security, an employee-friendly organisational climate and increased participation in the firm. Perceiving that they are respected and valued for their own sake as well as for their contribution to achieving the firm's objectives is expected to lead to reciprocation by employees in the form of higher commitment to the firm. It is suggested that, in its turn, higher commitment results in positive firm outcomes, for example, in the form of lower turnover and absenteeism rate and higher productivity and higher rates of problem-solving (Boxall, Ang, & Bartram, 2011; Brown, McHardy, McNabb, & Taylor, 2011; Ciavarella, 2003; see e.g., De la Cruz Déniz-Déniz & De Saá-Pérez, 2003; Huselid, 1995; Paul & Anantharaman, 2003; Snape & Redman, 2010).

Implementing employee-oriented CSR in multinational firms is complicated by transfer issues, not in the least because of the context-dependent character of social responsibilities (Matten & Moon, 2008). Employee-oriented CSR is developed in the home country and, consequently, is imprinted by the relevant regulative, cognitive and normative institutions of the home country. Because of its inherent context-specificity, employee-oriented CSR needs to be translated to the host country institutional environment if it is to result in mutual value creation in foreign subsidiaries. This entails that firms must be willing to deal with the diverging constraints set by the various national institutional environments in which they are operating (Kostova & Roth, 2002; Tempel, Edwards, Ferner, Muller-Camen, & Wächter, 2006). For multinational SMEs this is even more complex because they lack slack (financial) resources and specialised staff and expertise to facilitate transfer. This implies that owner-managers need to be 'champions' of employee-oriented CSR on a company-wide basis in order to

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turn employee-oriented CSR into a success in multinational SMEs (Jenkins, 2006). In further assessing the transfer of employee oriented CSR, we contribute to insights in two areas, one more practice oriented, one more theoretical. First, do corporate social responsibility (CSR) practices add mutual value for both firm and employees and create thus higher social standards and better performance? Second, more theoretically in nature, the tension between managerial discretion and the constraints set by the institutional environment is highlighted. If an owner-manager believes that CSR-practices add value, is he/she able to introduce and transfer employee-oriented CSR across the various national institutional environments of the firm?

Although companies independently can develop policies, they are strongly influenced by the institutional context (Amit & Belcourt, 1999; Boselie, Paauwe, & Jansen, 2001; Gooderham, Nordhaug, & Ringdal, 1999; Lawler, Chen, Wu, Bae, & Bai, 2011; Paauwe, 2004). When a manager wants to develop a differential HR policy, he/she faces institutional pressures, that limit his or her options for change, i.e., that restrain his or her managerial discretion. This raises the question what enables an owner-manager to exercise discretion despite possible adverse institutional constraints.

This question is probably even more relevant for CSR policies of SMEs. CSR can be argued to potentially contribute heavily to SMEs' performance in their markets (Spence, 2007). Due to scale disadvantages, competition on price with large competitors often is not possible for SMEs. Informal relations are a critical success factor for SMEs. They need to be trusted by vital stakeholders like customers and employees in order to survive in the long run (Grayson, 2003; Spence, 2007). Long-term trusting relationships postulate a normative base. (Berman, Wicks, Kotha, & Jones, 1999).

Based on Oliver (1997), we argue that company decisions on selection and use of resources – in particular human resources – are only partially based on motives stemming from economic rationality. Decisions on selection and use of human resources are profoundly influenced by the institutional context of the firm. Kostova (1999) argues that value-laden organisational practices in particular are difficult to transfer. Practices in the areas of human resource management and corporate social responsibility are examples par excellence of value-laden practices (Ferner, Edwards, & Tempel, 2012; Liu, 2004) . Furthermore, form and content of CSR vary strongly across institutional environments (Campbell, 2006; Matten & Moon, 2008).

The remainder of this paper consists of five parts. Section 2 reviews the relevant literature on CSR and SMEs, and develops a conceptual framework based on institutional theory. Key issue is the tension between managerial discretion and institutional constraints. In section 3 the methodology used in this research will be elaborated, while in section 4 the propositions will be assessed by relating them to the case studies. In section 5, the sustainability of the propositions in the conceptual model will be discussed. Finally, in section 6 some concluding remarks will be made on the most important findings.

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CSR as institutional resource of multinational SMEs: A conceptual model

There is a consensus in the literature that SMEs differ so strongly from large companies that findings from research on the latter group cannot be declared applicable to SMEs just like that. Thus, separate research on a wide variety of issues, CSR included, is warranted (Curran & Blackburn, 2001; Tilley & Tonge, 2003). To date, there is an extensive body of research on all kinds of aspects of CSR in large corporations but relatively little is known about CSR in SMEs. Still, social responsibility as practised in SMEs warrants research in its own right as these practices differ from CSR practices in large corporations in some important respects: (1) CSR in SMEs is hardly codified; (2) the person with ultimate responsibility for running the organisation is mostly the owner-manager; (3) informal relationships are critical for the success of many SMEs as they cannot undercut larger rivals on price due to scale disadvantages; (4) SMEs experience more difficulties in recognising and implementing CSR practices due to a lack of slack resources in the form of time, specialised skills and financial resources; (5) employees are very important stakeholders in SMEs; and (6) the specific industrial sector has a large influence on company culture with respect to social responsibility (Graafland, van de Ven, & Stoffele, 2003; Jenkins, 2006; Lepoutre & Heene, 2006; Spence, 2007; Tilley & Tonge, 2003)

As has been stated in the introduction, we study the assumption that the value systems of owner-managers are a key factor in explaining differential forms and contents of socially responsible employment relations policies. This results from the ways multinational SMEs deal with the tension between managerial discretion and institutional constraints across various national institutional environments. Figure 1 presents the exploratory conceptual model on the key role of value systems in the introduction and transfer of employee-oriented CSR.
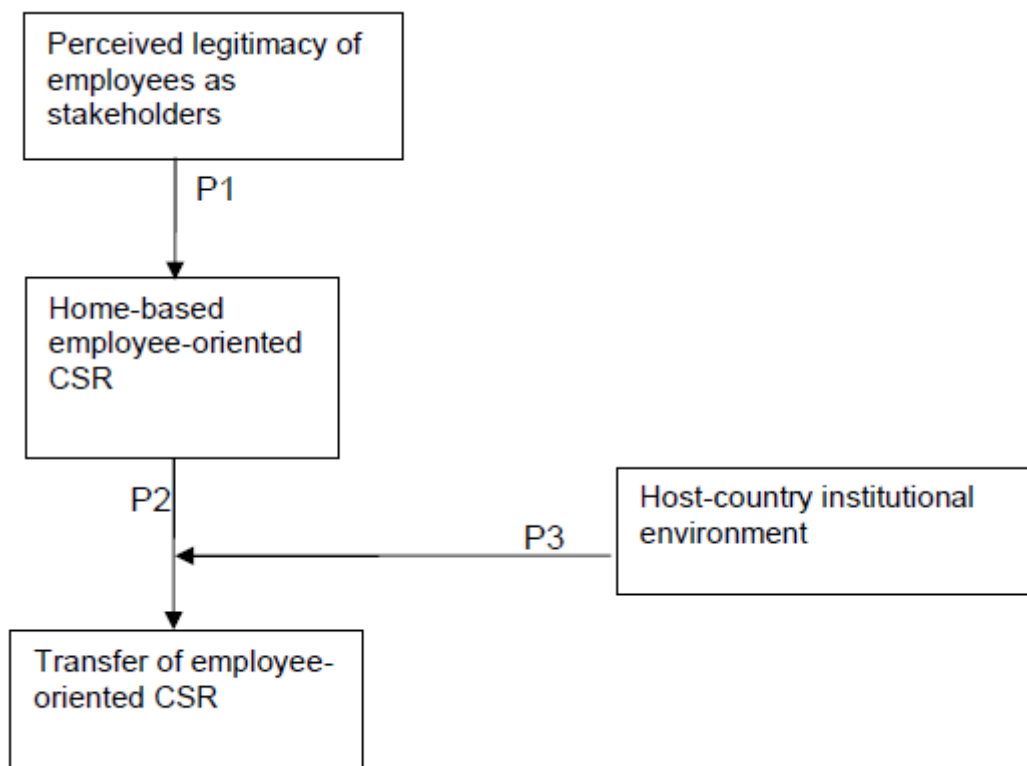
Fig. 1. Transfer of values of the owner-manager on employee-oriented CSR from a home country to a host-country

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Starting point is the observation by many authors (e.g., Branco & Rodrigues, 2007; Lee, 2008; Margolis & Walsh, 2003; McWilliams & Siegel, 2001) that corporate social responsibility shows up in relationships with stakeholders. Freeman (1984) defined stakeholder as "any group or individual who can affect, or is affected by, the achievement of a corporation's purpose". Mitchell et al. (1997) argue that the salience of stakeholder groups, the degree to which companies heed stakeholder claims, is dependent on three possible attributes of stakeholder groups: power, legitimacy and urgency. Driscoll and Starik (2004)add proximity as a fourth attribute. Employees are argued to be dominant stakeholders as at almost all times they possess at least the attributes power and legitimacy. This is congruent with statements in the SME literature on stakeholder groups that to owner-managers of SMEs employees are the most important stakeholder group (Hoevenagel & Bertens, 2007; Lepoutre & Heene, 2006; Spence, 2007).

SMEs are likely to act responsibly because their own legitimacy with immediate stakeholders is at stake in a far more direct and personal way than it is with large corporations (Fuller & Tian, 2006). Furthermore, owner-managers – embodying a combination of agent and principal – can exercise more discretion in addressing social responsibility issues than managers of large corporations since they are not under an obligation to maximize profit (Jenkins, 2006; Spence, 2009). This increases the likelihood that employees are considered as legitimate stakeholders whose needs and interests are to be taken care of by means of a policy at the owner-manager's discretion (Wood, 1991). Since home country employees are physically, as well as socially and culturally much closer to the owner-manager than foreign subsidiary employees, it is quite probable that employee-oriented CSR will first be instituted in the home country (Driscoll & Starik, 2004; Lepoutre & Heene, 2006).

Proposition 1: *The owner-manager's value system affects the introduction of employee-oriented CSR practices.*

To further understand this, more insight is needed in the values of the owner-manager, especially his/her values concerning his relation with employees. Does she/he only consider – based on self-regarding values – her/his employees as a resource that improves financial firm performance by minimising its costs and maximising its revenues or are – based on other-regarding values – employees seen as persons as well, with personal interests, ambitions and families and health-issues, to whom the employer owes a responsibility . This makes the stakeholder orientation essential for operationalising CSR towards employees, as corporate social responsibility materialises through interaction between companies and their stakeholders (Griffin, 2000).

Firstly, as Margolis and Walsh (2003) argue, it is of utmost importance to study the actual interaction between companies and stakeholders, since very little research has been done with respect to concrete and specific CSR policies of companies. This also holds for the question how employers show in their personnel policies that employees are important stakeholders whose needs and interests ought to be taken into account (Hammann, Habisch, & Pechlaner, 2009). Secondly, economic value creation of the firm is related to employees. Therefore employee-oriented CSR should influence the performance of the firm. Consequently, the question how relationships with stakeholders can lead to enhanced performance becomes relevant to be addressed (De la Cruz Déniz-Déniz & De Saá-Pérez, 2003; Galbreath, 2006). Employee-oriented CSR can be argued to be successful , if it succeeds in creating value for both firm and employees beyond what might be expected from complying by both parties with what has been provided for in law and/or (union) contracts. Employee-oriented CSR starts from the needs and interests of employees. This results in favourable outcomes for employees – in this study measured through the degree of satisfaction with organisational climate, level of information sharing and participation and with the personnel practices employed (Wiley, 2012) - compared to outcomes for employees in companies that do not have

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employee-oriented CSR. This will result in greater commitment of employees to the company and consequently in reduced turnover and absenteeism, and increased employee motivation. The resulting value creation for the firm consists of reduced costs and increased profits (Hammann et al., 2009), and, consequently, leads to increased competitiveness. Increased competitiveness as result of employee-oriented CSR will provide owner-managers with an additional stimulus to introduce employee-oriented CSR in the host country as well by means of transfer of their employee-oriented CSR policies and practices (Ferner, Almond, & Colling, 2005). This leads to

Proposition 2: *Successful introduction of employee-oriented CSR in the home country positively affects discretionary transfer of employee-oriented CSR to foreign subsidiaries.*

However, Jensen and Sandstrom (2011) argue that stakeholder theory hardly considers the business context and neglects the effects of globalisation. It is highly unlikely that transferability of employee-oriented CSR will not be affected by institutional differences between home and host countries. This leads to the third part of our argument: Companies do not operate in a vacuum. While the act of introducing employee-oriented CSR is discretionary, the way in which companies design such a policy will be influenced by the institutional environment in which the firm is active. Institutional theory states that institutional pressures from their internal and external environments will lead to homogeneity among firms. Successful firms increase their legitimacy by conforming to social pressures (Oliver, 1997). Legitimacy also is one of the three principles of corporate social responsibility (Wood, 1991). This implies that employee-oriented CSR will have a home-country institutional imprint. Thus, institutional environment and socially responsible management of stakeholder relations are inextricably linked to one another.

In this respect, it is important to establish that firms deal with their workforce more than with other stakeholder groups on a continual and regular basis. This implies that the way employees are dealt with will become institutionalised in time. Kostova (1999) terms the institutionalised conduct of organisational functions, such as the management of relationships with employees, organisational practices. Organisational practices are strategic in nature if they are believed to represent a distinct source of competitive advantage (Kostova, 1999). This means that the way in which firms manage their relations with employees can be considered to be a strategic organisational practice (Wright, McMahan, & McWilliams, 1994). Because of the diverging institutional settings involved in this research, it is necessary to gain insight into the differences between the different institutional environments. In our study we assess the relevant institutional distance between the Netherlands on the one hand and Poland on the other .

Industrial relations in the Netherlands are corporatist in nature, characterised by mutual understanding and exercising voice to solve problems (Visser & Hemerijck, 1997). These corporatist institutions can be argued to support mutual trust between employers and employees (Nooteboom, 2007; Visser & Hemerijck, 1997), which in turn stimulates employee behaviours beyond their employment contract provisions (Dirks & Ferrin, 2001; Fox, 1974; Lester & Brower, 2003). In contrast, industrial relations in Poland, having recently experienced a transition from communism to a market-based democracy, are typified by a strongly developed sense of hierarchical status, feelings of mistrust due to the communist past, and a resulting lack of initiative on the part of employees (Alas & Rees, 2006; Lewicka-Strzalecka & Kozminski, 2006; Soulsby & Clark, 2007; Woolfson, 2007). This is problematic as, being based on mutual trust, employee-oriented CSR presupposes a work morale based on trust and equality. Consequently, the introduction of employee-oriented CSR may be problematic in societies in which normative and cognitive institutions do not support work morale in the same way as in the home country (Lämsä & Pucetaite, 2006), which leads to the next proposition.

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Proposition 3: *The host-country institutional environment negatively affects transfer success.*

Based on Oliver (1997), it can be argued that in studying the issue of transfer of employee-oriented CSR to foreign subsidiaries in such a way as to result in enhanced performance, resource-based and institutionalist perspectives need to be integrated. Firms do not only have resource capital at their disposal, but also institutional capital (Bresser & Millonig, 2003; Lu, Zhou, Bruton, & Li, 2010; Morgan, 2005; Oliver, 1997). While resource capital consists of the value-creating assets and competencies of firms, institutional capital is the firm's capability to manage the institutional context of resources and resource strategies in such a way that resource capital can be used optimally (Oliver, 1997). This implies that an inquiry into the nature of stakeholder relations as a potential source of competitive advantage demands an integration of resource-based and institutionalist perspectives.

Transfer is deemed successful if the transferred employee-oriented CSR practices are implemented and internalised at the foreign subsidiary (Björkman & Lervik, 2007; Kostova, 1999) and lead to mutual value creation for both employees and firms (Ferrary, 2009; Van Buren, 2005). Internalisation of practices means that these practices over time have been accepted and have become taken-for-granted by employees and management at the foreign subsidiary (Björkman & Lervik, 2007). Just like in the home country, mutual value creation refers to positive employee outcomes in the form of increased job satisfaction and improved labour conditions beyond the prescriptions by law and union contract as well as positive firm outcomes in the form of increased employee commitment resulting in low turnover and absenteeism rates and in higher productivity and problem solving by employees.

Methodological issues studying Employee-oriented CSR in multinational SMEs

To further develop the propositions, exploratory research has been carried out by means of a multiple-case study. As described above, we try to understand transfer of employee related CSR within an institutional perspective combined with insights from the resource-based view of the firm, following Oliver (1997). To assess the transfer, we chose for the transfer between two countries, one with an institutional environment known for its susceptibility to employee-oriented CSR, the Netherlands, and one in which is seen as a less susceptible environment in this respect, Poland.

We assessed four Dutch companies with a subsidiary in Poland. Although Poland is a member of the European Union since 2004, the institutional characteristics differ greatly with those of the Netherlands. The Netherlands are a long-established, highly-developed market economy with a strong tradition of consultation and cooperation between social partners, in which delegation to and trust of employees play a major role (Visser & Hemerijck, 1997; Whitley, 1999). Poland, on the other hand, recently has undergone a fundamental and radical transition from a communist, planned economy to a market economy implying there is no tradition of consultation and cooperation between social partners. Employment relations are characterised by a lack of trust and do not encourage delegation of responsibility to employees (Lämsä & Pucetaite, 2006; Woolfson, 2007).

Four Dutch SMEs owning a subsidiary in Poland have been assessed. In total, 25 interviews have been conducted with both the owner-managers and with employees. The interviews were semi-structured and took place during on-site visits of the Dutch headquarters as well as of the Polish subsidiaries. In Poland, the interviews were conducted in the presence of one of the authors by a Polish interviewer after having been trained in the required line of interviewing.

The objective was to establish to what degree the expected relationships addressed within the propositions hold. As this research concerns a complex social phenomenon about which relatively little is known, a multiple-case study is the best way to replicate and contrast the expected

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relationships (Eisenhardt & Graebner, 2007; Yin, 2003). Moreover, Lockett and colleagues (2009), for example, argue that case studies among small and medium-sized enterprises are very suitable for carrying out empirical research into the expected results of the resource-based view; the lower complexity of SMEs compared to large corporations makes it easier to identify and explain causal relationships.

Case studies are most helpful for developing the required in-depth knowledge of the 'how' and 'why' of the processes involved in the transfer of proactive employee strategy practices (Yin, 2003). This knowledge comprises, first, employee salience to company management and the resulting objectives and strategy with respect to employees. Second, the impact of personnel strategy in the form of employee-oriented CSR on mutual value creation for employees and firm is researched. Third, the relevant differences between the various institutional environments involved are mapped out. Finally, the way the owner-manager affects transfer success including mutual value creation in the foreign subsidiary is investigated.

As the industry may affect the nature of strategies employed towards employees, companies from both the manufacturing and the services sectors have been selected. Since the characteristics of these industries are widely diverging, this set-up warrants a fruitful opportunity for cross-case search for patterns which enhances the possibilities for generalisation of findings (Eisenhardt, 1989). This effect has been strengthened by selecting companies with an explicit employee-oriented CSR strategy as well as companies without an explicit employee-oriented CSR strategy.

In order to acquire the information necessary to further develop the propositions and to achieve triangulation, interviews have been conducted with various groupings within the companies studied, e.g. management of parent companies and subsidiaries, and employees of the subsidiaries. Further triangulation of the information received has been ascertained by consulting internal and external documents related to the firms concerned (Eisenhardt & Graebner, 2007).

The first step in designing case studies is to establish the unit of analysis, the constructs on which data need to be gathered and the logic linking data to propositions (Emans, 2004; Yin, 2003). As suggested by Yin (2003) and Emans (2004), the unit of analysis is formed by relating constructs – phrased in propositions – to data about companies with and without explicit employee-oriented CSR. Employee-oriented CSR entails the values of the employer and the execution of policies based on these values. These values are more far-reaching then only the instrumental objectives of the firm (the employee as resource). Our approach has been to try to understand from the interview results whether the owner-manager has certain ambitions stemming from other-regarding values that go further than economic objectives and if he is (also) willing to transfer these ambitions to a host-country. These statements we have compared to employee perceptions of owner-managers' value systems.

If, based on the owner-manager's value system, personnel policies take the needs and interests of employees as a starting point, such policies should result in employee outcomes over and above compliance with legal or collective bargaining agreement requirements. Furthermore, with respect to foreign subsidiaries, employee-oriented CSR takes into account the influence the institutional environment may have on the way nature and content of employee-oriented CSR instruments are perceived by management and employees. Thus, the final litmus test of the presence of employee-oriented CSR is the perception of employees regarding the owner-manager's value system as basis of the firm's employment relations policy.

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This necessitates the collection of data on the following items:

- The view of the owner-manager on the role and position of employees. Does he/she take into account only economic objectives based on self-regarding values, or do other-regarding values play a role as well, such as recognition of employees as having a family, being individuals with certain ambitions, weaknesses
- The perception of employees of owner-managers' value system
- The employees' perception of and experience with their firms' personnel policies
- The relevant institutional differences between home and host country
- The relationship between the owner-manager's response to institutional differences and the way employee-oriented CSR practices are transferred
- The relationship between the foreign subsidiary's employee-oriented CSR and commitment of the foreign subsidiary's employees
- The effect of foreign subsidiary employees' commitment on value creation for the foreign subsidiary

For measuring these issues, a list of questions has been made (see appendix) that was guiding in the semi-structured interviews. The data has been analysed by using Atlas in coding the interviews and searching for cross-case patterns. Pattern matching has been applied to establish whether the pattern predicted in the conceptual model coincides with the pattern observed in the case studies (Yin, 2003).

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Results: The transfer of employee-oriented CSR practices

Legitimacy of employees as stakeholders

Without exception, our case study companies are medium-sized companies having more than 50 employees (European Commission, 2003). As table 1 shows, all case study companies are active in market niches in which quality, reliability, innovativeness and flexibility are important competitive instruments compared to price suggesting that the financial health of the companies concerned is relatively good.

Table 1. Basic data companies

Company	Packing Co	Metal Co	Rubber Co	Paint Co
Sector	Trade	Manufacturing	Manufacturing	Manufacturing
Run by owner-manager(s)	Yes	Yes	Yes	Yes
Employees total	160	210	150	70
Strategy	Tailor-made/innovative	Standard plus tailor-made/innovative	Tailor-made/innovative	Tailor-made innovative
Strategic capabilities	Translating customer needs via solutions into products	Translating customer needs via solutions into products	Translating customer needs via solutions into products	Translating customer needs via solutions into products
Part of production process/products standard	No	Yes	Yes	Yes
Market position	Favourable	Favourable	Favourable	Favourable
Number of foreign subsidiaries	12	1	1	2
Employees Poland	10	210	50	8
Investment motive	Market	Wage costs	Wage costs	Market
Ownership share Dutch parent	100%	100%	51%	100%
Production process	Client-specific	Standard/client-specific	Standard	Client-specific

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This conformity between market demands leads to the pursuit of more or less similar market strategies by these companies: finding flexible solutions to specific and heterogeneous client needs. Consequently, the strategic capabilities required to survive and prosper in the market are comparable as well: getting insight into client needs, translating these client needs into solutions and developing products/services to make these solutions optimally applicable. This also requires the capability to streamline and coordinate input, throughput and output processes in such a way that both efficiency and flexibility are guaranteed. These capabilities imply that commitment, motivation, initiative, problem solving, expertise are important characteristics of employees that are essential for making this type of strategies succeed. As a result, these companies to a large extent are dependent on the knowledge, skills and abilities (KSAs) of their personnel.

However, in the manufacturing companies, due to the technological demands of the production process or the nature of part of the product range, the activities of direct production personnel to a varying extent are relatively standard. This standardization decreases the relevance of KSAs of production personnel and increases the relevance of controlling costs. As a result, Rubber Co, for example, has transferred a department with labour-intensive, standardized products to its subsidiary in Poland, since production in the Netherlands over time had become loss-making because of the relatively high wage costs. For that same reason Metal Co, that initially produced only standard metal goods, set up all of its production activities in Poland right from the start of the company. For the other companies, the investment motive has been market expansion.

That staff is deemed to be important for companies' market success shows from the ranking of stakeholders by the owner-managers, see Table 2. By far most of them consider employees to be the most important stakeholder group, in one case ex aequo with customers.

Table 2. View owner-managers on employees as stakeholders

Company	Packing Co	Metal Co	Rubber Co	Paint Co
Relevance commitment	Large	Large	Large	Large
Ranking employees	1	1	2	1 ex aequo with customers
Moral responsibility	Yes	Yes	Yes	No
Legitimate stakeholders Netherlands	Yes	Yes	Yes	Yes
Legitimate stakeholders Poland	Yes	Yes	No	Yes

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"The most interested party at Packing Co – perhaps I put a bit pretentiously – is personnel. … we are a trading company so personnel is our most important asset so we think it important to take good care of them. We have 160 people …. And these 160 people have families of which they have to take care." (Owner-manager Packing Co)

Though all owner-managers consider the employees in the Netherlands to be legitimate stakeholders, only three of them explicitly state a moral responsibility for the well-being of their employees. Furthermore, only three of the owner-managers consider the employees in Poland to be legitimate stakeholders of the company. The exception is the owner-manager of Rubber Co, the only company that does not fully own its subsidiary.

Home country employee-oriented CSR

On the whole, the stance of owner-managers towards employees makes introduction of employee-oriented CSR quite likely. This is confirmed by the nature of their home country personnel policies and practices. Table 3 shows that the personnel policies and practices of all of these companies contain elements of employee-oriented CSR. All companies claim – and this claim is supported by employee statements – that profit maximisation is not the all-overriding goal to be pursued at the expense of employees. All of them say that they strive for more employment security than is provided for in law or union contract, i.e., decreases in sales which in itself would justify lay-offs are not used to that end unless the continued existence of the company is jeopardised.

"I don't believe in shareholder value. I don't run this company for only a few years, but for a very long time. And I want to manage this company in a very decent manner…. I try to give people a great deal of security and stability." (Owner-manager Paint Co)

"If circumstances – temporarily – worsen, they will try to keep you employed unless the firm's continuity is endangered." (Employee Paint Co)

In half of the companies, wages are at market level or are determined completely by collective bargaining agreements (CBAs). However, the above collective bargaining agreement wage level in the other two companies is due to coincidental factors. Packing Co is covered by the CBA for an industry that it historically belonged to but from which it has moved away as the company has upgraded its activities resulting in an upgrading of the labour required as well. Rubber Co, before its accession to the CBA for its industry, paid above average wages to its production personnel.

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Table 3   Employee-oriented CSR Netherlands

Company	Packing Co	Metal Co	Rubber Co	Paint Co
Employment security	Large degree	Large degree	Large degree	Large degree
Compensation	Above market/collective labour agreement	Market	Above market/collective labour agreement	Collective labour agreement
Relevance employee development	Very large degree	Large degree	Large degree	Some degree
Participation	Very large degree	Very large degree	Works council; large degree	Works council; some degree
Communication	Very open	Very open	Open	Open
Relational sphere	Very large degree	Large degree	Large degree	Large degree
Work-home	Large degree	Some degree	Large degree	Some degree
Employee outcomes	Very positive	Very positive	Positive	Positive
Commitment	Very positive	Very positive	Neutral	Positive
Firm outcomes	Very positive	Very positive	Neutral	Positive

In view of the market strategies pursued, the emphasis on employee development is not surprising. Packing Co goes furthest in this respect as is testified by its owner-manager's statement:

"At the moment employees develop themselves, the company develops along with them – at least that is our goal – so in that sense we direct people towards development and in this we go as far as to state that if someone feels more free in his head through a knitting on a spool knitter course, then he should do so and we will facilitate this."

At Paint Co, the attention for developing employees that carry out only routinized and technology-dictated activities though is less than that for other employees.

Participation and communication are very open at all companies in so far the direct activities of employees are concerned. The picture is mixed if we look at participation/communication at company level. Apart from the companies that have a works council in place, only Packing Co informs all employees in full detail on activities, performance and future plans of the company. In this, it goes further than even the two companies that have a works council.

All companies think a good relational sphere or organisational climate to be of great importance and undertake different types of activities to strengthen the mutual bonds between company and

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employees. This also brings that in most companies relatively much attention is paid to employees' situation at home. Furthermore, most companies are willing to help employees in case of problems at home that affect their functioning at work. Overall, employees appreciated the personnel practices used positively or even very positively. They testified of a high level of job satisfaction and of good labour conditions.

"Most important for me is that I have fun in doing my work. And of course that should include appreciation for your work as a pat on your back, not necessarily in monetary terms." (Employee Metal Co)

"I enjoy going to work, absolutely. An advantage here is the freedom you have in how you work. And the way in which I work also is appreciated." (Employee Rubber Co)

Table 4   Institutional environment Poland

Company	Packing Co	Metal Co	Rubber Co	Paint Co
Cognitive	Large	Very large	Very large	Very large
Normative	Large	Very large	Very large	Very large
Regulative	Some	Some	Large	Some
Influence unions	None	None	None	None
Parent – subsidiary relations	Positive	Very positive	Neutral	Negative
Impact institutional environment on transfer	Negative	Negative	Very negative	Very negative

These positive employee outcomes correlate with the positive firm outcomes owner-managers perceive. Consequently, according to owner-managers, employee-oriented CSR is successful as it creates mutual value.

"Recently, a guy working at the assembly line had thought up some process economies by making things run more smoothly."(Owner-manager Paint Co)

"Voluntary turnover is minimal here. … Our rate of absenteeism is very low as well, not even two per cent per year. That also indicates a certain level of commitment." (HRM manager Paint Co)

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The transfer of values by owner-managers

However, successful employee-oriented CSR at home does not imply automatically that these practices will be transferred to foreign subsidiaries. Table 4 shows that companies think transfer of employee-oriented CSR to Poland to be quite difficult and to be complicated by the institutional environment. Especially the normative and cognitive institutional environment are considered to be that different in nature from the Dutch cognitive and normative institutional environment that they – in confirmation of proposition 3 – form a formidable obstacle to transfer.

"In Poland you meet with suspicion and mistrust. They really feel much smaller than us here, in wonderful, well-organised Holland. … I think work morale is better here [Netherlands] than there [Poland].There, five o'clock is five o'clock. And here, if we have to go on, we do go on." (Owner-manager Paint Co)

This implies that owner-managers need to use institutional capital to deal effectively with those aspects of the institutional environment negatively affecting transfer of employee-oriented CSR. Table 5 presents an overview of the extent to which owner-managers make use of institutional capital to bring about changes in their subsidiaries' internal institutional environment. Metal Co's owner-manager makes most use of institutional capital while on the other hand Rubber Co's owner-manager hardly puts in effort in this respect.

Table 5   Institutional entrepreneurship

Company	Packing Co	Metal Co	Rubber Co	Paint Co
Perceived institutional distance	Large	Large	Very large	Very large
Parent-subsidiary relations	Positive	Very positive	Neutral	Negative
Initiate divergent changes	Yes	Yes	No	Yes
Actively participate in implementation	No	Yes	No	No

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Table 6   Employee-oriented CSR Poland

Company	Packing Co	Metal Co	Rubber Co	Paint Co
Employment security	Large degree	Large degree	Some degree	Large degree
Compensation	Above market	Market	Market	Above market
Relevance employee development	Large degree	Large degree	Little degree	Some degree
Participation	Little degree	Very large degree	None	Some degree
Communication	Open	Very open	Little open	Open
Relational sphere	Little degree	Large degree	Some degree	Large degree
Work-home	Large degree	Some degree	Some degree	Some degree
Employee outcomes	Positive	Very positive	Negative	Positive
Commitment	Positive	Very positive	Neutral	Positive
Firm outcomes	Positive	Very positive	Neutral	Neutral

Host country employee-oriented CSR

Table 6 shows that the case study firms with varying degrees of success transferred employee-oriented CSR to their Polish subsidiaries. Metal Co – being the only company in which the owner-manager actively participated in running the subsidiary – seemed by far most successful in actually transferring employee-oriented CSR practices. Packing Co and Paint Co aimed for transferring the organisational climate rather than actual personnel policies and practices. Especially Packing Co seems to have been successful in this.

"My last job felt like being in prison, but here even on a day off I would like to come. … On a scale from 0 to 5 I give my labour conditions a 4." (Employee Packing Co Poland)

 "Courses and training as well as the way we treat our employees affect firm performance. For example, I often hear from customers that they appreciate our traders very much because of their good advice. Initially, the result seems to be that customers buy less but because the relationship gets much more sustainable because of this, in the end you sell more." (Country manager Packing Co Poland)

Rubber Co is least successful in achieving positive employee and firm outcomes in its Polish subsidiary. For the most part, apart from Metal Co, the companies refrained from transferring specific elements of employee-oriented CSR under the explicit reference that they could not afford the required mobilisation of resources, especially of time. Because of that they explicitly left personnel policy to local management, though all of them stated it to be their intention in the future to transfer elements of Dutch personnel policy gradually over time. Still, the initiation of divergent change in Packing Co and Paint Co seemed to be that highly valued by their Polish subsidiary employees that it resulted in positive employee and firm outcomes.

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Discussion

Legitimacy of employees as stakeholders

The findings in this study show that values of owner-managers – in accordance with the tenets of the stakeholder literature – impact to a large degree on both their view on position and role of employees and the way this view has been crystallized in their corporate strategies. Without exception, owner-managers consider their employees as legitimate stakeholders in the firm. Carroll (1991) argues that legitimacy of a stakeholder groups depends on that group having a justifiable right to making a claim on the firm. Kochan and Rubinstein (2000) specify justifiable right as making a valuable contribution to the company. Assessing the companies, we observe that they all make use of market strategies that require a lot of employee initiative and input to be successful. Furthermore, all owner-managers stress their view that the employees' contribution is of crucial importance for their firms' prosperity.

However, Mitchell et al. (1997) criticize this view on legitimacy of stakeholders because it is mixed up implicitly with another aspect of stakeholder salience, power. Owner-managers indeed indicate that they expect their stance toward employees to result in greater employee commitment which should cause employees to exercise their power over the resources they make available to the firm to the greater benefit of the firm. In response to this criticism, Scott and Lane (2000) relate legitimacy of stakeholders to the appropriateness of their claims relative to the institutional environment the firm operates in.

The arguments of the case study owner-managers for considering employees as important stakeholders can also be argued to be legitimacy-based as these arguments are consistent with the Dutch institutional environment, characterised amongst other things by extensive legislation on employee rights and by relatively comprehensive codetermination (in companies with over 50 employees).

Another basis for legitimacy of stakeholders is having a moral claim on the firm (Clarkson, 1995; Donaldson & Preston, 1995). All owner-managers but one explicitly state their moral responsibility towards their employees. Packing Co and Metal Co translate moral responsibility into their awareness that employees depend on the firm both for their livelihood and their well-being, while Rubber Co restricts moral responsibility to employee dependence on the firm for their livelihood. Interestingly, the personnel strategy's perceived firm outcomes are less favourable to Rubber Co than to the other companies. This may have to do with Rubber Co's recent introduction of a three-shift system for production employees which caused a lot of unrest and dissatisfaction showing up, for example, in an increased absenteeism rate. This does not necessarily contradict the owner-manager's feeling of moral responsibility as this measure is intended to increase long-term profitability of the firm and consequently guarantees long-term employment security for employees. Accordingly, there is no need to reformulate proposition 1.

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Proposition 1a: *The owner-manager's value system affects the institution of employee-oriented CSR practices.*

Home country employee-oriented CSR

The owner-managers perceive employee-oriented CSR to be successful in the sense that employee commitment is positively affected which shows up in generally low turnover, low absenteeism, increased productivity and increased problem solving. This is in line with the findings of Hammann et al. (2009). Nonetheless, this positive outcome does not seem to be a strong incentive in its own right to transfer these apparently successful practices to foreign subsidiaries. All owner-managers, who have not transferred practices thus far, indicate that they are not prepared to do this in the short run but that it definitely is a line of action that they intend to carry out in the long term. One explanation might be that employees in the Polish subsidiary are considered not to be as important for firm performance as the Dutch employees, in other words that they have less power.

However, the activities of the Polish subsidiary are either similar to those of headquarters in the Netherlands or form – in the case of Metal Co – the heart of company activities. Consequently, this argument is only plausible for Rubber Co as its Polish subsidiary produces only standardized products by means of standardized technologies. On the other hand , the power argument can be complemented by the degree of urgency owner-managers perceive with respect to employee claims. Mitchell et al. (1997) state that the urgency of stakeholder claims depends on two conditions: 1) the time-sensitivity of the claim to the stakeholder; and 2) the importance of the relationship to the stakeholder. Owner-managers can perceive claims of home country employees as more urgent than those of foreign subsidiary employees because of greater proximity oh home country employees. Owner-managers interact in person with home country employees on a daily basis, while they meet foreign subsidiary employees only sporadically. Consequently, they will be much more receptive to home country employee claims to the firm. These considerations necessitate that proposition 2 be complemented by

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Proposition 2a: *Lower power, proximity and urgency of host country employees compared to home country employees will negatively affect transfer of employee-oriented CSR to foreign subsidiaries.*

Institutional environment and transfer of employee oriented CSR practices

Still another possible argument for the apparent lack of transfer of practices is given by Kostova and Roth (2002) who state that multinational enterprises (MNEs) are under pressure to adopt local practices in order to achieve legitimacy in the foreign institutional environment. This counteracts possible attempts by MNEs to make use of their organisational capabilities on a worldwide scale. Kostova (1999) argues that the larger the institutional distance between home and host country, the more difficult it is to successfully transfer strategic organizational practices. We argue that this holds to an even greater degree for multinational SMEs given their relative lack of specialised expertise and slack (financial) resources. They also are less connected to business and administrative networks (Molz, Tabbaa, & Totskaya, 2009).

All owner-managers indicate that the perceived large institutional distance between the Netherlands and Poland is a very large obstacle to transferring the employee-oriented CSR practices that they use in the Netherlands. This perceived distance exclusively concerns the normative and cognitive institutional environment within the Polish subsidiary. Though owner-managers admit to have themselves only relatively limited knowledge of the legal and regulatory requirements with regard to labour, they do not perceive this as problematic as this knowledge easily can be acquired locally. Furthermore, they experience labour legislation and regulation to be less restrictive in Poland than in the Netherlands. However, as companies' employee-oriented CSR – fitting in the Dutch normative and cognitive institutional environment – is based upon mutual trust and good informal relations and encourages taking initiative by employees, the normative and cognitive institutional environment of the foreign subsidiaries should enable similar policies as well. But without exception, owner-managers indicate that where the Netherlands is a high-trust country in which hierarchical status has a very limited role, the opposite holds for Poland. Consequently, the perceived distance between these two institutional environments exercises a considerable negative impact on transfer. Therefore, proposition 3 should be reformulated as

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Proposition 3a: *Perceived institutional distance will negatively affect transfer success.*

Consequently, firms need specific capabilities to deal with issues raised by institutional distance enabling the owner-manager to manage the institutional context of employment relations decisions. These capabilities can be captured under the heading of 'institutional entrepreneurship'. Institutional entrepreneurship here entails that the owner-manager strives for change of the internal institutional environment in a certain direction (Boxenbaum & Jonsson, 2008). Consequently, institutional entrepreneurs undertake activities and leverage resources to change the internal institutional environment (Battilana, Leca, & Boxenbaum, 2009).This automatically implies the existence of 'managerial discretion' or the leeway a manager experiences in taking decisions. Managerial discretion is – in addition to individual, organisational and industry characteristics – affected by the national institutional environment in which the manager operates. Discretion involves the range of alternative management actions that potentially are acceptable to key stakeholders (Hambrick & Finkelstein, 1987). However, until very recently, the impact of the national institutional environment on managerial discretion has hardly been researched (Crossland & Hambrick, 2011).

In contrast to Battilana et. al. (2009), who postulate that actors must both initiate divergent changes from existing institutions and actively participate in the implementation of these changes in order to be successful as institutional entrepreneurs, we observe that the owner-managers of Packing Co and Paint Co, who only initiate divergent changes, succeed in achieving positive firm outcomes. They attain this result not by actually transferring practices but by demonstrating convincingly that their approach of employees is based on their view on employees as being legitimate stakeholders – and apparently this stance of their employer is appreciated positively by employees. The owner-manager of Metal Co, conversely, not only initiates divergent change of existing institutions, but also actively implements this change in his company. He succeeds by investing time, financial resources and social capital in changing the normative and cognitive institutional environment in such a way that a number of practices requiring mutual trust and the fostering of informal relations and initiative can be introduced. However, because he himself lives in Poland for part of the year is it much easier for him than for the other owner-managers to invest sufficient time. Furthermore, because of his frequent presence, the arguments of urgency and proximity are more important in this case.

Other possible reasons for not being able or willing to invest sufficient time to actively participate in implementing institutional change are the number of subsidiaries and the ownership structure in subsidiaries. Packing Co, for example, owns subsidiaries in twelve countries which makes it impracticable for the owner-manager to personally deal with the personnel strategy of all of these subsidiaries. In the case of Rubber Co, the Polish establishment is not a fully owned subsidiary. Local management holds a share of 49 per cent. The Dutch owner-manager indicates that this makes it virtually impossible to impose changes in personnel policies against the will of local management.

Summarising the foregoing, the data suggests that in host countries where the view on employees as stakeholders in the firm is less common than in the home country treating employees as legitimate stakeholders is an important divergence from existing normative and cognitive institutions that causes employees to consider the resulting company atmosphere as a very positive outcome of firm policies. This results in increased employee commitment showing up in reciprocating behaviour that affects firm outcomes positively. However, only initiating institutional change is insufficient to achieve successful transfer of specific employee-oriented strategies and practices since these run counter to the foreign subsidiary employee and management attitudes conditioned by the existing normative and cognitive institutions. In order to change these attitudes, the owner-manager actively needs to participate in changing the related normative and cognitive institutions.

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Concluding remarks

The outcomes of the multiple case-study suggest that globalisation does not necessarily lead to a purely instrumental view on employees. This study lends support to the proposition that employee-oriented CSR in multinational SMEs is capable of creating value on top of what is arranged for by law and/or union contract for both employees and firms. This outcome holds for both the home country and the host country.

The role of values of the owner-manager is important in this, although it is not a sufficient condition for successful transfer of CSR practices from one country to another country. The skills of the owner manager are critical. The cases suggest that institutional entrepreneurship of multinational SMEs plays an important role in implementing and internalising employee-oriented CSR practices within their foreign subsidiaries. All interviewees were aware of critical institutional differences. An interesting result is that even the company that had a subsidiary because of the attractiveness of low wages and lenient regulation (economic rationality based on self-regarding values), and that did not feel morally responsible for their Polish employees – but delegated it to a Polish shareholder – still made an effort to set some other normative standards, tried to be more socially responsible, especially with regard to physical conditions at the workplace.

Furthermore, the case studies suggest that cross-national institutional entrepreneurship is quite problematic for multinational SMEs. The most that can be achieved is initiating divergent change. Active participation in implementation of divergent change only is possible if the owner-manager is able to be sufficiently frequently present in the foreign subsidiary. However, the results also show that just initiating divergent change is sufficient to achieve positive firm outcomes.

The research approach has some serious limitations. First, there is a real possibility that the views expressed by the employee interviewees are not representative for the total employee population of the firms concerned, if only because of the fact that these employees have been selected by the respective owner-managers. Second, on-site interviews in Poland were carried out by a Polish interviewer who was instructed by one of the authors and who also was present during the interviews. In semi-structured interviews, however, acquiring information also depends on the way the interviewer responds to interviewees' reactions to questions. As a result, the information content from interviews with Dutch interviewees will differ somewhat from the information content from interviews with Polish interviewees. A third limitation of this study is the difficulty to catch positive firm outcomes in the form of reduced turnover and absenteeism and increased productivity and problem solving in terms of financial performance of the firm.

We noticed that all our case study companies are medium-sized companies which raises the question whether the outcomes would have been different for small companies. The limited amount of research on SMEs makes it quite difficult to say something about a possible distinction between small and medium-sized companies with regard to employee-related CSR. The distinction between the S and the M in SMEs requires more research. The same goes for employee perceptions of CSR in foreign subsidiaries. Do foreign subsidiary employees experience benefits within companies from CSR policies and are these benefits different from those experienced by home country employees? Furthermore, in research of this nature the effects of employee-oriented CSR on the financial results of companies should be taken into account as well. Finally, since this study suggests an important role for institutional entrepreneurship in transferring employee-oriented CSR, this issue should be researched more in-depth .

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Appendix

List of issues interviews

1. Basis employee-oriented CSR:
   - View owner-manager on employees
     - Position employees in ranking order stakeholders
     - Explicitly expressed values
     - Consistency over time/varying economic circumstances
   - View employees on firm
     - Loyalty to firm
     - View on values management
     - Perceived appreciation by management
2. Practices employee-oriented CSR
   - investment in employees over and above legally or contractually required minimum
     - wage level and wage structure
     - education and training
     - participation (including financial participation)
     - communication
     - internal labour market
     - motivation
   - instruments
     - forms and facilitation of training
     - forms of participation
     - forms of communication
     - job design
     - size and instruments of internal labour market
     - appraisal systems
     - work-life balance programs
     - stimulation internal cohesion
     - appreciation instruments by management
     - appreciation instruments by employees
3. Firm outcomes employee-oriented CSR:
   - characteristics employees leading to improved performance
     - attitude
     - commitment
   - improved performance (compared to competitors)
     - productivity employees
     - problem solving by employees
     - relative employee turnover
     - degree of absenteeism
     - suggestions for improving products/processes supplied by employees
4. Employee outcomes employee-oriented CSR:
   - work satisfaction
   - reward satisfaction
   - commitment felt towards company
   - relative turnover
   - degree of absenteeism

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5. Institutional environment
   - regulative institutions
     - o regulation hiring and firing
     - o regulation rewarding
     - o regulation/inspection workplace conditions
     - o role/importance trade unions
   - cognitive institutions
     - o taking initiative by employees
     - o employee perception of management's employee strategy
     - o attitude unions towards employers

     - o attitude employers toward unions
     - o attitude employees toward unions
     - o appreciation employees of working for foreign companies
     - o nature and degree of supervision on employees
   - normative institutions
     - o importance hierarchical status
     - o attitude employees to work
     - o view management on employees
6. Institutional entrepreneurship
   - perceived differences between institutional environments
     - o regulative differences
     - o familiarity with host country regulative institutions
     - o recognition taken-for-granted assumptions and cognitive sunk costs
     - o recognition host-country underlying norms and values in subsidiary
   - explicit transfer of practices
     - o practices transferred
     - o practices not transferred
   - explicit policy of changing institutions
     - o policies aimed at employees
     - o policies aimed at unions
     - o policies aimed at (local) authorities
   - results
     - o attitude (local) authorities
     - o attitude unions
     - o attitude employees
     - o level of implementation practices in subsidiary: presence of practices
     - o level of internalisation practices in subsidiary: perceived value of and commitment shown to practices

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Work Well-being of Self-employed

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Abstract. The study examined work well-being of self-employed operating in the Satakunta region in Finland. The aim was to gain new insights into entrepreneurship and how it can be supported. The study utilized the Work Well-being Model by Manka (2010) and explored its usefulness in gaining understanding about the work well-being of the self-employed. The study was based on semi-structured interviews of 9 self-employed persons and one former entrepreneur between 5.12.2014 and 12.12.2014. The themes of the interviews were based on the five dimensions of the Work Well-being Model: Organization, Work Community, Work, Leadership, and Individual. The interview material was analyzed using content analysis. The dimensions of the Work Well-being Model appeared to be useful in examining how the self-employed experienced their work well-being. Still, the model does not fully take into account the special characteristics of the self-employed and need to be further developed. As a rule, the self-employed of the study were satisfied with their work and roles. The significance of different kinds of networks was highlighted by all the interviewees within all the five dimensions of the model. Networks provided arenas for learning from each other and support to the individuals and their businesses. This finding suggests that networks may have even more valuable role than anticipated in supporting the work well-being of the self-employed and the success of their businesses. Networks could also be utilized by business advisers as a way to ensure support to new entrepreneurs.

1 Introduction

Self-employed are a significant asset to economic growth and the improvement of the employment situation. More and more people become entrepreneurs. The distinction between entrepreneurship and paid employment is becoming blurred. A trend of non-standardization of work is emerging (Kovalainen 2010; Pärnänen & Sutela 2014; Siltala 2004).

People may work as entrepreneurs and wage earners at the same time or move between entrepreneurship and paid employment. Self-employment is increasing and new forms of entrepreneurship are evolving. The regional, international and professional mobility of labour markets is growing. Work life is in transition, and changes in the operating environment are affecting enterprises.

According to the Labour Force Survey by the Ministry of Employment and the Economy (2014) the number of entrepreneurs with no employees has been growing during the past ten years. At the same time, the number of employers has not changed. Solo entrepreneurs (entrepreneurs with no employees) along with freelancers and grant researchers belong to the group of self-employed persons who generate their income directly from customers, clients or other organizations as opposed to being an employee of a business.

Also the number of self-employed persons is growing. In Finland there were 15 000 18 to 64 years old self-employed persons in 2013. (Pärnänen & Sutela 2014.) In this study the term 'self-employed' is used to refer to entrepreneurs with no employed workforce.

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Work well-being is a strategic factor to enterprises. It affects the profitability of the business, the quality of its products and services and customer satisfaction.

Generally, a self-employed person is solely responsible for her/his work well-being and the profitability of her/his business. Moreover, she/he works without the support of the traditional work organization and the work community. These issues make up some of the challenges that are characteristic to the promotion of the work well-being of self-employed.

The work well-being research tradition is over a hundred years old. During this time the focus of the research has shifted from occupational safety and diseases to promoting the health and well-being of individuals and work communities. Instead of problems, stress and illnesses it concentrates on strengths, challenges and possibilities for development.(Manka 2011.)

Earlier research on work well-being has focused mostly on the well-being of wage earners. Work well-being studies concentrating solely on entrepreneurs and self-employed are less common. They have most often examined the work satisfaction of entrepreneurs.

This study aimed to provide new insights into the work well-being of self-employed by examining work well-being of self-employed operating in the Satakunta region in Finland. It utilized the Work Well-being Model by Manka (2010) and explored the model's usefulness in gaining understanding about the work well-being of the self-employed.

2 Theoretical framework

   The Work Well-being Model by Manka (2010) provided the theoretical framework from which the work well-being of the self-employed was examined in this study. The model is based on a holistic view on well-being at work. The concept of well-being behind the model is grounded on the positive psychology approach by Seligman (2002, 2008). The model integrates different viewpoints to the examination of work well-being and derives its insights from the fields of psychology, organization theory, economics, and behavioral and health sciences. Based on these approaches, the model is built on and consists of five dimensions of work well-being: Organization, Work Community, Work, Leadership, and Person.
Through these dimensions the resource oriented Work Well-being Model describes the characteristics of organization, work community, work, leadership and the person that are the prerequisites of the well-functioning and successful organization and workplace and at the same time enable the employees experience well-being at their work (Figure 1).

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Figure 1. Work Well-being Model (Manka 2010)

The Organization dimension in the Work Well-being Model includes goal-orientation, flexible structure, continuous development and work environment. Goal oriented business means that the organization has a clear vision and strategies that are needed to reach its goals. An enterprise can clarify its goals and strategies with the help of a business plan. Structure enables flexible and self-directed functioning. It ensures that everybody can make decisions in her/his own field and receive information concerning it. Team work is common and teams operate in networks outside the organization. With the help of continuous development the organization can survive in the changing environment. Developing competence requires orderliness and future orientation. Strategic planning is emphasized in defining future competences. Supporting continuous learning requires time-management and meetings with the work community members on a daily basis. Physical work environment has an effect on work well-being. Making a work well-being plan is one way of systematically develop well-being at work. (Manka 2011.)

The key aspects of Work Community in the model are open interaction, team functionality and common rules. A well-functioning work community is built on them. Well-functioning work communities contribute to the development of trust, reciprocity, and social capital and promote networking. A common knowledge base, a sense of shared understanding together with competence and openness promote trust between members of a work community.

In the Work dimension of the model, important aspects of work related to well-being are decision authority on one's work, opportunities for learning and rewards. Satisfaction and happiness at work arose from possibilities to do one's work properly, complete it, concentrate on it and be in control of it. They also derive from clear goals for the work and from possibilities to get feed-back. Issues related to work well-being are work engagement (vigor, dedication, absorption) and enjoyment (enough time to enjoy work results), and burnout and stress. Work engagement and enjoyment can

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be promoted by orderly planning of work, work community support and feed-back. It is also important that the employees can get their voices heard about the work. (Manka 2011.)

Leadership dimension in the model refers to empowering, shared or authentic leadership. (Manka 2011.) Leadership and supervision are paramount to work well-being. Modern leadership is situationally and contextually bound interaction in which employee and task-orientation overlap. The task of the supervisors is to provide conditions and resources needed at work and to motivate employees to achieve common goals.

The fifth dimension of the Work Well-being Mode is the Individual. It refers to an individual's life-management, competence, health and functional capacity. Changes in the work life set new demands to employees such as adaptability and flexibility and also the ability to act as change agents. Psychological capital is related to managing one's own life and work, commitment and job satisfaction, and also to interaction skills needed in well-functioning work communities. It is also linked to positive emotions related to attitudes that increase enthusiasm and decrease cynicism. Moreover, it contributes change oriented behaviors by promoting interaction skills and reducing negative behavior.

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3 Material and methods

The material of the study was generated between 5.12.-12.12.2014 by semi structured interviews of 9 self-employed persons operating in Satakunta region in Finland. They were members of the advisory group of the Satakunta regional organization of the Federation of the Finnish Enterprises. All of them were solo-entrepreneurs with no permanently employed employees. One of them used hired help on hour to hour basis occasionally. The interview material of the entrepreneurs was supplemented by interviewing one person, who had recently given up her business.

Nine of the interviewees were women. The average age of the interviewees was 41 years, the age range being 38 to 55 years. All of them had at least vocational level education and two of them had graduated from university. The most common motivation for starting their own business had been their will to become entrepreneurs that had developed during their working careers as employees.

The interviewed entrepreneurs operated in the following sectors: four in the business services and finance, two in wholesale and retail trade, one in health and social work, one in accommodation and food service activities, and one in personal services. The former entrepreneur had had a household service business. The turnover of the entrepreneurs businesses varied from 20 000 to 140 000 euros, the yearly average being 48 000 euros. Eight of the interviewed persons had utilized public business services when establishing their businesses. Six of them had received start-up grant

The themes of the semi structured interviews derived from the five dimensions of the Work Well-being Model by Manka (2010): Organization, Work Community, Work, Leadership, and Person (figure 1). Each of the themes was examined through open questions that were presented to each of the interviewees in the same way and in the same order. In relation to the Organization theme, the interviewees were asked about the goals of the business, organizational structure, opportunities for development, and about the significance of a safe and functional work environment. In regard to Work Community, the interviewees were asked about the significance of work community to the well-being of self-employed with no employees. The third theme was Work that was approached by asking about the content of work, decision authority, and opportunities for learning, rewards and the experiences of work well-being. Also the impact of work on experiencing stress and ways of coping with stress were explored.

Leadership theme was approached by examining the interviewees' self-leadership and the goals set to the businesses. Also their roles in different networks and the significance of networks to their work well-being were explored. With respect to the Person dimension in the Work Well-being Model, the interviewees were asked about the management of work-life balance and how they experienced mental and psychical well-being at work.

The interview material was analyzed using content analysis during which inductive and deductive approaches alternated. The inductive approach was utilized in the first stage of analysis, in which individual findings were categorized and developed into a more general level. Deductive characteristics of the analysis were displayed in juxtaposing and discussing the findings in relation to former studies and their results.

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4 Results

Within the Organization theme, the most central issue the interviewees brought up was continuous development and especially developing competence. At the time of the interviews, seven out of the nine self-employed were doing that.

"I'm studying a mode of therapy as a part of developing my professional competence. I have completed several courses, but this is the best. Now I have found something I really belong to. Someday I will do something really big based on this."

Four of the self-employed were participating entrepreneurial training; they regarded training as a way to develop their competence and – at the same time - develop their businesses. In general, the self-employed regarded business development as difficult and only half of them had a plan about how to develop their businesses.

Work environment was seen as an important factor affecting the well-being of the self-employed. It had an influence on both the safety and homeliness of the workplace. In addition, it had an impact on customer satisfaction. Also the importance of network communities were highlighted. All of the study participants had broad networks and four of them operated in a psychical community of entrepreneurs.

"Actually, I work physically in this entrepreneurs' community. We share premises and all of us pay rent for them. It is much more than only a place to work. It is several things, it is my work community, these ten entrepreneurs from different businesses working here. I can always ask for tips from my colleagues."

The most seldom discussed topic within the Organization theme was the organizational structure. The self-employed experienced that it was difficult to discern the organization from themselves: the entrepreneur was the organization.

In relation to the Work Community theme, the self-employed stressed the significance of their family and networks to their work well-being. Even if the work of a self-employed person is often seen as very solitary, the self-employed of this study did not experience loneliness and therefore did not feel that working alone had a negative impact on their work well-being.

What was regarded as a work community varied considerably among the self-employed of this study: For some of the entrepreneurs the work community was the entrepreneur herself, for some others it consisted of several (even up to 18) people.) All of them felt that their colleagues and networks were part of their work community. The entrepreneurs of this study were members of varying personal, official and unofficial networks. Some of the networks were professional, some others were based on entrepreneurs' associations or interest groups.

The work community of a self-employed can be much broader and versatile compared to that of a salary earner working in a certain job. The self-employed felt that they got concrete help from their work community in their work. Moreover, it provided the social aspect of work and gave them psychosocial support. In the networks they were able share and receive information and learn from others.

"In networks you can discuss and share things. It is a kind of sparring companionship, we help each other."

The significance of the work community was highlighted also by the former entrepreneur of this study. He reflected that sharing a workplace with other self-employed was much nicer than working alone. Working at the same place with others was important also for the mental and physical health.

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Work and its content had a huge impact on the work well-being of the self-employed. Some described their work to be 'everything' to them. They felt that their work was meaningful, and they experienced work engagement regularly (cf. Palmgren et al 2009). Competence was the most important aspect of the entrepreneurs' work and it was constantly developing through work.

"My work is almost everything to me. It has been the reason for my studies and I have done also non-paid work. I have travelled a long journey to this point, but now I understand that everything I have done before has been the path towards my entrepreneurship."

Eight out of the ten self-employed felt that they had more decision authority over their work compared to wage earners. Especially, they were able to have an influence on the content of their work, use of time, and the amount of work.

Work was also a source of stress, most often through the experience of haste. The most common ways of coping with stress were hobbies, such as sports, outdoor activities and meditation. Also networking and participating in different associations' activities were seen as good ways to offload stress.

For the self-employed, leadership concerned their self-leadership and roles in different networks. The most vital challenge of self-leadership was time-management. An entrepreneur with no employees can act also as a leader in her/his networks. Moreover, her/his roles can vary in different networks. When a self-employed person acts as a network leader, she needs also other leadership skills than self-leadership skills. Almost half of the self-employed of this study regarded that the goals set for their businesses helped them manage their own activities towards business results.

"My work requires self-leadership skills. You have to consider carefully how many customers you can take, because the lengths of the projects vary a lot. If you got even one big project, you have to look carefully, whether or not you can be involved in something else."

An entrepreneur can influence her/his own well-being through the psychological capital she/he possesses. Also healthy lifestyle and work-life balance are important for well-being at work. The self-employed experienced high level work well-being both physically and mentally despite illnesses some of them had. The self-employed felt that their work ability was good and that the work-life balance was in order. They were proud of their work and were inspired of it. Almost all of them took good care of their physical condition.

Being competent was a part of the professional identity of the self-employed. They emphasized their personal competence and invested in developing their business skills as well as their professional competence. All of them had at least four years work experience, which can be seen as a sign of their persistence and competence development.

Customers and their satisfaction had a significant effect on the work well-being of self-employed. Customer satisfaction was also related to how they experienced the meaning of their work. Satisfied customers were experienced as a reward from work.

"The best feedback I get from my work is my customer going home relaxed and in a good mood. Then I feel well."

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5 Discussion

As a rule, the self-employed of this study experienced high work well-being when examined in terms of the five dimensions of the Work Well-being Model by Manka (2010). They were satisfied with their work and felt that it was meaningful and important. This finding is in accordance with the Well-being Barometer by the Federation of Finnish Enterprises (2013), according which entrepreneurs are proud of their work and enthusiastic about it. Also earlier studies have demonstrated that entrepreneurs are more satisfied with their work than wage earners, despite the fact that the entrepreneurs work longer hours and that they are solely responsible for their enterprises (Hytti 2013; Millian & Hessels & Thurik & Aquado 2011). Self-employed are even more satisfied with their work than entrepreneurs with employees (Blanchflower 2004; Elomaa 2014; Palmgren & Kaleva & Jalonen & Tuomi 2010; Taylor 2004). They experience a high level of mental and physical work well-being (Elomaa 2014; Kivelä & Montonen 2010).

Finding one's professional identity, obligations based on one's values and the lack of other options for employment have been described as reasons for becoming self-employed (Hasanen 2004, cf. Heinonen ym. 2006, Kovalainen 2010, Pärnänen & Sutela 2014). Half of the self-employed of this study had started their own businesses by their own will. They felt that they had found their professional identity through entrepreneurship. Only for one of the study participants becoming a self-employed has been a way to get work. The strong drive for becoming entrepreneurs and the meaningfulness of their work may explain the high level of work well-being among the self-employed of this study.

However, work engagement is always a personal experience (Feldt & Mäkikangas & Kokko 2005). The story of the former entrepreneur in this study points out that self-employed may have varying experiences about entrepreneurship and well-being at work. It also indicates that the level of work well-being of self-employed may not generally be as high as it was among the self-employed of this study.

In this study, the Organization and the Person dimensions of the Work Well-being model overlapped partly. Such aspects of Organization dimension as goal orientation, flexible structure and continuous development were perceived in terms of the entrepreneur: For the self-employed the organization was the entrepreneur. Furthermore, their networks were part of their organizations as well as their work communities.

In relation to the continuous development aspect of the Organization dimension, especially developing competence was stressed. A novel aspect of developing competence was learning in and from the networks. In a study of small entrepreneurs (Manka 2011), networks seemed to be related to entrepreneurs' social capital. According to Allen (2000), the work well-being of self-employed can be explained by their membership in different networks and social communities that compensate the lack of actual work community. He also demonstrates that people who start their own businesses have got broader social networks than non-entrepreneurs.

Business goals and results were not highlighted in the study participants' interviews. Half of the self-employed did not have clear financial objectives for their businesses. This is not a new finding: according to Elomaa (2014) and Palmgren et al (2010) written financial objectives are not as common in enterprises with no employees as in enterprises with employed personnel.
Within the Work dimension, the significance of decision authority was emphasized. The importance of having decision authority over one's work has been demonstrated also in earlier studies: independence at work, varying tasks and experiencing work as meaningful can buffer against heavy workload and have a positive effect on the work satisfaction of the entrepreneurs (Hytti 2013). According to the study by Pärnänen and Sutela (2013) self-employed persons experienced that they were able to influence their work much more than employees. All of the participants of this study

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experienced work engagement. This finding is consistent with the earlier studies suggesting that self-employed with no employees score higher in work engagement than salary earners (Elomaa 2014; Sutela & Pärnänen 2014, Palmgren 2010). Moreover, most of the participants of this study were women and work engagement has been demonstrated to be especially strong among women entrepreneurs (Palmgren et al 2010).

Continuous learning functioned as a stimulus for the self-employed. In addition to networks, customers played an important role in the learning process. Customer satisfaction was one of the most important rewards for the self-employed of this study. This finding is parallel to earlier studies according which success at work and successful projects with customers generate satisfaction and well-being (Mamia 2009; Pyöriä 2012).

Self-leadership was an important skill for the self-employed. In addition to self-leadership, leadership was conceived in terms of leading one's networks. Among the self-employed of this study, there was a balance between the work and the family life. It has been suggested that managing work-life balance is easier for solo-entrepreneurs than entrepreneurs with employees (Palmgren et al 2010, Well-being Barometer 2013).

The significance of networks to the work well-being of the self-employed came up within all the dimensions of the Work Well-being Model. The results suggest that networks may substitute the work environment and work community of the traditional work organization for the self-employed. Additionally, networks provide them with opportunities to interact with others, and new insights to developing their competences and leadership.

The results of this study suggest that the five dimensions of the Work Well-being Model by Manka (2010) may be useful in describing the work well-being of self-employed. However, the model has been developed for enterprises with employees, and does not fully acknowledge the special characteristics of self-employed. Furthermore, the traditional view of organizations with clear boundaries and hierarchical structures embedded in the Work Well-being Model needs to be reconsidered to allow more open and versatile conceptions of organizations that take into account the significance of networks to the self-employed. In future, atypical employment contracts and network –oriented work communities will become more common. Networks may provide possibilities for entrepreneurship to more and more people planning to start their own businesses.

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6 Implications

In supporting entrepreneurship at the national level, it is important to remember that entrepreneurs need advice, business services and financing that help them develop their businesses, and the well-being of the people working in their enterprises. Public business services should take into account the significance of work well-being and integrate it into the advising processes for new and operating enterprises. Furthermore, there is a need to develop business advisors' knowledge about work well-being and how to bring up work well-being issues when discussing with their customers. Business advisors should also be able to assess the level of competence, the ability for self-leadership and business management, and the psychological and physical resources of persons starting their businesses. Electronic learning environments for entrepreneurs should be developed to support improving competences and promote networking. They are needed to enable entrepreneurs to learn and be in contact with each other with the help of easy to use equipment. In the future, developing entrepreneurs' networks and network-oriented work communities could be one of the business developers' tasks.

The importance of networks for self-employed came up in many ways in this study. More research is needed to provide profound understanding about the role and significance of networks in the entrepreneurial process and for the well-being of self-employed. It might also bring along new insights into 'the real world' of self-employed who are still often seen as sole traders working alone all day long at certain places. More studies are also needed about the role and services of public business services. What kind of new approaches are needed in business services when the aim is to promote entrepreneurs' networks and networking?

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Reviewing the relationship between technological innovation and internationalization from a dynamic capabilities' perspective

Jaan Kets

Abstract

Considerable attention has been paid to the reciprocal relationship between technological innovation and internationalization. However, despite research efforts in identifying if and how these two strategic processes influence each other, the literature is inundated with inconsistencies, contradictions and heterogeneous in terms of theoretical approaches applied. This paper reviews and critically examines the empirical literature on the relationship between technological innovation and internationalization. Building upon the dynamic capability view, we distinguish between sensing, seizing and reconfiguring aspects of technological innovation and internationalization and use it as a framework to organize the empirical literature. A systematic analysis of seventy-two journal articles published in leading journals over the last 25 years reveals that the majority of the empirical studies largely focus on seizing and not on sensing and reconfiguring. We present a set of propositions that outline 1) how technological innovation and internationalization are related processes in firms 2) how this relationship is mediated by co-ideation and co-innovation 3) how entrepreneurial orientation leads the sensing and seizing of opportunities and reconfigures the resources base. Our discussion and model help to delineate key differences in the relationship between technological innovation and internationalization that firms have.

Introduction

From the field of strategic management it is known that the effects on performance of various strategic processes, such as technological innovation and internationalization, are not independent (Golovko et al, 2011). Indeed the literature on the relationship between technological innovation and internationalization acknowledges that there is a relationship between these two processes. However, the results are mixed as to how the technological innovation and internationalization processes contribute to performance and how these two processes are dependent each upon the other (Chiva et al, 2013). Autio et al (2011) suggest that firms may be more innovative because they have internationalized, rather than becoming internationalized because they have innovative capabilities.

An overview of the results of past empirical research on the relationship between technological innovation and internationalization can shed light on the interdependency and the factors influencing that relationship. It identifies gaps in the empirical literature to direct future research and to support practice. To researchers it can provide a theoretical model that can be used

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for new studies to explain the interdependency between technological innovation and internationalization. To practitioners it can provide a frame of reference of how these two strategic processes are mutually dependent. This review's scope is to analyze which dynamic capabilities are used in the relationship between technological innovations and internationalization.

Three concepts take a central position in this review. These three concepts are technological innovation, internationalization and dynamic capabilities.

First, technological innovation can be defined as the set of activities through which a firm conceives, designs, manufacturers, and introduces a new product, technology, system or technique (Freeman, 1976). Various fields, such as engineering, marketing, management, put different emphasis on what really defines technological innovations. In this key term the word technological refers to those innovations that comprise inventions from the industrial arts, engineering, applied sciences and/or pure science. Examples include inventions from aerospace, pharmaceuticals, life sciences, sustainable energy. According to Cantwell (1989), Garcia & Calantone (2002:112) innovation is an iterative process initiated by the perception of a new market and/or new service opportunity for a technology based invention that leads to development, production and marketing tasks striving for the commercial success of the invention.

Second, internationalization can be defined as the process by which firms both increase their awareness of the direct and indirect influence of international transactions on their future, and establish and conduct transactions with other countries' (Beamish, 1990:77). Knight & Cavusgil (2004) consider internationalization at the same time an innovative act. International market entry often requires innovative products or products that have been adapted to foreign market preferences (Leiblein and Reuer, 2004; Zahra, Hayton, Marcel and O'Neill, 2001).

Third, the concept dynamic capability consists of two terms, namely *dynamic* and *capability*. A capability "is the ability to perform a particular task or activity" (Helfat, 2007:1). The word dynamic refers to change. Dynamic capabilities were originally defined as "the firm's ability to integrate, build and reconfigure internal and external competencies to address rapidly changing environments" (Teece, Pisano & Shuen, 1997:516). Firms have to constantly deal with new situations due to technological changes (Teece et al, 1997). Firms have to respond to changes in their external environment (Prange, 2010; Sapienza et al, 2006). These external cues may lead to changes in internal structures and processes (Knudsen et al, 2002; Sapienza et al, 2006; Prange, 2010). Subsequent work refined and expanded this original definition of dynamic capabilities. Eisenhardt & Martin (2000:1107) define dynamic capabilities as "the firm's processes that use resources to match and even create market change". In this definition dynamic capabilities are considered organizational processes such as for instance product development. Apart from defining dynamic capabilities as processes, Eisenhardt & Martin (2000) include the creation of market change. It is possible to classify dynamic capabilities into three groups, namely 1) the capability to sense opportunities (sensing),

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2) the capability to seize opportunities (seizing) and 3) the capability to reconfigure the firms intangible and tangible assets (reconfiguring) (Teece, 2009) .

The contribution of this paper is threefold. First, it introduces a model of three dynamic capabilities. It distinguishes the outcomes of these three dynamic capabilities explicitly. Second, it clarifies how the innovation processes and the internationalization processes are combined dynamic capabilities, because activities of a firm's strategy and their effects on performance are not independent (notion from strategy: Golovko (2011)). It proposes to include entrepreneurial orientation as to make the entrepreneurial aspects of the three dynamic capabilities clearer. Third, it proposes factors that could stimulate the transition between the three dynamic capabilities. The propositions are depicted in a theoretical model that can be used for further research.

The remainder of this paper is structured as follows. The next section describes the approach used to compile and analyze the publication data resulting from our literature review. The third section reports the results. It elaborates on the three dynamic capabilities, introduces the model of dynamic capabilities and summarizes the results. The fourth section discusses the results and presents a set of propositions. The sixth and final section concludes the paper and provides limitations of the study.

Method

Although a significant number of articles have been published on the relationship between technological innovation and internationalization, there is still no systematic and comprehensive overview.

This paper covers 72 empirical studies published in peer reviewed academic journals between 1990 and 2015 inclusive. We excluded books, book chapters, reports and conference proceedings, because of variability in peer review processes and more restricted availability (Jones, Coviello & Tang, 2011). Based on an assessment of methods used in recent review articles (Barreto, 2010; Kiss, Wade & Cavusgil, 2012; Peiris, Akoorie & Sinha, 2012; Jones, Coviello & Tang, 2011), we took the following steps to organize the review process. The search process was started by using the keywords internationalization and technological innovation in title using Web of Science and the electronic database Ebsco-host. This led to very limited results (less than 10 hits), so we broadened the search by using the key word internationali* and innov* in title and by using the key word export instead of internationalization. We also search by using the key word internationalization or export in title and the key word technological innovation in subject term. This gave a list of 142 articles

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We did limit the list of articles to those empirical articles published in top journals in the categories of business and management. Top journals were identified by using journal impact scores (Journal Citation Reports, 2013; Thomson Reuters). The journals were selected based on an impact

score higher than 1.0. 41 articles were published in journals with an impact score less than 1 or in journals that were not in the category business & management. 18 articles were disregarded because these did not deal with the relationship between internationalization and technological innovation.

In addition to conducting the database search, we checked the references of all included articles to identify additional relevant articles. This lead to another 6 articles being added to the list. Another selection criteria were the number of citations of the articles in the Web of Science and Google Scholar. By going through the citing articles we found another 4 relevant articles. Once the 72 relevant articles were identified they were read and assessed and coded their content in relation to the following categories:

1. Field and publication outlet

2. Context issues: geographic focus and industry

3. Dynamic capability: sensing, seizing and reconfiguring

Table 1 shows that almost half (48%) of the empirical articles appeared in the field of Business & Management and one third (33%) in the field of Technology & Innovation. Research Policy published most articles (16) in this stream of literature on the relationship between internationalization and innovation, followed by the International Business Review (13) and then Technovation (5). The remaining 38 articles are spread over 14 different journals. Surprisingly, we found only 8 articles published in the field of Entrepreneurship and 4 in the field of international marketing. We find it troubling that this stream of research is rather underrepresented in the mainstream entrepreneurship journals, particularly given the growing prominence of small firms in the global economy and the important role that entrepreneurial firms are playing in technological innovation.

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Table 1: Distribution of articles by field and publication outlet

Field of research	Journal	# articles
Entrepreneurship	Journal of International Entrepreneurship	3
	International Small Business Journal	3
	Small Business Economics	2
		8
Technology & Innovation	Technology Analysis & Strategic Management	3
	Technovation	5
	Research Policy	16
		24
Business & Management	International Business Review	13
	Journal of International Business Studies	4
	Journal of World Business	4
	Strategic Management Journal	4
	Journal of Management Studies	3
	European Management Journal	3
	California Management Review	1
	Academy of Management Journal	3
		35
International Marketing	Advances in International Marketing	1
	Journal of International Marketing	3
		4
Other	Journal of Business Ethics	1
		1
		72

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Results of the Literature Review

The literature review's purpose is to analyze which combinations of dynamic capabilities are used in the relationship between technological innovation and internationalization so as to explain the mutually dependent relationship. For that reason the key concepts of the review, i.e., the dynamic capabilities, technological innovation and internationalization, are first further explained. Then a model of combined dynamic capabilities is introduced. This is followed by a summary of the findings from the literature review with respect to the empirical aspects of the relationship between technological innovation and internationalization.

Dynamic Capabilities

For firms to adapt to technological and market changes, they need to recombine and integrate their resources. Teece et al (1990) highlighted in a working paper that firms' ability to adapt to changes in the external environment could be explained by the fact that some firms are able to integrate, build and reconfigure internal and external competencies to address rapidly changing environments. Soon after that, Teece, Pisano & Shuen (1997)' s seminal paper fully described the dynamic capability framework. One of the fundamental concepts in the dynamic capability framework is that of capability. A firm's capability is a set of current or potential activities that utilize the firm's productive resources to make and/or deliver products and services (Teece, 2014:328). There are two important kinds of capability: ordinary and dynamic. Ordinary capabilities involve the performance of administrative, operational, and governance-related functions that are (technically) necessary to accomplish tasks (Teece, 2014). Dynamic capabilities involve higher-level activities that can enable a firm to direct its ordinary activities toward high-payoff endeavors (Teece, 2014). Dynamic capabilities once they are developed become over time operational capabilities and these operational capabilities over time will become routines. There is now also discussion in the literature that actually signals for change could come from the internal environment of the firm (Zahra et al, 2006). It was first assumed that dynamic capabilities would influence operational capabilities and not the other way around. So there are dynamic capabilities that are signaled by the external environment and dynamic capabilities that are signaled by the internal environment. It is possible to make a division between externally signaled dynamic capabilities and internally signaled dynamic capabilities.

The dynamic capability framework emphasizes the key role of strategic leadership in appropriately adapting, integrating and reconfiguring organizational skills and resources to match changing environments

The dynamic capability framework is most relevant in a growing number of eco-systems characterized by market structures that are fluid, clusters of know-how and technologies are globally dispersed, competition takes place between business eco-systems, and innovations that are dependent on combinations of technologies (Teece, 2014). Jantunen et al (2012) explored the differences and similarities of dynamic capabilities in a comparative setting in innovative firms. They

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found that all of the different forms of dynamic capabilities were represented in all four cases companies. Next to that they found that different forms of dynamic capabilities differ in terms of the commonalities and idiosyncratic features between firms. It seems that practices comprising sensing capabilities are likely to be similar across firms within a single industry, while practices comprising seizing and reconfiguring types of capabilities may differ more between companies.

In the following section we will further define these processes and explain why they are considered dynamic capabilities i.e., why the processes of technological innovation and internationalization may be disentangled in sensing, seizing and reconfiguring.

Technological Innovation and Internationalization

Technological innovations, in the form of either product or process innovation, generate competitive advantages based on cost and/or differentiation, which provide the firm with a greater competitive capacity (Filipescu et al, 2013). This definition indicates that technological innovations have an impact on the overall performance of the firm. Technological innovations require an understanding of both international customers and technologies and thus of both international market and technological capabilities. International market capabilities are a combination of the international market-related resources, processes and knowledge needed to serve current and potential future international markets, while technological capabilities are a combination of tangible and intangible technically related resources, processes and knowledge. In other words, technological innovations have two 'forces' from which discontinuities may originate – from an international market direction or from a technological direction. Product innovation may require new marketplaces to evolve, and/or new marketing skills for the firm. Similarly, product innovations may require a paradigm shift in the state of science or technology embedded in a product, new R&D resources, and/or production processes for a firm. Some products may require discontinuities in both marketplace and technological factors. From this definition it may be derived that both market and product play a role. This means that the technological innovation can come from within the firm or from external to the firm, from the market.

Figure 1 visualizes technological innovation and internationalization as a combined dynamic capability. From a linear perspective, the technological innovation process and the internationalization process start with sensing. Sensing opportunities and threats, particularly in rapidly shifting markets, requires scanning and searching both internally and externally. These sensing activities must occur even though technology trends are hard to figure out, particularly as path dependencies and top team's mind set often lock firms into existing market and technological trajectories. The identification of new technological innovations and international markets leads to seizing. Seizing capabilities are needed in the design of product architecture and business models or brand management. They also include decision-making practices concerning new ventures, partners and choice of distribution channel (Ellonen et al, 2011). In organizational terms, this requires top teams who can craft a vision and strategy, ensure the proper organizational alignments, assemble

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complementary assets, and decide on resource allocation. In more concrete terms, this involves developing a consensus among the top team about aligning the business model and strategy. Without these capabilities, firms may have ideas, but be unable to act on them. Then firms enter the reconfiguration phase. Reconfiguring capabilities are activities such as the redeployment of existing assets, the management of complementary assets and reengineering processes. Structures, practices and processes included in reconfiguring capabilities include knowledge management, resource-base reconfiguration, and asset co-specialization (internally and with external partners).

Figure 1: Model of technological innovation and internationalization as combined dynamic capabilities (based on Teece, 2007)

	sensing	seizing	reconfiguring
Technological Innovation			
Internationalization			

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Results

The literature review's scope is to analyze which dynamic capabilities are used in the relationship between technological innovation and internationalization. Eisenhardt & Martin (2000) state that the more dynamic an industry is, the stronger the drive to display dynamic capabilities. For that reason we first summarize our findings on the geographical scope and type of industry in table two as they may help to explain the kind of dynamic capabilities are used. The meaning of the abbreviations used in table 2 is explained in the list of abbreviations in table 3.

Table 2: Distribution of studies by region/country and industry

Literature source	Country									Industry					
first name, year	EU	US	JP	CN	KR	IN	AU	AF	O	Man	PH	EN	Bio	S	O
Alegre (2012)	x									x					
Ambos (2004)	x									x	x				
Ambos (2007)	x									x	x				
Anon Higon (2010)	x									x				x	
Basile (2001)	x									x					
Beers (2008)	x									x					
Beise-Zee (2006)	x									x		x		x	
Belderbos (2003)			x							x	x				x
Bell (2004)	x									x					
Boso (2013)	x						x			x	x	x			
Burgel (2000)	x									x					
Cantwell (1999)	x									x	x				
Cantwell (2000)	x									x	x				

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Cassiman (2011)	x									x				
Cerrato (2009)	x									x				
Chakrabarty (2012)		x								x			x	x
Chaminade (2008)						x								x
Chari (2007)		x								x				
Chen (2012)									x					x
Ciabuschi (2011)	x	x							x	x				
Coeurderoy (2010)	x													x
Costantini (2012)	x													x
Deng (2014)				x						x				
Fabrizio (2012)	x	x	x								x			
Filipescu (2013)	x									x				
Garcia (2012)	x									x				
Golovko (2011)	x									x				
Guan (2003)				x						x				
Guellec (2001)	x						x		x	x				
Hitt (1997)		x								x				
Kafouros (2008)	x									x	x			
Knight (2004)		x								x				
Kotabe (2002)		x								x				
Kylaheiko (2011)	x									x				
Lahiri (2010)		x								x				

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Lee (2009)				x				x				x		
Lefebvre (1998)							x							
Lindell (1997)	x	x						x						
Lopez (2005)	x							x						
Macher (2007)		x						x						
Molero (1998)	x							x						
Molero (1993)	x							x						
Monreal-Perez (2012)	x							x						
Nassimbeni (2001)	x							x						
Nielsen (2009)	x							x				x		
Pearce (1999)	x							x	x					
Pla-Barber (2007)	x										x			
Poon (2005)				x			x	x						
Ramos (2011)	x							x						
Roper (2002)	x							x						
Rycroft (2004)		x						x						
Sadowski (2006)	x							x						
Sahaym (2012)		x						x						
Santangelo (2001)		x						x						
Schwens (2011)	x									x	x			

eaa
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Shi (2001)				x					x	x	x				x
Sterlacchini (1999)	x									x					
Thistoll (2010)									x						x
Tovstiga (2004)									x						x
Un (2011)	x									x					
Venanzi (1996)	x									x					
Villar (2012)	x									x					
Wakelin (1998)	x									x					
Wang (2013)				x						x					
Woerter (2010)	x									x					
Wortmann (1990)	x									x			x		
Yi (2013)				x						x					
Zahra (2003)		x													x
Zahra (2000)		x								x	x		x		
Zhang (2007)					x										x
Zhao (2005)				x						x					
	44	**15**	**2**	**6**	**3**	**1**	**1**	**1**	**8**	**60**	**11**	**3**	**4**	**5**	**11**

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Table 3:

Country:	Industry:
EU: European Union	Man: Manufacturing
US: United States	PH: Pharmaceuticals
JP: Japan	EN: Energy
KR: Korea	Bio: Biotechnology
IN: India	S: Service Industry
AU: Australia	O: Other
AF: Africa	
O: Other	

Country/Region

Table 2 shows the distribution of studies on the relationship internationalization – innovation by country/ region. In total, the large majority of studies we reviewed examined internationalization - innovation research in advanced economies with studies of Europe (44) and United States (15) being most frequent (see column 1 and 2). In terms of geographic regions, Western Europe has received by far most attention, with studies of Spain (12), Germany (8), United Kingdom (6) and Italy (5) being most common, followed by North America, where studies of the United States (11) dominate. The least frequently studied region of the world has been Eastern Asia, followed by Southern Asia, Oceania, South Eastern Asia and Africa. Regions like Central Asia, Western Asia, and Latin America and the Caribbean did not appear in any of the studies. The absence of studies focusing on these regions may reflect the political and institutional turmoil that plagues these parts of the world and makes internationalization very risky. It may also speak to the difficulties associated with data collection from these regions.

  A number of the studies (16) we reviewed were multi-country studies. 11 out of those 16 studies took place in one region (Europe: 8, Eastern Asia: 2 and South Pacific: 1), followed by 5 studies done across regions. Notably, studies of this type have focused largely on transfer of knowledge flows to increase competitiveness. The limited number of studies across regions could be explained by the fact that firms operate more regionally than globally (Cerrato, 2009). This regional- versus global orientation of the firm is contingent upon firm- and industry-specific factors (Cerrato, 2009).

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Table 2 shows that the internationalization – innovation research is mainly skewed toward countries in advanced economies, i.e. countries that are also highly ranked on the global innovation index 2014 with the exception of research in Africa and Eastern Asia, which is skewed toward countries at lower stages of development (perhaps reflecting a relatively fewer number of advanced economies in these regions). Considering that internationalization – innovation research has centered largely on more advanced economies in Europe and North America and that other major regions of the world have been relatively neglected, it is difficult to generalize findings and to make reliable comparisons of results based on either region or country. Most studies have centered on one country only, as we noted previously, and could thus benefit from comparing a broader range of both emerging and advanced economies.

Industry

Table 2 also shows the distribution of studies on the relationship technological innovation - internationalization by industry.

The majority of the studies state that they have taken a stratified sample of manufacturing industries. This explains the high number of multi-industry studies. A reason for the large number of stratified samples is that industrial sectors differ greatly in the sources of technology they adopt, the users of the technology they develop and the methods used by successful innovators to appropriate the benefits of their activities (Pavitt, 1984). Most studies have generally focused on manufacturing industries without taking into account the implications of dealing with heterogeneous technological profiles (Pla-Barber et al., 2007). There are 20 studies in which the manufacturing studies are not further specified. There are also studies that combine manufacturing- and service industries. There are 9 single study industries. These studies are done to explain the global innovative character of the industry. In case of the semi-conductor industry it turns out that this industry is not as innovative as one would aspect. It is surprising that there are few studies about science-based industries such as biotechnology, because study of a single industry will reveal more homogeneous technological and economic effects. There is no single study about the renewable energy industry. It is also not clearly defined what is meant by a 'high-tech industry'. The pharmaceutical industry, as a science-based industry, is well represented in the various studies and so is the IT industry. A reason for this presence is that the pharmaceutical industry is a very competitive and innovative industry due to increasing consumer health care awareness and search for entry in emerging markets. The studies do not go in detail about the various industries.

Technological Innovation and Internationalization as sensing, seizing and reconfiguring capabilities.

This section provides an overview of which dynamic capabilities play a role in the relationship between technological innovation and internationalization. Table 3 presents this overview. Column A

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shows the empirical studies used in the literature review. Column B sub-divides the capabilities sensing, seizing and reconfiguring in respectively column B1, B2 and B3. Column C does that for Internationalization. Column D shows those studies that report results of the dynamic capabilities technological innovation and internationalization. The meaning of the abbreviations used in table 3 is explained in the list of abbreviations in table 4.

Table 3: Literature organized by dynamic capability and outcome

A: Literature Source	B: Technological Innovation										C: Internationalization							D. Result
	1. sensing	2. seizing					3. reconfiguring				1. sensing	2. seizing				3. reconfiguring		
	IC	E	C	Pa	Pr	Pc	I		U	S		a	E	P	i		EM	Perf.
Alegre (2012)	x				x										X			
Ambos (2004)									X									
Ambos (2007)									X									
Anon Higon (2010)					x	x								X				
Basile (2001)			X											X				
Beers (2008)			X															
Beise-Zee (2006)												X						
Belderbos (2003)												X						
Bell (2004)												x						
Boso (2013)														x				

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Cantwell (1999)				X																		
Cantwell (2000)				X																		
Cassiman (2011)					x	x								x								
Cerrato (2009)							x							x								
Chakrabarty (2012)							x							x								
Chen (2012)				x																		
Ciabuschi (2011)										x												
Costantini (2012)				x										x								
Deng (2014)							x							x								
Fabrizio (2012)				x																		
Filipescu (2009)					x	x									x							
Filipescu (2013)					x	x	x							x								
Garcia (2012)							x							x								
Golovko (2011)							x															
Guan (2003)	x													x								
Guellec (2001)				x																		
Hitt (1997)					x		x							x					x			
Kafouros (2008)							x							x								
Knight (2004)	x													x								

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Kotabe (2002)							x											x
Kylaheiko (2011)							x						x					x
Lahiri (2010)				x														
Lee (2009)							x											x
Lefebvre (1998)	x													x				
Lopez (2005)					x	x	x							x				
Macher (2007)				x														
Molero (1998)				x										x				
Molero (1993)										x								
Monreal-Perez (2012)					x	x	x						x					
Nassimbeni (2001)					x	x	x						x					
Nielsen (2009)	x											x						
Pearce (1999)										x								
Pla-Barber (2007)							x							x				
Poon (2005)	x																	
Ramos (2011)					x	x	x						x					
Roper (2002)					x								x					
Rycroft (2004)																		

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	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Sadowski (2006)							x								x			
Sahaym (2012)				x											x			
Shi (2001)																	x	
Sterlacchini (1999)	x													x				
Thistoll (2010)																		
Un (2011)					x										x			
Venanzi (1996)																	x	
Villar (2012)					x										x			
Wakelin (1998)																		
Wang (2013)				x											x			
Woerter (2010)					x	x							x					
Wortmann (1990)						x												
Yi (2013)						x									x			
Zahra (2000)	x																x	x
Zahra (2003)			x												x			
Zhang (2007)																		
Zhao (2005)																	x	
total	**8**	**0**	**2**	**1**				**3**										

(Below the "2" column: **11**)

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Table 4: List of abbreviations

Abbreviations	Meaning
Technological Innovation	
B1. Sensing	
IC	Innovation Capability
B2. Seizing	
E	Expenditure
C	Collaboration
Pa	Patent
Pr	Product
Pc	Process
I	R&D Intensity
B3. Reconfiguring	
U	R&D Unit
S	Subsidiary
Internationalization	
C1. Sensing	
C2. Seizing	
A	Alliance
E	Export behavior
P	Export Performance
I	Export Intensity
C3. Reconfiguring	
EM	Entry Mode
D. Result	
Perf	Performance

Column B and C in table 3 shows that the studies that were collected mainly deal with the seizing capability of the relationship between technological innovation and internationalization. The table is relatively symmetric in that both processes seem to have been investigated when in the seizing stage. Very few studies report overall results of these dynamic capabilities to the overall firm performance. This is remarkable because in the dynamic capability framework it is assumed that dynamic capabilities lead to competitive advantage. It may be explained by the fact that in the international business literature the effect of internationalization on overall company performance is still subject to debate.

In the now following we will discuss the results per column starting with sensing.

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Sensing

For both the technological innovation process and the internationalization process the sensing dynamic capability receives little to no attention. This is remarkable, especially because in the dynamic capabilities' framework the responses to the environment play an important role: signals from the external environment lead to changes in the resource base (Eisenhard & Winter, 2000). Besides that it is even more striking because of the important debates on opportunity recognition in the international entrepreneurship literature (Ellis, 2012). Eight studies report the importance of innovative capabilities as a prerequisite for technological innovation. This also leads to believe that the entrepreneurial aspects of the dynamic capabilities' framework are underdeveloped and could be made more explicit with introducing "entrepreneurial orientation". The external/ market needs to be incorporated more. It may well be that the signals from within lead to technological innovation as described in the dynamic capabilities framework, but that is not revealed by the reviewed studies. The role of top management due to the lack of entrepreneurial orientation also remains absent.

Seizing

The majority of the reviewed articles deal with the seizing capability. This is perhaps due to the fact that this is easiest to measure by means of variables as export intensity and R&D intensity. Colum B2 and C2 show that there is more on the exploitation side than on the exploration side. Networks, which are considered important sources of information and resources in the international entrepreneurship literature, are not really discussed in the literature on the relationship between technological innovation and internationalization. This may well be due to the fact that most of the studies were at firm level and not at network level. Another reason for the relatively few studies on the exploration side may well be caused by the nature of the industry: in supplier dominated industries firms achieve their technological innovation through the purchase of new equipment (Roper, 2002). Another reason for the limited number of studies taking exploration into consideration could be inertia. In the stage of seizing opportunities the activities a firm undertakes become more concrete and also more planned. Still many of the articles deal with SMEs or samples that are a combination of SMEs and MNEs. Most research is survey based as it is not so easy to follow a certain company for a longer period of time. The data used is also from before 2008.

The fact that in this stream of literature the emphasis is so strongly on outcome leads to believe that the process is not taking into consideration, despite strong calls for bringing the process back into the internationalization literature (Prange, 2012).

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Reconfiguring

When dealing with this capability most of the articles discuss how MNEs are able to integrate their R&D units and what is the most effective organizational structure to integrate these R&D units. Very few articles deal with SMEs as SMEs most of the time are using export as a first step to internationalize also due to the low risks and low financial involvement needed. And high tech firms often do not get the chance to grow as they are taken over by large firms. With exporting the internationalization is not really becoming an integral part of the organization. The effect of the entry mode is not really dealt with in this stream of literature. It is also not explained how the technological innovation has an impact on the R&D units of the MNEs; it is only stated that these units are important for the development of the firm. The literature on technological innovation and internationalization very much looks at the input- output aspects, not so much at how the process is handled. It does not indicate how resources are being reconfigured. It is interesting to notice that there are hardly studies on the inbound side of firm internationalization (Cassiman et al, 2011). What about the effect of domestic R&D input?

Discussion

Based on the review of the literature, this section presents a conceptual model and its associated propositions that describes the relationship between technological innovation and internationalization as a process of combined dynamic capabilities.

The model and the propositions serve as a research model.

Conceptual model and propositions

The process of combined dynamic capabilities and its antecedent entrepreneurial orientation are conceptually modeled and visualized in Figure 2. This figure demonstrates that entrepreneurial orientation encompasses all three dynamic capabilities. Implying that the market needs to be involved right from the start in the sensing of opportunity phase. The sensing phase of opportunities transforms technological innovations into ideas that can be seized. The transition from sensing to seizing is mediated by the co-ideation. The impact of the champion, leader and entrepreneur on how to bring the idea forward in the eco-innovation and sustainability system. The seizing phase transforms into the reconfiguration phase of dynamic capabilities when a suitable organisation forms (project, team, business, public-private partnerships) are chosen in the co-innovation phase.

The conceptual model comprises four propositions, which are based on the gaps identified in the literature review and will be tested and evaluated in case study research.

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Proposition 1:

The process of technological innovation and internationalization is a process of combined dynamic capabilities.

Proposition 2:

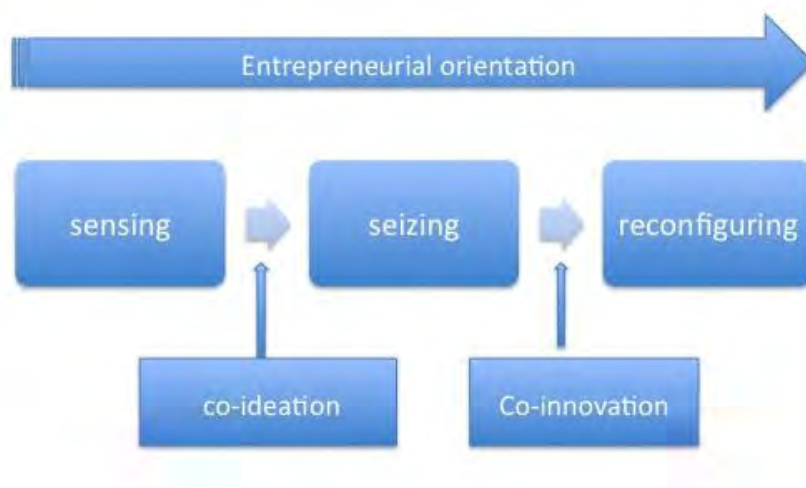The transition between sensing and seizing phase is mediated by co-ideation.

Proposition 3:

The transition between the seizing and reconfiguring phase is mediated by co-innovation.

Proposition 4:

Entrepreneurial orientation is encompassing all three dynamic capabilities.

Figure 2:

It is worth noting that there are two key assumptions in our proposed model.

The first is that a firm's current position is not only a function of the path it went but also influences its decision and capability of taking up future technological opportunities (Teece et al, 1997). Capabilities are built over a longer period of time.

The second is that this model assumes that firms grow through accumulation and development of internal resources and capabilities and this implies that the sensing, seizing and reconfiguring dynamic capabilities are sequential unlike what is stated by Teece (2007).

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Based on the review of the literature and the propositions, the following research questions can be formulated.

1. How does entrepreneurial orientation leads to an effective combination of the dynamic capabilities technological innovation and internationalization?
2. How is the transition between sensing and seizing mediated by co-ideation?
3. How does the result of co-innovation influence the transition between seizing and reconfiguring?

In order to answer the research questions we would propose case study research in the life science and sustainable energy industry so as to compare two single industries.

Conclusion

Based on the literature of the past 24 years, this review article provides insights into the relationship between technological innovation and internationalization from a dynamic capabilities' perspective. It concludes that the understanding of the relationship between technological innovation and internationalization increases when the entrepreneurial orientation is made explicit in all three capabilities. First the firm senses an opportunity in which from the start the market is involved, then the organization seizes that opportunity while balancing explorative and exploitative activities, and finally the firm needs to reconfigure its resource base and this depends on the entry mode chosen. The research further concludes that emerging markets are not well presented in the empirical studies as well as single studies in the sustainable energy and life science industry.

The review article contributes to the existing body of knowledge that the process aspects of the relationship between technological innovation and internationalization are underdeveloped, because of the mere focus on the seizing capability. Furthermore it adds to this that the. Finally, it extends the dynamic capabilities framework by making the implicit entrepreneurial aspects more explicit.

By understanding the differences between sensing, seizing and reconfiguring practitioners may be able to more effectively manage and internationally market their technological innovations. For policy makers one of their most important tasks is to continue to promote interdisciplinarity and entrepreneurship as a means of spurring technological innovations, internationalization and economic growth.

Like most studies ours has its limitations. We focused our review on leading peer-reviewed journals in business & management, technology & innovation, international marketing and entrepreneurship. Although our set of journals generally overlaps with those examined in similar review studies, time and resource constraints prevented us from examining all possible outlets for research on the relationship between internationalization and technological innovation. This would include books,

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non-refereed journals, conference proceedings, as well as non-English publications and research published in related fields and/or business sub-disciplines such as economics, sociology and marketing. While we believe our approach provides a representative account of the stream of research on technological innovation - internationalization, examining a broader set of research outlets could yield additional insights.

In spite of its shortcomings our study provides a critical appraisal and evaluation of extant research on the relationship between technological innovation and internationalization that we know of, and highlights its potential for enriching and extending this research.

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Farming in transition: How do Norwegian farmers interpret and approach new workplace risks?

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Introduction

Farming is one of the most dangerous occupations worldwide, with a high risk of accidents and injuries. It implies a high degree of physical and manual work, and work tasks involve use of machinery and handling large animals. Major differences may be found in how agriculture is organized and performed, due to structural, cultural, and economic differences cross nations and continents. Study context is therefore of great importance in discussions of risk and prevention. Norway holds the history of a nation's journey from poor, agricultural-based, and half-industrialized, to a rich country whose industry is based on specialized technology and high competence. Norwegian agriculture has been dominated by small farms, where family members in all generations participate in the work. Industrialization and changes in social structure made it more common for one spouse to have a paid job elsewhere. At the same time there is an ongoing transition towards fewer, larger, and more efficient farms. Less work hours are spent in this sector, though production level is stable. Additionally, political interests aim for a more industrialized and "professional" agriculture.

This transition entails new requirements regarding investments, new technology, and work organization. This may further give consequences regarding occupational health and safety. The aim of this study is to explore the farm as a work organization and how farmers interpret and approach a tentative new risk picture, due to the change in societal and political interests.

Methods

As part of a larger study regarding Norwegian farmers' occupational health and safety, 28 in-depth interviews with farmers were performed. Ten interviews were with one farmer only, 17 interviews were with couples (whereof some involved in farm cooperation), and one interview was with members of the same farm cooperation. The interviews were performed in three different parts of Norway; each representing different main production types and topography. Except one, all of the interviews were done face-to-face. An open interview-guide was used. The interviews were taped and later transcribed verbatim. The data was analyzed through inductive content analyses. A selection of the interviews are used in this paper.

Results

The interviews paint pictures of certain typologies, and the ones that we want to bring to light can be referred to as *the single farmer*, *the family farm*, *the farm with hired help*, and *the farm cooperation*. Each typology will be presented with further reflections on how this may impact workplace risk.

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The single worker

The single farmer works alone at the farm. The single worker is of higher age, and the spouse have work or responsibilities which lie outside farm interests. Parents are insufficient contributors and children have other occupations. Involving relief workers and investing is done in accordance to economic constraints, and the machinery may therefore represent traditional exposure. To work alone gives the advantage of being in control of work processes and decisions. However, the single farmer has no one that on a daily basis can surveil or correct work processes, or assist the farmer if something goes wrong.

The family farm

The characteristics of a family farm is that both spouses contribute in farm work, that children and parents are participating, or different combinations of these features. Central for the family farm is that other contributors than the responsible farmer belong to and are well known with the facilities. When being a farmers' couple, there is still one definite responsible farmer, because of Norwegian regulations regarding agricultural enterprises. Work tasks may be informally distributed between the two, where the male farmer typically takes responsibility for machine work and maintenance. The wife is more responsible for paper work and young animals, as well as for general household and family care.

Older parents contribute with their tacit knowledge about the production and the routines. As previous owners, they are aware of the risks they are exposed to, but recent investments and new technology may have changed the risk picture and limited their ability to perform certain work tasks. Furthermore, older contributors may not have the mental awareness and physical capacity required for modern farming.

Farm children are generally well known with the daily farm life, but there are great diversities in how much detailed knowledge they have regarding work routines and risk. The farm is a complex work environment, and including children and teenagers therefore requires extensive attention and training. Some farmers use the strategy of including them as early as possible, e.g. in calf feeding, milking activity, or in mowing season.

The farm with hired help

To hire help from outside the family is a solution at large farms and for farmers who have an additional job. A common arrangement for animal productions is the use of relief workers. Different categories of hired workers exists. They could be employed in a locally owned cooperation and hired by farms on a regular basis. They have often been on the same farms for years and are well known for the farmers. The use of relief workers gives the farmer some time off, or some extra time for other work tasks.

Young people are often hired to help out in weekends or in mowing seasons. Teenagers and young adults who themselves grew up on farms are preferred. However, training and follow-up is highly time consuming, and short engagements can be frustrating for the farmer.

Foreign workers may be hired for some months at a time, mostly in summer season, and often repeatedly. They typically come from countries in Eastern Europe (Estonia, Lithuania, Latvia, and Poland). Work capacity is high, but language problems are common. Work tasks are therefore fixed and characterized by routine and a low degree of complexity.

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The farm cooperation

The farm cooperation is not one single category, rather a mixture of ways to organize farms. A cooperation may consist of two farmers who have brought about their land and gathered the livestock in joint outbuildings, and who share the amount of work required. Some of the members may be what is called passive members, who only provide livestock and/or land, but who do not contribute with work. Passive members have an owner's share in the enterprise. A cooperation may also be managed by one farmer or a couple only, and where all other members are passive. Farm cooperation is characterized by large size and investments in outbuildings and new technology, often with a high degree of automation.

Discussion for further work

Whether the farmer works alone, have family help, or works in a fellowship with others is something we anticipate to be of importance for injury risk. The farm organization seems to affect the investment level (and thereby the degree of new technology), which further affect the risks present in the work environment. This can also be turned the other way around: How technology and workplace risks affect the farmer is influenced by the work organization. Perceived time pressure is a factor that needs to be explored in further analyses, and as well as the distribution of responsibility. Representing an industry in transition, it is necessary to study the importance of management versus the autonomy of a single worker.

The present research literature is heavily focused on individual characteristics and certain work tasks as risk factors for occupational injuries in agriculture. Some recent studies have looked more into farm structure and time of exposure, in order to understand more of the risk picture among farmers. Studies regarding stressors and stress symptoms indicate that there are underlying mechanisms that can contribute to our understanding of the risk that farmers face. It may not only be the individual characteristics or the work task that is of importance, but the larger work situation in which this task is performed.

Lastly, an important aspect is how the farmers are influenced by the agricultural regulations related to their production. These mechanisms represent something that is anticipated to affect how farmers organize their work. Though less evident, this is potentially highly relevant for farm structure and injury risk.

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The roles of voluntary facilitators in participatory work improvement and stress prevention programmes based on group work of their co-workers

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Abstract. The roles played by volunteer facilitators in participatory work improvement and stress prevention programmes were studied. In both types of programmes, concrete improvements of workplace conditions were achieved by serial group work steps. The facilitators supported these steps by utilizing action checklists reflecting local good practices. In work improvement programmes, the facilitators focused on low-cost improvements in materials handling, workstations, physical environment and work organization, while for stress prevention the facilitators further focused on internal communication, information sharing and social support measures. These improvements had real impact on risk reduction. It was suggested crucial to build the capabilities of voluntary facilitators to assist co-workers in using action tools and apply simple, action-oriented group work procedures.

1 Introduction

Participatory action-oriented programmes are increasingly organized in improving working conditions in various sectors[1, 2]. They have proven useful for improving small-scale workplaces in both industrially developing and developed countries[3, 4]. A recent trend is to apply the participatory programmes for preventing stress at work and improving mental health of workers in large and small workplaces[5, 6].
It is of particular interest that many of these participatory programmes are successful with the support of voluntary trainers and facilitators selected from among the local workers[7, 8]. These facilitators are knowledgeable about existing work conditions and have experience on practical types of workplace improvements that have real impact. Recent experiences demonstrate the merit of relying on trained voluntary facilitators in organizing group work steps by their co-workers in planning and implementing practical improvements. It is notable that such voluntary facilitators have been acting effectively in both participatory programmes for improving working conditions in small enterprises and those for preventing stress at work in various settings. Since these participatory stress prevention programmes make use of group work methods based on work improvement programmes for small enterprises, the roles played by local facilitators are similar in many aspects[9].

The purpose of this paper was to discuss advantages of relying on the voluntary facilitators selected from among local workers in organizing the participatory improvement process in work improvement and stress prevention programmes. The roles of facilitators were compared between the two types of participatory programmes and the specific features and the effectiveness of their roles were examined. Attention was drawn to the practical ways of involving voluntary facilitators in improving existing work conditions and in utilizing the action-oriented tools unique for the group work processes in the participatory programmes.

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2 Method

Recent experiences involving voluntary facilitators in organizing two types of participatory action-oriented programmes were reviewed: (a) participatory work improvement programmes widely applied in small and medium-sized enterprises (SMEs) in industrially developing and developed countries[10, 11] and (b) participatory stress prevention programmes applied in various workplaces in Japan and some other countries[12, 13]. The participatory programmes for small enterprises usually applied the WISE (Work Improvement in Small Enterprises) methodology developed by the ILO and spreading to numerous SMEs in many countries. The participatory stress prevention programmes were more recently developed by occupational health teams and led to many workplaces in local governments, manufacturing enterprises and health and nursing care services.

The roles played by the facilitators were examined by comparing the participatory steps and resulting improvements between the two types of programmes. A particular attention was paid to the action-oriented tools such as 'action checklists' commonly utilized in these programmes and the support activities undertaken by the facilitators in the serial group work steps. The effectiveness of the support was further examined based on the comparison of the both types of participatory programmes and recent intervention studies[5, 9, 14].

3 Results and Discussion

The participatory approaches taken by the reviewed programmes were similar in view of serial group work steps involving the voluntary facilitators. All the programmes applied group work methods leading to planning and implementation of locally feasible improvements in multiple technical areas. Occupational health teams and trainers experienced in the participatory methods usually trained the facilitators in brief workshops or on-site meetings. These programmes led to many practical improvements with the support of the facilitators.

3.1 Participatory Steps Supported by Voluntary Facilitators

While the participating workers were different among the reviewed programmes, the participatory steps taken by these programmes were based on the same sequence as summarized in Fig. 1. The steps taken by the work improvement programmes in SMEs and the stress prevention programmes were thus similar. In each subsequent step, the facilitators were acting so as to support the actions taken by their co-workers. The support activities taken by the voluntary facilitators were also similar and are indicated for each step.


```
<Participatory steps>              <Voluntary facilitators>

┌─────────────────────────┐
│ - Collect good practices │ ······ Focus on examples
│ - Compile action tools   │        Use action tools
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│ - Apply an action checklist │ ······ Secure participation
│ - Group discussion          │        Focus on simple ideas
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│ - Agree on prompt actions │ ······ Assist in consensus
│ - Implement action plans  │        Join in implementation
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│ - Report achievements      │ ······ Assist in reporting
│ - Sustain continual action │        Feedback and follow up
└─────────────────────────┘
```
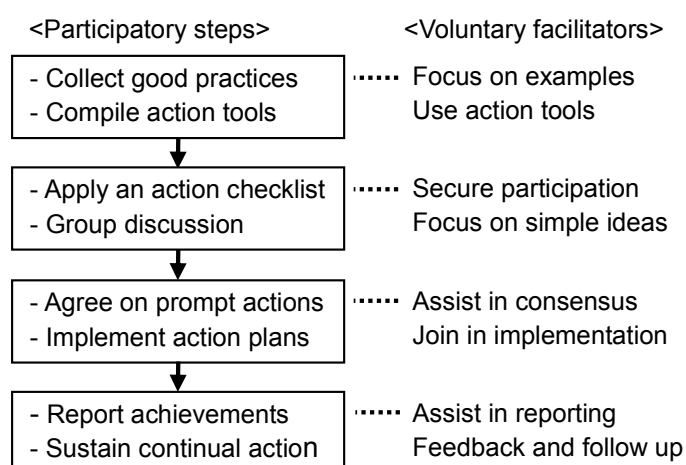
Fig. 1. Participatory steps commonly taken in work improvement and stress prevention programmes.

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It was striking that the focus on local good practices was commonly useful for facilitating the planning and implementation of the multifaceted improvements. The facilitators acted to support this focus by expediting the group work process and by assisting their co-workers in learning the local good practices and proceeding to group discussion and consensus building on readily practicable improvements.

3.2 Types of Low-cost Improvements Achieved
Consequently, a broad range of technical areas were covered by the participatory programmes. This advantage of planning multifaceted improvements has been proven by recent reports on good occupational health practices. Usually the technical areas listed in Table 1 were covered by the action checklists utilized by the reviewed programmes. The WISE-based checklists focused on low-cost improvements in materials handling, workstations, physical environment, welfare facilities and work organization. The stress prevention checklists included selected actions in all these areas and additionally covered internal communication, information sharing, social support measures and access to care.

Table 1. Technical areas of improvements covered in both types of participatory programmes.

Technical areas	Work improvement in SMEs	Stress prevention
Materials handling	+++	++
Workstations	+++	++
Physical environment	+++	+++
Welfare facilities	++	++
Work organization	++	++
Internal communication		+++
Information sharing		+++
Social support		+++
Access to care		++

(++, always covered by the checklists; +++ always covered substantially by the checklists)

It was noteworthy that while the range of improvements addressed differed considerably between the two types of participatory programmes, the facilitators could effectively help their co-workers conduct many improvements. As a clear focus was commonly placed on low-cost improvements that improved health and safety at work and contributed to higher productivity of workers, the conducted improvements generally had real impact at work. Typical types of such low-cost improvements frequently incorporated in the action checklists and actually planned and implemented by the participating workers are shown in Table 2.

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Table 2. Typical low-cost improvements planned and implemented by the participants.

Technical areas	Work improvement in SMEs	Stress prevention
Materials handling	- Provide multi-shelves - Use mobile racks, lifters	- Provide multi-level storage - Use mobile racks, lifters
Workstations	- Work at elbow height - Displays easy to distinguish	-- Keep natural work postures - Use labels, signs, colours
Physical environment	- Adjust lighting, ventilation - Isolate hazard sources	- Adjust lighting, temperatures - Isolate hazard sources
Welfare facilities	- Provide drinking water - Provide resting corners	- Provide resting facilities - Ensure evacuation routes
Work organization	- Provide rest breaks - Provide buffer stocks	- Secure enough rest periods - Avoid excessive workload
Internal communication		- Hold brief meetings - Use notice board, share files
Social support		- Ensure supportive climate - Organize informal gatherings
Access to care		- Set up counselling contact - Organize training sessions

Recent studies confirmed that for workplace problems, there is a large variety of low-cost solutions commonly applicable in any of the areas listed in the table. Most these solutions reflected the basic principles of occupational hygiene and ergonomics and those applicable for better mental health. It should be noted that the improvement actions undertaken by the work improvement programmes related to the low-cost improvements incorporated in the Ergonomic Checkpoints of the ILO[11] and were thus generally assured to have concrete effects on reducing work-related health and safety risks and improving productivity at the same time. The improvements undertaken by the stress prevention programmes additionally in mental-health-related areas, on the other hand, related to the similarly low-cost improvements in the Mental Health Action Checklist and in the Stress at Work Prevention Checkpoints of the ILO[13]. The action checklists used in these programmes further reflected the actual good practices locally found, and therefore, the range of improvements achieved by the both types of participatory programmes could be relatively easily planned through the group work with the support of local facilitators.

3.3 Action Tools for Planning and Implementing Improvements
The group work steps in the reviewed participatory programmes made full use of action-oriented tools adjusted to each local situation. This orientation of the group work tools was similar in both types of programmes. The design of these tools seemed relatively easy because they were formulated on the basis of the long experiences of the WISE methods and of local good practices. The voluntary facilitators made full use of these tools in assisting the co-corkers in particularly in proposing the necessary improvement actions.
Three kinds of action tools were commonly utilized by the both types of programmes as shown in Table 3. These common tools were used by the facilitators and participants together, and comprised (i) local good examples in multiple technical areas, (ii) action checklists and (iii) a manual or a list of low-cost ideas. These tools were obviously adequate for facilitating the planning of practicable improvements. Additionally, the stress prevention programmes utilized group work sheets as well as planning and reporting sheets. These sheets were simply formatted and easy to use for filling in the group work results.

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Table 3. Action-oriented tools utilized by the facilitators and participants together.

Work improvement in SMEs	Stress prevention
- Good practice photos - Samples of ergonomic checkpoints	- Good practice photos - Practical hints for reducing stress

- Workplace action checklist
  (e.g., 30 items)
	- Mental Health Action Checklist
	  (e.g., 24 items)

- Action manual of low-cost ideas - Slides showing improvements	- List of stress-reducing actions
	- Group work sheets - Planning sheets and report sheets

It should be noted that the original three kinds of tools, i.e., good examples, action checklists and low-cost ideas, were utilized for the purpose of facilitating the group planning of the improvement actions. The facilitators could thus help the participants propose immediate improvements locally feasible.

3.4 Evaluation of the Roles of Facilitators

The reviewed programmes were successful by involving local facilitators throughout the participatory steps from reviewing existing conditions and planning and implementing feasible improvements up to reporting and feedback of the positive results. Many of the reviewed programmes undertook the evaluation of the obtained achievements by examining the features of the improvements obtained and the questionnaires replies about opinions of the participants as well as the impact on local working conditions. Typical criteria frequently used for evaluating the outcomes of these participatory programmes are listed in Table 4. It was clear from these criteria that the facilitators could effectively support the participatory steps by focusing on locally practicable improvement actions and facilitating group work of co-workers. The intervention studies examining the effectiveness of participatory procedures and of action tools also revealed the real impact of these programmes relying on group work supported by the voluntary facilitators[5, 15, 16].

Table 4. Frequently used criteria for evaluating the outcomes of participatory programmes.

Work improvement in SMEs	Stress prevention
- Multifaceted risk-reducing changes - Self-evaluation by participants - Spread use of action tools - Better knowledge of improvements	- Multiple stress-reducing changes - Self-evaluation by participants - Locally adapted use of action tools - Improved workplace climate
- Reduction in injuries or complaints - Spread to local workplaces	- Reduction in stress scores - Continual implementation
- Local network of /trainers/facilitators	- Networking of positive results

The reviewed results of the two types of participatory programmes clearly indicated the similarity of the roles played by the voluntary facilitators. In these programmes, the facilitators were initially briefly trained about the advantages of group work and about the flexible use of the action tools, in particular the use of locally adapted 'action checklists'. This indicated the wide applicability of participatory action-oriented programmes for both improving work environments and mental health of workers. Apparently, the facilitators were instrumental in organizing participatory steps aimed at proposing readily practicable improvements. A new development in the case of stress prevention programmes was the active use of group work sheets and locally formatted planning and reporting sheets. The combined use of action checklists and work sheets was useful for focusing on feasible actions for better mental health of workers. These actions could be hinted from local teamwork practices that were not necessarily visible through examining work environments.

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The key roles of voluntary facilitators that were common to the both types of reviewed participatory programmes may be summarized into the following aspects:

- Encourage co-workers to conduct group work for improving their own work conditions;
- Focus on low-cost improvements practicable by learning from existing good practices;
- Organize group discussion of co-workers aiming at proposing immediate actions;
- Help co-workers build consensus on improvement plans and their implementation;
- Assist in reporting improvements achieved and in the feedback of programme results.

It is suggested to develop and apply similarly action-oriented participatory programmes for improving workplaces and mental health of workers by taking advantage of the locally effective roles of volunteer facilitators. The merits of relying on voluntary facilitators knowledgeable about the local working conditions and the workplace climate are proven from the reviewed results. It is important that their roles can be reinforced by the use of action tools adjusted to local settings. These facilitators are expected to support participatory workplace improvements encompassing work environments and mental health by means of combining the practical use of locally tailored action checklists and group work methods.

4 Conclusion

Voluntary facilitators played key roles in facilitating the planning and implementation of immediate workplace improvements in both participatory work improvement and stress prevention programmes. While the range of improvements achieved differed considerably between the two types of programmes, the facilitators could effectively help their co-workers conduct many improvements by supporting their group work and the use of action checklists reflecting local good practices. The effectiveness of the roles played by volunteer facilitators in both the types of participatory programmes could be confirmed by the multifaceted risk-reducing workplace changes, improved health conditions of co-workers and the networked progress for applying these programmes.

It was suggested critically important to support the volunteer facilitators for building their capabilities to assist co-workers in using action tools through simple, action-oriented procedures. The involvement of volunteer facilitators trained in this way should be promoted as an effective means of support for facilitating work improvement and stress prevention in various work settings.

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Designing a prevention approach suitable for small enterprises

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Abstract. 98% of firms coming under the French general social security scheme employ fewer than 50 employees. Although small enterprises do not see risk prevention as a priority, the statistics show without doubt that the majority of occupational accidents occur in such small businesses in many sectors of activity. How can we raise their awareness and encourage them to prevent occupational risks? By implementing appropriate approaches based on a better knowledge of SMEs and by collecting their needs, their interest for OSH issue becomes stronger. These approaches, usually used in marketing, reduce the gap between the weaknesses of the OSH competences of SMEs and the requirements for occupational risk prevention.

Introduction

Improving occupational safety and health in small enterprises has been a recurring topic over the last three decades. This is probably due to the lack of solutions adapted to this category. Today, occupational safety and health (OSH) institutions hope to better reach small enterprises, as demonstrated by the emphasis placed on this category of enterprises in French national OSH strategy. The particularities to be considered regarding small enterprises are due to their large numbers, the lack of in-house skills and their little interest in occupational risk prevention topics. In order to encourage these small enterprises to take action in prevention, approaches suited to their particularities should be proposed. This article presents recommendations for designing such approaches.

1 Prevention in microenterprises

1.1 Number of enterprises

In France, the term "very small enterprise" relates to companies with fewer than 20 employees, "small and medium-sized enterprises", from 20 to 249 employees. In 2008, the definition of micro, small and medium-sized enterprises was harmonised at European level for statistical and economic analysis criteria. "Microenterprise" refers to an establishment with fewer than ten employees, and annual turnover or balance sheet total not exceeding two million euros.
 With regard to the health and safety of employees, the number of employees criterion is sufficient for initial analysis. The ceiling of 20 and 50 employees serves to group together companies with a similar organisation in terms of prevention. It must also be noted that companies in France with at least 50 employees are required to set up a committee for health, safety and working conditions (CHSCT) and it has been observed that companies with at least 50 employees adopt a prevention strategy. In the remainder of this article, we shall use the term "small enterprises" to designate enterprises with fewer than 50 employees.

Grouping companies or establishments according to their number of employees is key for addressing prevention in small enterprises. It reveals that a vast proportion of companies in France are in fact small enterprises. Establishments with fewer than 20 employees account for 92% of all establishments, while those with fewer than 50 employees account for more than 98%.

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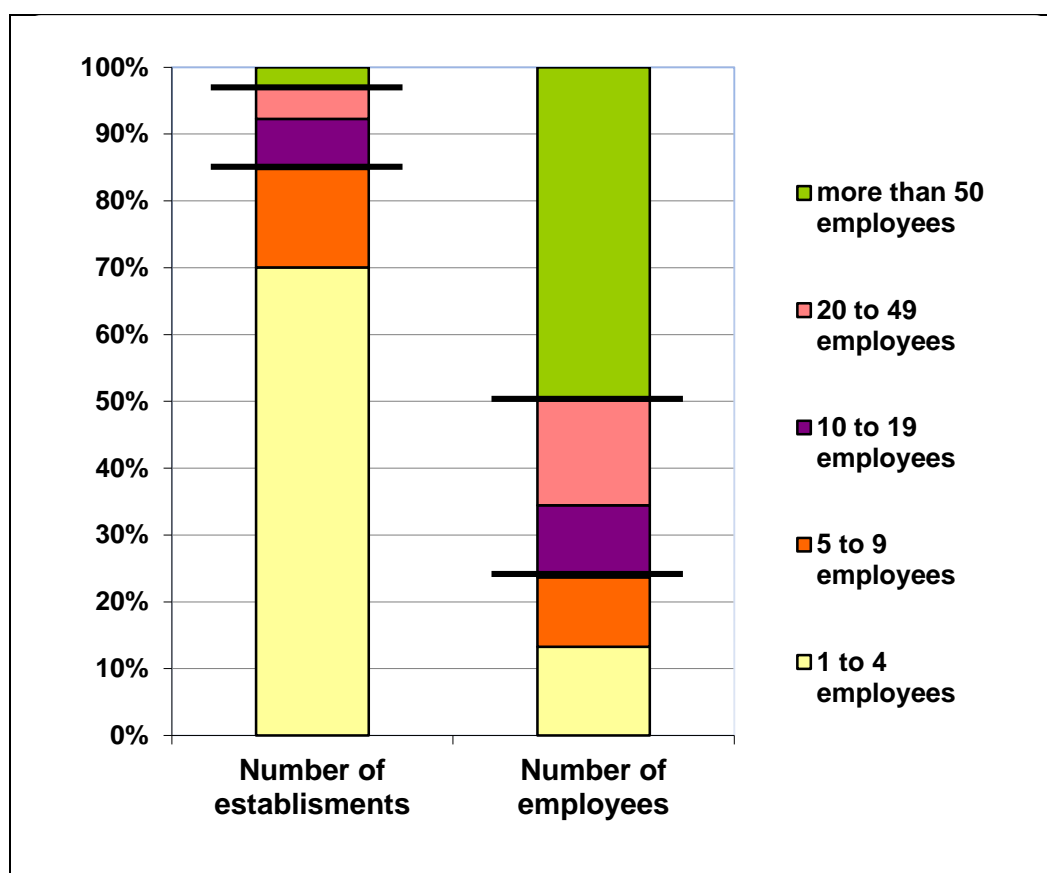
Figure 12: Breakdown of establishments and employees by company size

This breakdown concerns all of the activity sectors under the general social security scheme (as opposed to the public, agricultural and self-employed regimes), but varies considerably depending on the activity. It takes into account the 1.8 million companies in France with at least one employee. It therefore excludes the 2.7 million enterprises, including one million self-employed workers, that have no employees.

1.2 Main features of small enterprises

Companies with fewer than 20 employees are characterised by a company manager who performs the same activity as the employees. This person is therefore well-versed in the activity and the related risks, especially when the risk causes occupational accidents. However, the manager does not always make the connection between disease and the professional activity, particularly in the case of occupational cancers: in fact, the possible connection between the work and the disease is often denied.[i]
While the occurrence of an accident in the company may raise the awareness of risks, it should not be forgotten that on average, for a company with three employees, an accident occurs only once every twelve years.

The low number of worker representatives in these companies does not facilitate staff involvement in the prevention of occupational risks. In the light of this situation, the French Labour Code now requires the appointment of an in-house person in charge of employee protection and occupational risk prevention activities in the company (Article L.4644-1 of the Labour Code).

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1.3 Accident statistics

In terms of accident statistics, the situation in small companies can be assessed through the frequency and severity indices. The values of these indicators depend on the size of the company. The analysis of the number of accidents based on company size is also very important, as it sheds a different light on accident occurrence.
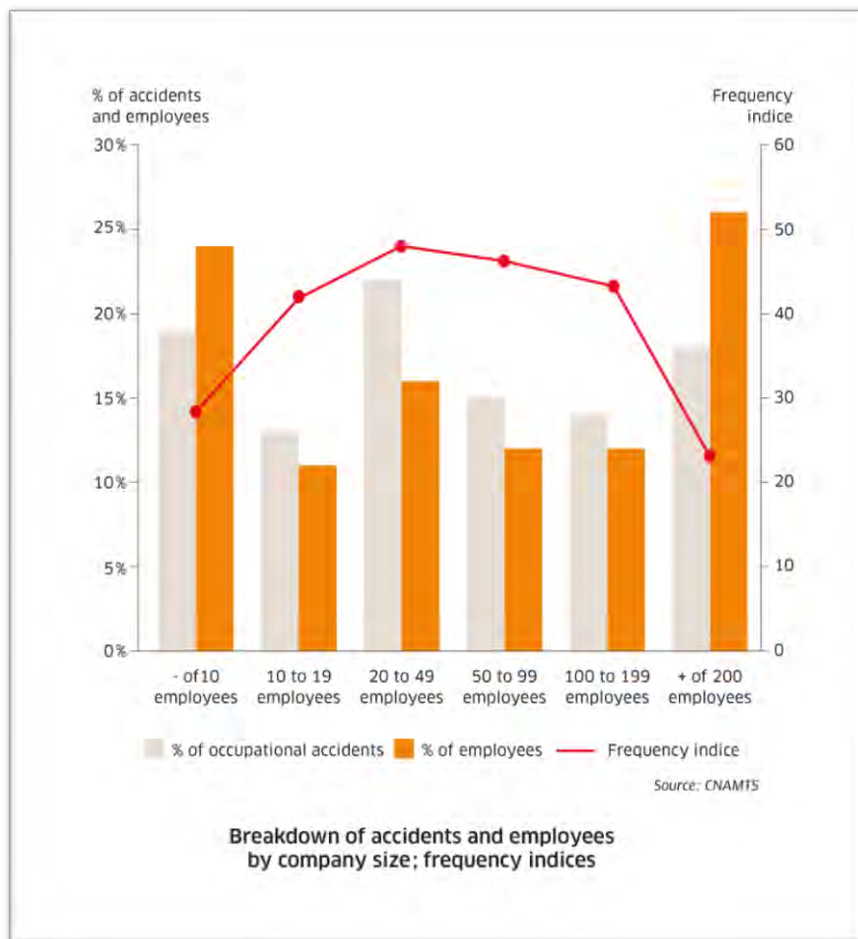
Fig 2: Accident statistics for all employees (data 2012)

The frequency index (FI)[16] follows a peculiar curve: it varies according to the size of the establishment, with a maximum value for enterprises with around 50 employees and the lowest value for large companies (>200 employees) and companies with fewer than 10 employees.

This indicator should be interpreted with caution, since it measures the number of accidents compared to the number of employees. A low indicator means that the number of accidents/number of employees ratio is low.

However, in looking at the breakdown of the number of accidents, a low frequency index can correspond to a high number of accidents for a given profession. This is the case for numerous professions comprising mostly small enterprises, for example, the masonry and heavy construction work sectors and the catering industry. The car repair sector is a characteristic example. In this sector, 88% of employees[17] work in very small enterprises (<20 employees). Figure 3 shows that these enterprises account for 82% of work accidents (total of the first two grey columns). Although

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[16] Number of accidents with absence from work (x 1000)/number of employees

[17] This activity accounts for 92,000 employees in France

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the frequency index is lower in the very small enterprises in this sector, most accidents occur in these companies. Inversely, enterprises with 50 to 99 employees, in which the FI is highest, account for only 3% of accidents.
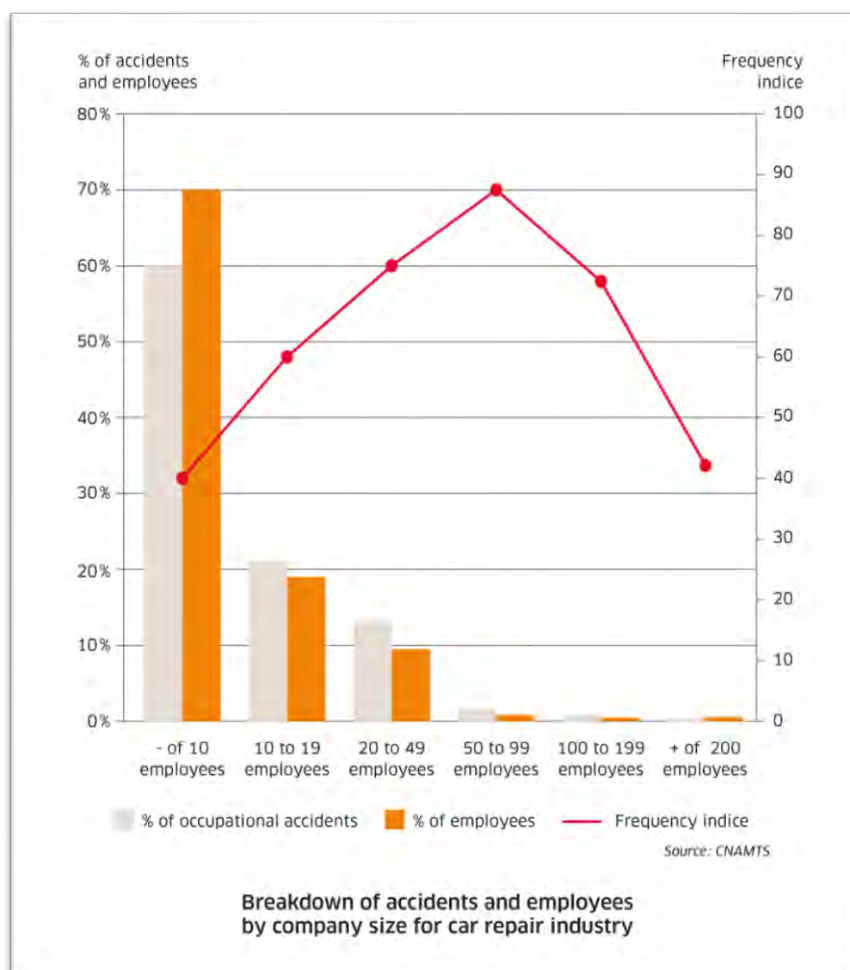
Figure 13: Accident statistics for car repair industry (data 2012)

1.4 Prevention obstacles and drivers

The effective implementation of prevention in companies is reflected either in the existence of a health and safety management system or an action plan (adjustment of work stations or equipment, training, organisational changes, etc.). Studies show such measures are rarely implemented in small enterprises.

There is room for improvement if the prevention approaches take into account the observations made in the 2009 Enterprise Survey on New and Emerging Risks (ESENER), which are, by increasing order of importance: the perception that the activity does not involve any risks, the lack of skills, lack of time, lack of interest, and to a lesser extent, lack of financial resources. These conclusions mirror those of another study commissioned by INRS[ii] which highlights that prevention takes a backseat to other more pressing issues related to the continuity of the activity (funding, commercial development, etc.). To that is added the lack of connection between small enterprises and prevention bodies.

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Despite efforts by Social Security – 15 to 20% of its direct interventions concern enterprises with fewer than 10 employees -, their direct actions cover less than 1% of these companies.

An important characteristic of small companies relates to their organisation: centralised organisation relying on the leader, versatile employees and lack of support functions devoted to health and safety (human and legal resources, quality, etc.). Prevention, which requires legal, technical and health knowledge, is a complex topic that is difficult to grasp by small enterprises because of their lack of in-house skills in these fields that would enable them to adopt prevention messages which are often quite conceptual. Most often, this results in a lack of prevention organisation and planning[iii]. However, centralisation of management can also be an asset, driving the entire enterprise to adopt a prevention approach. Lastly, small enterprises express very few needs in terms of prevention apart from some form of support or operational tool in order to comply with legal obligations.

2 Principles for building a prevention approach

On the basis of these elements, a certain number of principles that contribute to the success of prevention approaches can be highlighted: the need for a "job-based" approach, support for small companies and the setting up of partnerships.

2.1 Job-specific approach

Prevention programmes, which are heavily based on technical skills, often address prevention from a risk perspective. This approach does not hold the attention of small enterprises either because they do not break down their activity according to risk, or because they do not always find operational elements specific to their activity in these approaches. By addressing prevention from a job perspective, small enterprises become more receptive to the prevention messages that directly concern their activity. This approach also enables the introduction of prevention measures adapted to these companies.
Approaches directed at small enterprises must take into account the obstacles mentioned above: poor prevention skills, lack of experts, and more pressing concerns that do not involve prevention. Introducing a company assistance, to close the gap between intention and action, can encourage the company to take an interest in prevention.

2.2 Partnership approach

Since individual support to companies cannot be envisaged by prevention institutions, collective support should be provided or associations made with some of the company's other partners by encouraging those partners to include prevention within their scope of action. This support can take the form of regional meetings, training sessions, a telephone assistance service, etc. In this case, it may require minimal resources focusing on the approach objectives and stages, with deadlines being set to spur the company into action.

To minimise resources devoted to this support, the approach should promote actions that the company can carry out on its own. IT tools can be used for that purpose.

Partnerships are necessary for implementing approaches aimed at small enterprises, particularly because of the large number of companies concerned. They enable the action to be spread to a greater number of enterprises. The type of partner depends on the objective set: in addition to spreading the action, some partners can also give credibility to the action. The choice is made among the following categories:

- Partners in the profession: trade organisations or associations, technical centres and centres of innovation are important players for the elaboration and spread of prevention approaches. Their ability to mobilise companies and their credibility in the eyes of companies are their main assets. Their knowledge of the profession is also key for success in taking into account the needs of the companies and the adaptation of the approach to the particularities of each profession;

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- Institutional partners: inter-company occupational health services, local and regional health insurance funds, relevant ministerial departments, etc. can all spread the approach and support companies;
- Social partners contribute to giving the approach credibility and are information and promotion relays;
- Socio-economic partners: chambers of commerce and industry can spread actions and provide support. They are located in the different regions and can rally enterprises or identify all business takeover, development and creation projects;

Other non-prevention relays that are closely tied to companies, such as insurance firms and accountants and training centres are also potential partners that enterprises easily address about issues not relating to occupational risks. These relays can play a role in raising awareness of companies or rallying them, and also in recommending approaches when these are designed for autonomous use. Depending on the activity sector, clients can contribute to making health and safety requirements be taken into account, in the same way that material and product suppliers can steer companies towards safer products and techniques.

The complexity of prevention approaches for small companies, in terms of partnerships, resources, duration, etc., calls for rigorous management.

3 Methodological elements for the microenterprise approach
An approach is constructed in six stages (See Fig 4) and can be applied regardless of the target. In the case of small enterprises, it is important to specifically identify their needs and draw on those needs to produce a suitable offer.

Fig 4: The six stages in building prevention approach

These stages must follow the order indicated. Since there can be frequent interactions between several stages, it is possible to go back to a stage several times.
Starting a project by building a prevention offer, without any knowledge of the target and its needs, presents the risk of being ill-adapted to the target or completely out of sync with the need.

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3.1 Knowing the target

First, better knowledge of the target is required, in particular, the number of enterprises concerned, the number of employees, accident statistics indicators, the structure of the profession, training programmes, techniques implemented, etc. Social Security provides accident statistics for each profession.

3.2 Understanding the needs

The next stage consists in seeking out the needs of the target, which, initially, are envisaged in very broad terms: productivity, profitability, legal compliance, information, etc. This stage can be carried out using tools borrowed from marketing strategy (telephone surveys, online questionnaires, etc.).
Needs can be expressed in different ways (need for information, training, support, etc.) and can vary considerably depending on the size of the company and its activity, history, actions already undertaken, etc. The type of need will depend on the adoption of prevention in the company and the relevant resources available.

3.3 Dividing the target into segments

The third stage consists in segmenting the target: each segment is a group of enterprises with the same characteristics and similar needs. It is this homogenous target (segment) that will be the subject of reflection concerning the prevention offer.
The segments can be done with the enterprises having the same activities, or with the similar number of employees, or with companies where an accident occurred, ...

3.4 Building an offer

The actual design of the offer includes actions intended for the target and must be consistent with the previous stages. This is a complex and sometimes resource-intensive operation. It requires a strategic objective (or outcome) to be clearly formulated, which will then be broken down into several operational objectives. These objectives must be formulated such as they are perceived by the company in order for the indicators for assessing the action to enable the company's progress in terms of prevention to be measured.

Prevention approaches have three types of objectives:

1. To raise awareness in order to draw the attention of a "broad target" and thus reveal a need.

2. To obtain support for the need or to make it attractive, rendering it a priority. Highlighting the potential profits, using proof or testimonials all serve to meet this objective.

3. To spur to action targets that have had a top-priority need revealed.

For small enterprises, preference must be given, initially, to easily achievable prevention approaches, with quick and visible effects, in order for them to not be discouraged. For example, the introduction of collective (or personal) protective equipment is a means of motivating very small enterprises to invest in prevention.

Different types of tools may be developed (or reused if they exist) to construct this prevention offer. Regardless of the type, tools for very small companies must be easily accessible, simple and quick to use, if possible, with the necessary and sufficient information allowing it to be used autonomously. INRS studies reiterate that it is indeed necessary to approach small companies with operational and realistic tools, and to give priority to prescriptive messages and to tools combining risk identification with concrete solutions.

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IT tools improve the autonomy of the company by facilitating access to information (internet) and by offering methodological tools. Moreover, their content is easily updated and their effective use can be followed (number of users, percentage of completion in the tool). Regardless of the tool selected (document, computer application), it is necessary to schedule a pre-test phase with the target in order to verify the relevance of the product. This stage serves to validate the choices made and, if required, to develop the tool based on the comments made by a small number of users before the tool is disseminated.

3.5 Implementing actions and communicating

Second-to-last stage: implementation of the approach. To put in place actions aimed at a broad and widespread target, communication is of the utmost importance. It is built based on the needs identified in stage 2. A same action can be aimed at gaining productivity, improving working conditions, retaining customers, keeping the activity running, complying with regulations, improving social dialogue, etc. Properly positioning the action echoes the needs of the target, which favours adoption by the target. The right approach also stems from the first two stages. Its goal is to adapt communication to the target and therefore has an indirect impact on the implementation of the action.

Communication must also take account of the external players associated and their own positioning. The message will also assist in reaching the prevention objective, and the means of communication will be chosen accordingly: communication through the use of existing media, communication specific to the project, etc.

3.6 Assessment and experience capitalisation

The last stage, which is essential, consists in assessing the actions in order to verify whether the objective has been reached but also to be able to rapidly develop an action that has not achieved its objective. The assessment also serves to compare the effectiveness and efficiency (cost/benefit ratio) of the different actions or means of action, in order to move towards best practices. Assessment is only possible if the objective is clearly defined and must necessarily be factored in when the action is designed. Each objective is associated with one or several indicators to assess the level of success. As indicated above, the assessment is facilitated by the precise and quantifiable definition of the objective and the associated indicators.

4 Conclusion

Approaching very small companies requires methods adapted to their size and culture. In addition to the dual profession/partnership approach, this involves major coordination among players at regional and national level. Lastly, it entails innovative adaptation of approaches and tools, enabling them to be spread more widely and allowing companies to more easily embrace them.

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Application of PAOT-OSH programme to SMEs in Korea

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Abstract. The purpose of this study is to enhance workers' awareness of industrial accidents and to stimulate their voluntary activities for occupational safety and health in relation to prevention of musculoskeletal disorder. The project was jointly proceeded by the KIHA and the FKTU with a regional office of the Ministry of Labour in 2009. The project was named "PAOT-OSH(Participatory Action Oriented Training in Occupational Safety & Health) training programme." The programme was composed 5 steps; Recruitment of participants, Training of trainers & Conduct PAOT-OSH workshop, Follow-up visits to the workplace, Achievements workshop, and Evaluation. The project was carried out 9 months in 2009, 39 SMEs participated. The final results showed that 35(97.2%) enterprises out of 36 enterprises, which had set up safety and health improvement plan at beginning of the project, had carried out the plan and improved one or more items. As a whole 211 items(69.1%) out of 305 items set-up in the plan and had been improved. The enterprises achieved 211 out of those items covering the broad categories of materials storage and handling, machine safety, workstation design, the physical environment, and welfare facilities. Most of the programme participants responded to the survey after finishing the whole programme. They reported that it had been a good opportunity to share practical ideas for improvement. PAOT-OSH training programme yielded encouraging results for SMEs that had been vulnerable to industrial accidents.

Keywords
PAOT-OSH training programme, **GOHS**(Group Occupational Health Service) Center, **SMEs**(Small and Medium-sized Enterprises), **KIHA**(Korean Industrial Health Association), **FKTU**(Federation of Korean Trade Unions)

1. Introduction

Most small and medium-sized enterprises(SMEs) need to implement practical improvements in order to protect workers from industrial accidents. Especially SMEs are in great need of improved working conditions, both for the protection of workers and for increased productivity. The importance of participatory approach programme for occupational risk reduction in SMEs is gradually increasing. Principles of PAOT programme are as follows; Build on local practices, Focus on achievements, Link working conditions with other management goals, Use learning by doing, Encourage exchange of experiences, Promote people's involvement.[1)]

The purpose of this study is to enhance workers' awareness of industrial accidents and to stimulate their voluntary activities for occupational safety and health in relation to prevention of musculoskeletal disorder.

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2. Methods

A project was jointly proceeded by the KIHA and the FKTU with a regional office of the Ministry of Labour. The project was named "PAOT-OSH(Participatory Action Oriented Training in Occupational Safety & Health) training programme."

2.1 Development of PAOT-OSH training materials

PAOT-OHS training materials was designed by making references to the WISE(Work Improvement in Small Enterprises) and the WIPE (Work Improvement for the Protection of Environment) training programme applying ILO's ergonomic checkpoints. These training materials are necessary to enable PAOT facilitators/trainers to conduct the mini PAOT-OSH workshop in workplaces. The practical way is make it simple and ready to use at any workplace and in any conditions.

Fig1. Developed PAOT-OSH training materials

2.2 Step of PAOT-OSH training programme

PAOT-OSH training programme was composed 5 steps; Recruitment of participants, Training of trainers & Conduct PAOT-OSH workshop, Follow-up visits to the workplace, Achievements workshop, and Evaluation.

Fig2. Step of PAOT-OSH training programme

3. Results and discussion

The project was carried out 9 months in 2009, 39 SMEs participated.

3.1 Recruiting participants

Employers whose enterprises suffered from industrial accidents the previous year were invited to the half-day gatherings. We explained the government's occupational safety and health policy, experiences of PAOT programme, and held a contest for photos illustrating good examples.

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 Fig 3. Half-day workshop with employers of SMEs

3.2 Training of trainers & Conduct PAOT-OSH workshop

We organized two types of the training courses. The one was 3-day training course of PAOT trainers, and the other was 2-day PAOT-OSH workshop of the managers & workers. Contents of each course were similar; principle of PAOT methodology, good examples of low-cost improvements, role of trainer/facilitator, exercise action checklist, prevention of musculoskeletal diseases, technical sessions (including materials storage and handling, machine safety, work station design, physical environment and facilities for wellbeing), group work were used as training methods.

3.2.1 Action checklist exercise as the first part of the training
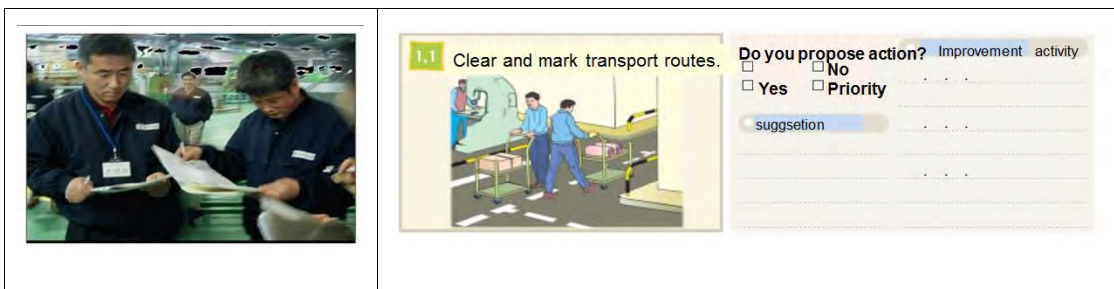
   Fig. 4 Exercise action checklist

This action checklist is a powerful training tool of the PAOT methodology. The checklist serves as a self-assessment tool where participants walk through the workplace to conduct the checklist exercise.

3.2.2 Sharing low-cost good solution through the technical sessions

The PAOT programme depends largely low-cost solution; they play the main role in initiating the self-effort of participants. It is firmly acknowledged that the best way to motivate local people to take positive actions is share good practices made under similar workplace conditions.

   Fig. 5 Low-cost good examples of improvements

3.2.3 group work

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Group work is a core methods used PAOT-OSH training programme. Group work consisited of group discussion and presentation. In PAOT-OSH programme, many group discussions are based on previous workplace visits with the checklist application. In every technical session, PAOT-OSH trainers usually proposed discussing two question. They are: 1) From the results of the checklist exercise, please identify three good points, 2) Identify three points that need improvements and your ideas on how to improve them. Participants had many ideas in items of good points as well as improvement ideas.

Fig. 6 Group work

3.2.4 Implementation of improvements

The "Implementation of improvement" session is the final technical session in PAOT-OSH training programme. This session provides useful tips on how to implement improvement idea which were formed in group work.
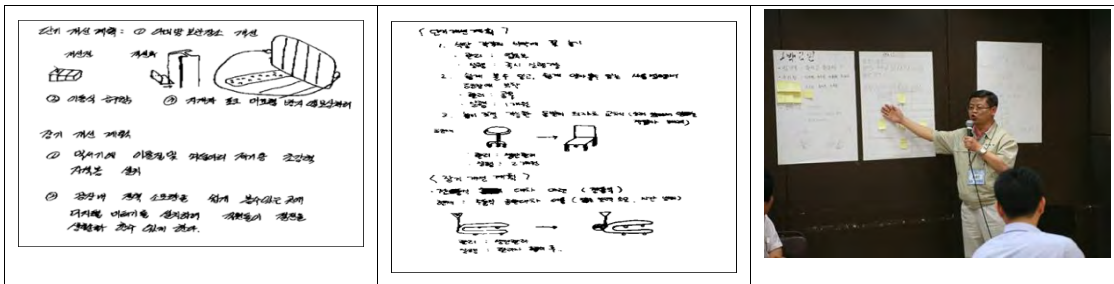
Fig7. Short term & long term plans for improvements in each enterprise

3.3 Follow-up visits

Follow-up activities were consisted of visiting workplaces by the occupational health personnel of GOHS(Group Occupational Health Service) centers. Follow-up visits to enterprises where participants of PAOT-OHS training programme were working were done to collect good examples of improvements achieved subsequent to the training, and to encourage PAOT-OSH workshop participants' safety and health activities in their enterprises. Occupational health personnel of GOHS centers carried out their original duties in line with follow-up activities.

The practical design of follow-up poster is very useful when worker need to show their own commitment to actions planned and achievements to be reached within a particular period. All check items are arranged on one sheet; this poster facilitates the assessment of Improvements actions and simplifies the taking of notes. At first glance, every body can easily identify the number of improvement actions as well as the number of proposed actions to be taken at the workplace.

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Fig. 6 Workplace follow-up poster

3.4 Achievements Workshop

We invited all managers and PAOT-GOHS training programme participants to the workshop for presentation of what participants had achieved since they had returned to their workplaces. Managers and workers from participating enterprises exchanged their experiences and materials improvement such as photos of good practices at achievements workshops. Presentation also showcased the photo contest for good, low-cost practices, and attendants had opportunity to exchange valuable information.
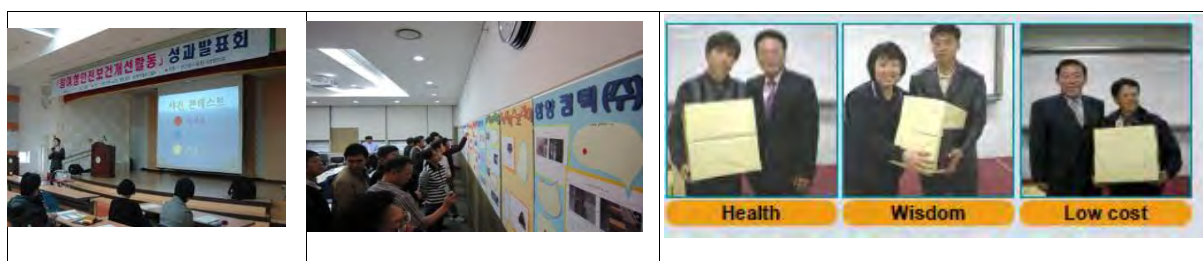
Fig. 7 Achievements workshop

3.5 Evaluation

Final results showed that 35(97.2%) enterprises out of 36 enterprises, which had set up occupational safety and health improvement plans at beginning of the project, had carried out plans and improved one or more items. As a whole 211 items(69.1%) out of 305 items set-up in plans and had been improved. Enterprises achieved 211 out of those items covering broad categories of materials storage and handling, machine safety, workstation design, physical environment, and welfare facilities. Analysis of improvement cases in terms of 'working conditions before and after the program', 'contents of the improvement', 'advantage of the improvement' and 'the cost of the improvement', showed that those improvements were achieved at a very low cost in a short period of time.

Table1. Evaluation of outcome(2009)

participation rate (enterprise)	92.3% (36 among 39 enterprises)
improvement rate (enterprise)	97.2% (35 among 36 enterprises)
improvement rate (item)	69.1% (211 among 305 items)

Table2. Improvement rate by technical area(2009)

Technical area	plan	improved	improvement rate(%)

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Material storage & Handling	60	40	66.6
Work station design	73	48	65.7
Machine safety	35	26	74.2
Physical environment	76	57	75.0
Welfare facilities & Work organization	61	40	65.5
Total	305	211	69.1

4. Conclusions

4.1 We may conclude that the successful results could be achieved from the following factors: The SMEs had special rapport with GOHS centers, whose OH personnel made regular visits and kept close communication. Continuous and steady support from the occupational health personnel of GOHS centers were available to SMEs. Collabaration of the FKTU and the regional office of the Ministry of Labour in application of the programme encouraged both workers and employers to do their best to improve their working conditions.
4.2 Through the evaluation of approaches based on participatory methodology, it is concluded that PAOT-OSH training programme is efficient to stimulate workers' voluntary activities for occupational safety and health, and to improve work condition in SMEs. PAOT-OSH training programme yielded encouraging results for SMEs that had been vulnerable to industrial accidents.

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An empowering network for micro- and small enterprises

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Abstract. There are about 280 000 companies in Finland, employing 1.4 million people. Most of companies (93.4%) are micro-enterprises (with less than 10 employees). Nearly 6% are small enterprises (with less than 50 employees), 1% are medium-sized (with less than 250 employees), and only about 0.2% are large companies. For over ten years in Finland, new jobs have been emerging in micro-enterprises and small- and medium-sized enterprises (SME). Healthy personnel and healthy entrepreneurs are the most important resource for the company's operations and productivity. Unfortunately, health and well-being at work issues often receive less attention in small companies. Networking is also particularly important for small businesses. It is almost impossible to operate without networks today. The National Network on Well-being at Work at Finnish Workplaces (Tyhy Network) is a good model for connecting well-being at work and networking. The Tyhy Network started operations in 2012. Its aim is to create a platform for communication and co-operation for workplaces, well-being at work specialists and decision-makers; and to develop well-being at workplaces equally, openly, and through participation. One important objective of its operations is to help small enterprises in particular to network and obtain support for promoting well-being at work.

Membership of the Tyhy Network is free of charge and open to anybody interested in well-being at work. It operates at the regional level. This helps connect people from the same area, who know the specialities of their region, and people from different workplaces; big, small, private, and municipal. It also helps connect those with different standpoints regarding well-being at work; those who see it from the perspectives of occupational health, occupational safety, human resources, pension companies, trade unions, entrepreneurs, employers, and employees. This promotes multiprofessional co-operation. Today, the Tyhy Network operates in twelve regions all around Finland. Currently, it has over 900 members; companies of various sizes (54% SMEs), with a variety of tasks: entrepreneurs, supervisory work and management, personnel management, occupational health and safety etc.
The Regional Networks regularly organize Network meetings. thousands of participants have attended almost 60 local and national Network meetings. The Tyhy-Network has created an excellent platform for discussion and the joint development of the aims of well-being at work. It is a platform on which to share good practices and hidden traps. Networking is a different way of working. We have learnt a lot. Networking means trust and commitment, and creating such behaviour, as the process will take time and requires patience. Based on our experience so far, this has all been worthwhile.
Keywords: Work well-being, network, good practice, multiprofessional co-operation.

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1 Introduction

The National Network on Well-being at Work at Finnish Workplaces (Tyhy Network) started operations in 2012. It is a Network for well-being at work actors at the workplace. Its roots go back to the Finnish workplace health promotion network (WHP network) which began operations since 1996, and consisted of occupational health care specialists. From 2010, this network became the Tyhy Network. Its aim is to create a platform for communication and cooperation for workplaces, well-being at work specialists and decision-makers – regionally, nationally and internationally. Its activity is based on the needs of the workplaces, companies and other partners – regionally. The Network aims to develop well-being at workplaces equally, openly, and through participation.

The ultimate goals of the Network are: healthier employees, more profitable companies, more vitality in Finland. Its objective is to be a meeting point and an arena of discussion for the employees and well-being at work specialists of workplaces; to share methods and experiences regarding improving well-being at the workplace; to provide support for the concrete actions taken to improve well-being at the workplace; to improve communication and interplay between workplaces, specialists and decision-makers; and to enable cooperation between different agents: regionally, nationally and internationally

2 The National Network on Well-being at Work at Finnish Workplaces (Tyhy Network)

The Tyhy Network is managed by the Finnish Institute of Occupational Health (FIOH) and is closely linked with the activities of the Forum for Well-being at Work (Työhyvinvointifoorumi). The operations of the Network are funded by the Ministry of Social Affairs and Health.

2.1 Structure of the Tyhy Network

The Tyhy Network consists of a national co-ordinator and small support and expert group, both from FIOH. These constitute the *project group*, which is in charge of national operations and supports the regional networks' activities and contact persons. The *professional group* comprises experts from occupational health care, occupational safety and health, and various stakeholder groups: for example, The Centre for Occupational Safety, pension insurance companies, and various ministries. The professional group follows, guides and supports national operations. The *national support group* consists of the contact persons from regional networks and the project group. Every regional network has a *regional planning group*, and choses the contact person, who is the leader of the group and belongs to the national support group. The structure of the network is described in Figure 1.

Fig. 1. Structure of the network

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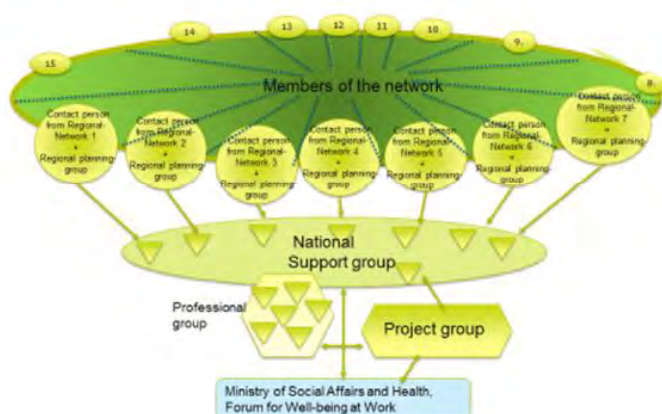
2.2 Operations of the Tyhy Network

The Tyhy Network operates at the regional level. This helps connect people from the same area, who know the specialities of their region, and people from different workplaces; big, small, private, and municipal. It also helps connect those with different standpoints regarding well-being at work; those who see it from the perspectives of occupational health, occupational safety, human resources, pension companies, trade unions, employers, and employees. This allows easier multiprofessional co-operation. The regions of the Network are the ELY areas (The Areas for Economic Development, Transport and the Environment). Finland has 15 ELY Areas (Figure 2)

1 Lappi
2 Pohjois-Pohjanmaa
3 Kainuu
4 Pohjanmaa
5 Etelä-Pohjanmaa
6 Keski-Suomi
7 Pohjois-Savo
8 Pohjois-Karjala
9 Satakunta
10 Pirkanmaa
11 Etelä-Savo
12 Häme
13 Kaakkois-Suomi
14 Varsinais-Suomi
15 Uusimaa

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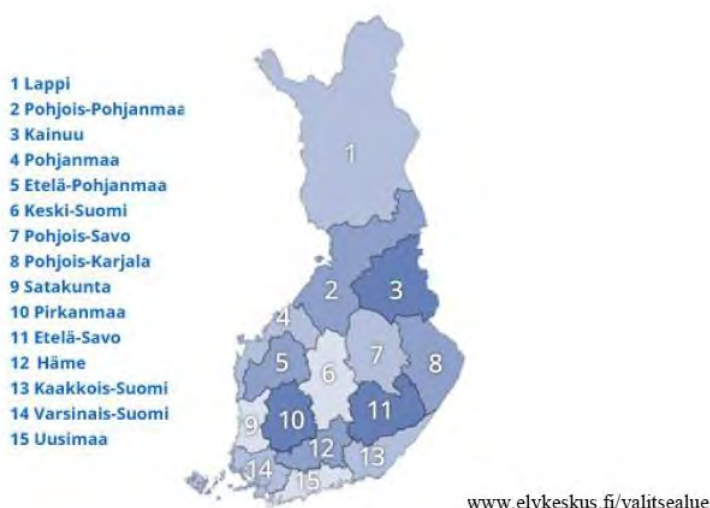
Fig. 2. Finnish ELY areas

Membership of the Tyhy Network is free of charge and open to anybody interested in wellbeing at work. The network has its own operating principles and every member must accept these: Confidentiality, Commitment, Equality, Openness, and Participation. Confidentiality means open and fair interaction, and responsibility for disseminating information. Commitment means the readiness to pledge oneself as far as possible to the common development of wellbeing at work. Equality means that all the members of the network are equal in regard to rights and obligations. Openness means readiness to share and to receive information and experiences related to well-being at work, as well as openness to the thoughts and ideas of others. The network is not a place for sales and marketing. Participation means co-operation, encouragement and support: creation together.

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2.3 Members of the Tyhy Network

Today, the Tyhy Network operates in twelve regions all around Finland. Currently, it has over 900 members (Figure. 3), from companies of various sizes (Figure 4.), with a variety of tasks: supervisory work and management, personnel management, occupational health and safety, well-being related education, training, and service activities (Figure.5). Members also include occupational health service personnel, well-being at work specialists, and decision-makers.
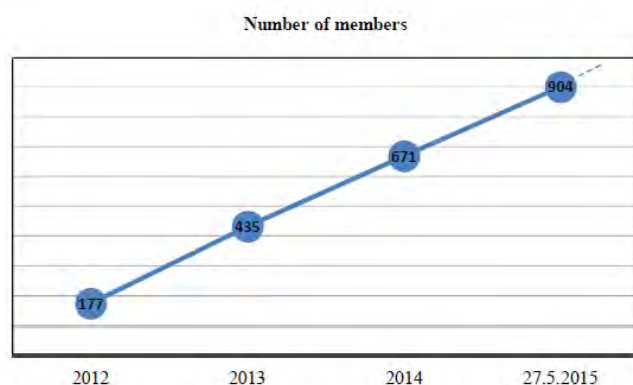
Fig. 3. Development in number of members from 2012 to May 2015
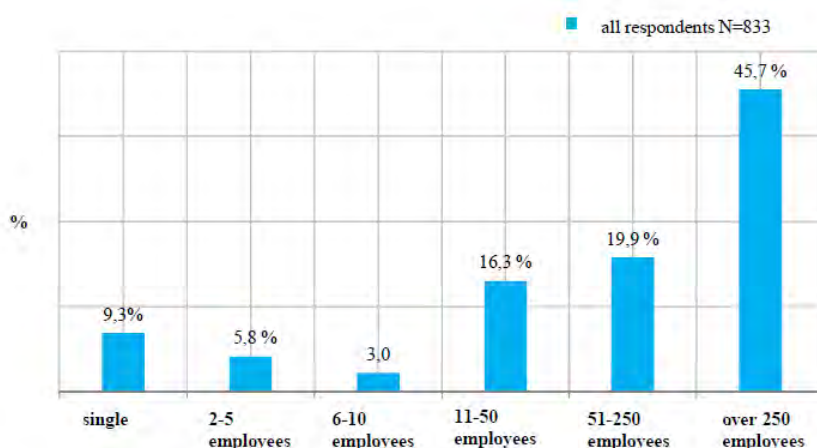
Fig. 4. Members of the Network, size of their companies

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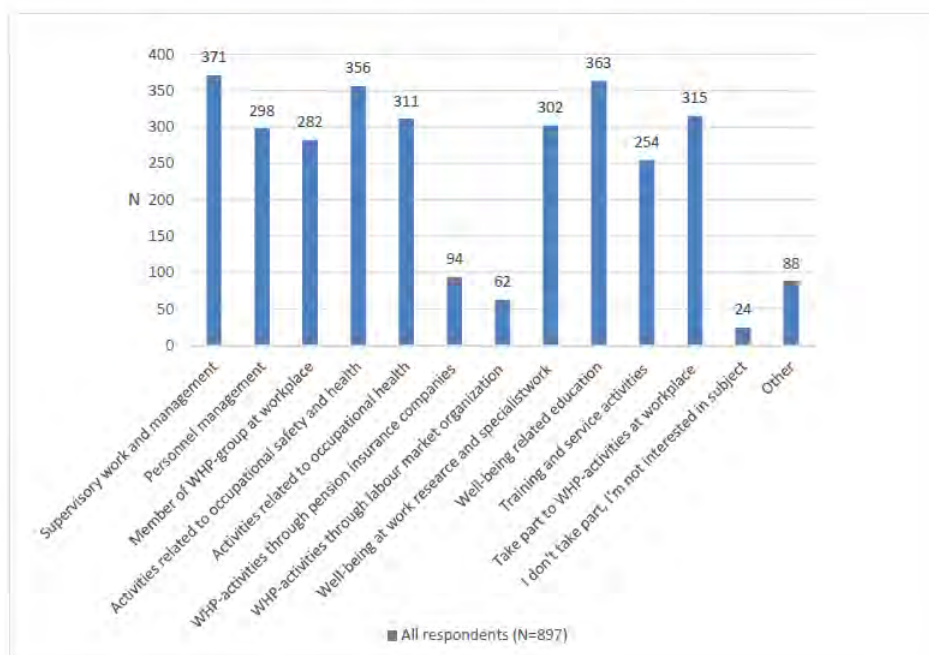
Fig. 5. WHP or Well-being at work duties of members at their workplaces

The majority of the members of the network operate within human health and social work, public administration or education. More detail in Figure 6.
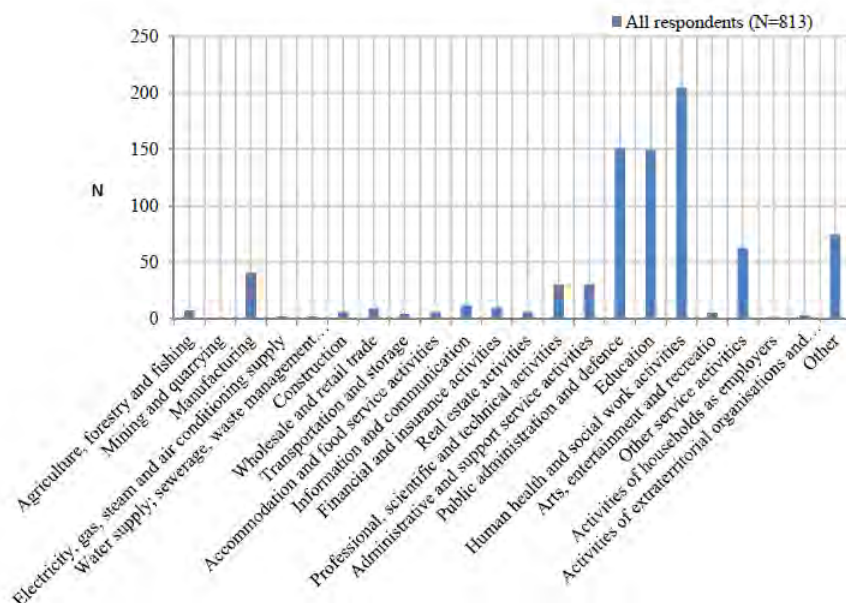
Figure 6. Members of Network and their industries

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2.4 Tyhy Network meetings

The Regional Networks regularly organize meetings. Three/four times a year, the Network members, or people who are interested in the topic of the Network meeting, come together to discuss, obtain and share knowledge and experiences regarding the chosen topic. The Regional Networks decide on the topics themselves, and invite relevant specialists to take part in the meetings. How to manage stress, and how to prevent psycho-social risks at the workplace, for example, have been Network meeting topics in all areas. Each meeting also provides current news and information on well-being at work subjects, instructions, and so on, in Finland and in Europe.

Twice a year, the National Networks organize meetings for stakeholders (e.g. the Ministry of Health and Social Affairs, pension companies) and partners (e.g. The Centre for Occupational Safety), in which regional network representatives can discuss their regional specialities, good practices, and challenges. This is a good way to get workplaces' voices – the region's voice – heard. These meetings also inform stakeholders and partners of what is happening in different parts of Finland, at different workplaces. Once a year, the Tyhy Network organizes a joint Network meeting, in which the Regional Networks from all over Finland share experiences via an interactive video conference.
The Network has organized almost 60 local and national Network meetings, which have been attended by thousands of participants.

3. Micro- and small enterprises need networking

Generally speaking, entrepreneurs feel well in their work; they are satisfied with, often feel engaged in and enjoy their work. However, they also face challenges. They often feel stress, time pressure and uncertainty related to their work. They also have many development needs related to know-how. Vocational and business know-how has been regarded as the precondition for both one's own coping at work and the success of the company. 1) (Palmgren et al. 2010). Micro- and small entrepreneurs also face similar challenges. 2) (Sinisammal et al. 2014). Networking and peer support are important to the entrepreneur, especially to the private entrepreneur, who does not have the support of a work community. 2) (Sinisammal et all 2014). The Tyhy Network is one opportunity for regional and national networking of microand small enterprises. Participation in the operations of the Tyhy Network is free of charge; they take place regionally on different sides of Finland, near the workplaces. Participation has been made easy. Entrepreneurs, and the actors of micro- and small enterprises, can obtain peer support and help; simple solutions to develop well-being at work. Through the Network they can increase their own know-how in matters related to well-being at work. 3) (Helander A. 2014).

4. Challenges for the Tyhy Network

In connection with a project, a SWOT analysis was made of the Tyhy Network. The results showed that networking is a new, increasingly common way of working, and responds to the often-detected lack of co-operation between different stakeholders.
As networking is a new and different way in which to work, we have to find ways in which to deal with uncertainty. The critical question is: Do we trust each other enough to share our experiences? Networking and the development of trust take time, patience and commitment. Since the actors in the Network are not paid, maintaining interest in networking depends on the effects and benefits gained. One reason behind the success of the Tyhy Network is the participation of decision-makers. The SWOT results also revealed that although good processes exist; for example, risk assessment and early support, they are not yet everyday practices at all workplaces. The Network provides a way in which to disseminate these practices, even to smaller workplaces in rural areas.

Another future challenge of the Tyhy Network is to spread its activities throughout Finland, to strengthen its connection with international networks, and to strengthen its connection with other national networks. Making the network known and creating sustainable structures will finally stabilize the operations of the network. For this we need to secure funding and adequate resources for managing the Tyhy Network's operations.

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In order to meet these challenges, the Tyhy Network tries to find funding to ensure resources and development in the future.

5. Future development of the Tyhy Network

We have made a new project plan and applied for funding in order to secure the development of the Tyhy Network. The aim of the project is to help workplaces proactively carry out occupational health, safety and well-being (OHSW) measures, thus improving the productivity of work. Its aims are 1) to create a structurally strong national co-operation and competence network for workplaces' well-being actors, which functions on the regional level and is connected to international (especially neighbouring areas') networks, 2) to improve OSHW competences and co-operation, and the utilization of OHSW services at workplaces. The project specifically targets small enterprises and entrepreneurs.

The project is based on the results of previous research and development projects and addresses the development needs of workplaces' OSHW, and problems arising from the underutilization of services. Traditional OHSW development has been silo-like, i.e. not actoror network-oriented or co-operative. Co-operation between actors enables new, innovative solutions, and optimizes the use of resources.

The project's activities are based on the networking of workplaces, and on the communal learning and development that occurs within these networks. They use workshop processes that follow the principles of network activities that support sustainable development and equality (working together, interaction, trust, and commitment). These are carried out in different parts of Finland in co-operation with workplaces, regional TYHY networks (workplace's well-being networks) and other partners from different parts of Finland.

The project will develop the networks' methods and coverage through four themes and five national lines of development. These themes will 1) create a co-operation and competence network, 2) increase OHSW competences at workplaces, 3) improve OHSW co-operation at both workplace and regional levels, and 4) develop entrepreneurs' and small enterprises' methods of procuring and organizing OHSW services. They will also develop good practices for promoting work ability and health in order to extend the working careers of those in physically and psychosocially demanding work, and to prevent the premature retirement of ageing workers and those with partial work ability. The national lines of development will produce information to support decision-making: 1) a definition of OHSW competence and a recommendation that it be considered a part of work life competences, 2) recommendations concerning the continuation of work careers for those in physically demanding work, and the maintenance of work ability among those with partial work ability, 3) recommendations for well-functioning OSH measures at workplaces, 4) a proposal for OSHW procedures in sparsely-populated areas, and 5) a proposal for new organization methods for simplifying the procurement of OHSW services.

6. Closing words

The Tyhy Network has operated for over three years. It has expanded, and its operations have continuously developed and diversified. New, enthusiastic members and actors have joined. The future will reveal how the Network can be involved in making Finnish work life the best work life in Europe.

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Total Safety Management for SME

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Abstract. This paper describes the TOSCA approach to safety management and three test beds illustrating their application and potential benefit to SMEs. The focus of the TOSCA approach is on improving the information available for safety management and providing improved methods of sharing this information across an organisation. The first case study describes a participatory approach to assessing an activity, the second a risk register for collecting and analysing risks across a business over time, and the third a simulation approach to designing complex procedures. Finally, the specific safety and productivity related gains from applying specific methods and tools are illustrated.

1 Introduction

Over the recent past, the accumulation of major mishaps, crises and accidents have made it clear that organisations must still improve their capabilities to address safety "not as a stand-alone activity that is separate from the main activities and processes of the organization" but as an integrated part of total performance management. Organisations, especially SMEs dealing with safety critical operations for example, find it difficult to integrate their different functional units in a common programme of operations management; there is no clear consensus about what it means to be 'proactive'; there is no integrated framework for analysing or managing all the human related functions in an operational system. Different SMEs and large companies have different approaches to building their 'understanding of risks and risk control measures' depending on the resources invested in safety management. SMEs may have greater problems than large companies in getting an accurate understanding of their risks and the possible measures to control risks. Among other reasons, SMEs are more diversified than large companies, as well as are usually more limited in human resources and this makes it difficult to draw on what risk information already exists in the specific industry domain they operate.

The majority of studies in the literature have found that SMEs have an increased risk of accidents compared to large enterprises. SMEs focused their investments on issues associated with purely regulatory or legislative aspects, that is, (1) training and information of workers on safety, (2) upgrading installations to comply with safety standards, and (3) introducing safer production technologies and personal protective equipment. A greater tendency was observed among SMEs to outsource safety management to compensate for the lack of specific competences within the enterprise (this means that safety competences needed are not internalized). Therefore there is a need to address the capacity of SMEs to risk assess actual operations with an easy to apply, robust set of methods. In addition, there is a strong need to provide the capacity to monitor and record data on the operations in a solution to be embedded in their routine data collection that can offer significant benefits in terms of their capacity to improve safety and performance. This is the scope of a EU funded research project called TOSCA[iv] (Total Operations Management for Safety Critical Activities) aimed at developing an innovative approach to integrate and enhance safety, quality and productivity especially for SMEs in the process industry.

The aim of the TOSCA project is to establish a framework in which the most innovative tools and techniques (advanced 3D software, virtual reality, innovative theoretical models, updated information exchange protocols, etc.) are operated together in order to take advantage of synergies in complying

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with standards, requirements, regulations, thus improving safety and enhancing productivity in an integrated way. The present paper will introduce the framework, methods and tools, and the test cases on which the methods and tools developed are being implemented, tested and evaluated. The test beds reported in the present paper are the following:

1. The use of process mapping and task analysis to improve an SME risk assessment in the food processing industry and as a cornerstone for participatory risk assessment procedure review and training;
2. The establishment of a risk register and a set of Safety Performance Indicators (SPIs) to support hazard identification and risk monitoring in a company comprising several energy production plants;
3. The use of Rapid prototyping and simulations to test possible alternatives in the design of an infrequent procedure for pressurized water testing of the Liquefied Petroleum Gas (LPG) storage tanks and to provide training information for contractors and operators.

2 The TOSCA Approach to Total Safety Management

The TOSCA T-model describes the TOSCA approach to total safety management; in the centre lies a Common Operational Picture (COP) which holds the knowledge of the organisation regarding its operations, risks, and activities and which is used to support risk assessment and safety management. This picture links to a design loop and an operational loop (Fig. 1). The information held in the COP may be represented in different ways but should be accessible to all stakeholders involved in a project or operation in order to analyse and communicate risk, and to support training and procedure design. The design loop applies the TOSCA tools to the design of new plant sections, the management of technical and organizational changes, and the risk analysis of critical activities and draws from the COP to gather the information needed, and feeds back into the COP to update it after any changes to the system design have been made. The design loop considers both physical plant design, as well as the design of critical tasks and activities for workers. Formal risk assessment techniques, dynamic risk modelling, and rapid prototyping are methods used to support design risk assessments. Critical activities covers change management and the provision of appropriate procedures and training to workers. The operational loop applies the methods and tools to the management of safety barriers, the design of workflows, coordination of teams, and training. A feedback loop to the Common Operational Picture is also included here to ensure it remains current with operations as they are being performed. Modular products to deliver safety management have been developed within TOSCA for each area of the framework.
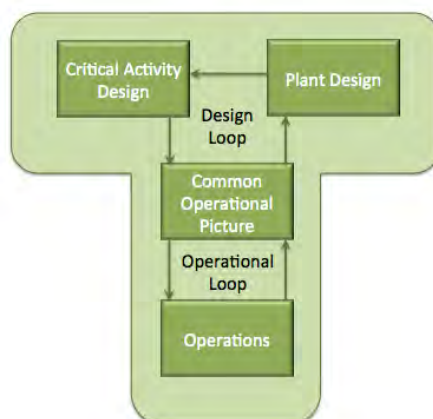
Fig. 1: TOSCA Total Safety Management Framework

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The three test beds discussed in this paper cover different aspects of the TOSCA framework. The first describes the use of participatory methods to establish a common operational picture (COP) between managers and operators, and uses this picture to improve the safety and efficiency of safety critical activities. The second describes the use of a risk register as a COP in which risks from operations are identified and documented, and its possible use in supporting design improvements. The third test bed describes the use of innovative prototyping and simulation tools to design a procedure and its use for safety analysis and training.

3 Participatory Risk Assessment

Risk assessment involves careful examination of each of the activities implemented in a workplace that could cause harm to workers (HSA, 2005). This facilitates the analysis of whether sufficient precautions are in place or whether more should be done to prevent damage. The goal of the risk assessment is to assess, manage and thus minimise the risk of injury or fatality in the operation of equipment or processes. To achieve this, the hazards should consider not just technical equipment within the design but also possible hazards generated from work activities, particularly safety critical activities (Wells, 1996). Risk assessments are often conducted by safety specialists, and in the case of new designs, in consultation with engineers. However, the inclusion of the workers involved in the operation allows their experiences and knowledge to be captured in the risk assessment process and facilitates the identification of risks regarding the operation that may not be apparent to specialists more removed from the actual task. The workers themselves may also have ideas for possible improvements that can be incorporated in to the design or operational process.

The case study reported here involved cleaning operations of large storage bins in the malting industry. There are many risks that can occur in confined spaces; in most cases these are assigned exclusively to risks originating from atmospheric conditions of the inside or to an improper installation of the abseiling system. However, these tasks involve the convergence of several other hazards related to the task, some of which may be apparent only to the operators involved and others that might only be apparent to managers. For this reason, a workshop approach is useful, as during the process it is possible to identify different factors that threaten the health and safety of workers.

The case study began with the analyst developing a broad understanding of the task in order to map out the process followed in the form of a task analysis. Task analysis is used to describe and evaluate the human interactions in a system. As such, it forms the basis of many human factors risk assessments. Task analysis has been defined as the analysis of how a task is accomplished, including a detailed description of both manual and mental activities, task and element durations, task frequency, task allocation, task complexity, environmental conditions, necessary clothing and equipment, and any other unique factors involved in or required for one or more people to perform a given task (Kirwan, 1992). Without these important representations of the socio-technical system, it would not be possible to correctly analyse the system and identify and evaluate all the relevant risks.

For this case study, this was achieved through site visits, observation of the task, interviews with the workers, and analysis of the relevant procedural and process information. This was a critical and extensive activity for an external agent conducting the risk assessment, but could be achieved with relative ease by personnel within the organisation. The process steps included preparation activities (e.g. checking of weather conditions, briefings), isolation activities (e.g. electrical and mechanical isolation of the bins), setting up of equipment (e.g. abseiling equipment and PPE), checking gas levels, entering the bin (including safety procedures), the cleaning activity, and exiting the bin. This simple linear process was documented in as much detail as possible ahead of a workshop with operators and the safety manager.

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This process map, or task analysis, allowed the information to be shared with the workers during the workshop and facilitated the identification of those activities that create a higher risk for the workers, achieving a more comprehensive risk assessment. Gathering together the responsible staff makes it possible to achieve a more thorough risk assessment, as they have the necessary expertise to solve, and at the same time, give their opinions on each of the tasks performed. Printed copies of the process model were used to structure the workshop which began with the presentation of the process map developed by the researchers describing the various tasks that need to be executed during cleaning operations in the bin. The workers had a chance to analyze each of the functions described in the map, and where necessary provided a better description of the map itself. Simultaneously, the hazards associated with each activity were identified – each task was examined with the workers; they studied, discussed and identified the activities that needed further attention. Once the identification stage was accomplished, the workshop proceeded with a much deeper study and understanding of each of tasks listed; workers described any possible deviations that may arise during the execution of each of these activities. The whole group discussed and reached a conclusion about the possible deviations. The workers reported then the consequences that can be generated because of these deviations and generated recommendations to improve safety.

The results from this exercise identified 32 possible deviations during the cleaning process during a two-hour workshop. These included possible deviations such as not isolating the correct bin, not checking equipment prior to use, mis-reading the gas detector, and dropping equipment during the cleaning process. Of these, 29 were assessed to have sufficient mitigations in place to accept the risk as tolerable. Three deviations were highlighted for further mitigation.

The involvement of the workers in the validation of the task model and the analysis of the risks was very successful and feedback from the workshop highlighted how useful each participant had found it. The identification of new risks and required mitigations proves the value of this approach, and the new ideas generated offer increased learning for the entire workgroup, causing an increase in understanding the perspectives of others, while leading to better ideas and decisions. Involving everyone in the risk assessment process may also provide a sense of security and develop interpersonal relationships. This method could be particularly useful for SMEs who have been shown to have a limited ability to conduct traditional risk assessments requiring an investment in resources and staff competence (Miceli and Cagno, 2009). The structured approach allows SMEs to use their existing staff to generate the data for the risk assessment and identify possible improvements to their work processes.

3 The development of a Risk Register as common operational picture

In order to maintain safe operations, organisations must continuously review and monitor their risks. This means that the results of safety studies must be translated into a format that can be analysed, reviewed and acted upon, and new data about the level of risk continuously collected to keep the safety information up to date. A risk database, or risk register, is a central tool for organisations to use to monitor and reduce risks, both those identified during initial safety assessments and those emerging during operations (Whipple and Pitblado, 2010). The risk register should contain all analysed risks and should prioritise the areas that require managerial attention and typically contains information describing each risk, an assessment of the likelihood and consequences, a ranking according to a risk matrix, the risk owner, and information on the mitigations to be put in place (Filippin and Dreher, 2004). When populated with information on each risk, including risk ranking, the risk register can analysed to present the risk profile for different aspects of the organisation (Filippin and Dreher, 2004). When reviewed and updated over time, it can also be analysed to present trends within the risk profile and focus management attention on the highest risk activities or facilities (Whipple and Pitblado, 2010). In order to successfully develop a risk registry that provides an

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accurate level of risk within a process, there is a requirement for real time data on risk to be input into a risk registry.

Risk registers are used in a variety of industries, e.g. medicine (Brown, 2004) and construction (Dunović, Radujković and Vukomanović, 2013), as well as high hazard industries such as oil and gas (Hasle et al., 2009) and electricity generation (Leonard, 1995). They are typically used either to support safe operations or to support safe and efficient project management. Patterson and Neailey (2002) highlight the importance of the risk register and suggest that the benefit of a risk register is as a method to enable all stakeholders to "consciously evaluate and manage the risks as part of a decision making process" (pp. 365). They also note the importance of the risk register in documenting the process of reducing risk and introducing mitigations. Despite the clear importance of risk registers in the risk management process, there is very little guidance on their development and implementation and previous research has found that although 67% of companies use some form of risk register, the majority have developed their own format to host it (Patterson and Neailey, 2002).

During the TOSCA project, a risk register was developed for an electricity generation company to help identify, manage, and report the risks facing individual parts of the business and guidance on this process was documented throughout the project. The aim of the case study was to build a single central risk register on existing risk management systems in place in the organisation, including the asset management investment process, Critical Asset Register (CAR) and risk matrix, and the quarterly business risks reports as well as any existing risk assessment processes. These reports/matrix provide an update of the risk levels within the business at a particular moment of time, but do not dynamically taking account of short term emerging risks i.e. weather extremes, equipment type faults, internal or external incident investigations, etc. It is critical for a risk management that all potential hazards have been identified and assessed, that adequate control measures are put in place and that control measures remain effective in management of that risk.

The risk register is based on a data structure that considers the hazards associated with different types of assets, including physical assets, human assets, financial assets and compliance assets (e.g. regulatory). The use of this data structure helps ensure consistency across sites in their approach to identifying and classifying risks, and establishes a clear link between the risk being reported and the affected business unit. Hazard lists can be constructed from key international standards, as well as from a review of the current known hazards relating to the assets in the business. A comprehensive loss framework was also necessary to classify the severity of the risks. This needs to be capable of quantifying not only safety or financial losses, but also technical performance, reputational, and environmental losses (Table 1). A simple risk matrix, combining these severity ratings with an appropriate frequency scale, can then be used to prioritise risks to the business.

A clear process for using a risk register is a pre-requisite to its success; the population of the risks relies upon their identification by experienced personnel and regular discussion and updating of each risk. This requires a commitment to review and update the risk register on a regular (monthly, bi-monthly or quarterly) basis from each area of the business. This may be best achieved as part of management meetings during which the review not only prompts an update of the register, but also engages the management team in managing safety.

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Table 1: Example severity scales

	Safety	Environment	Financial	Technical Performance	Reputational
1	Minor injury	Minor impact	<€1m	€10k repair <24h outage	Informal/local complaint
2	1-2 day lost time injury	Moderate (short) impact	>€1m	€75k repair <1wk outage	Formal complaint to company
3	Serious injury	Significant impact; minor license breach	>€5m	€100k repair >24h shutdown	Local media coverage / Formal complaint from regulator
4	1 fatality, or multiple health effects or permanent incapacity	Significant, long-term impact; temporary shutdown	>€20m	€1m repair >1wk shutdown	National coverage / Formal inspection
5	Multiple fatalities	Major, permanent damage, long term shutdown	>€100m	€50m repair >1wk shutdown	International coverage

Following this simple process, an organisation can achieve a basic risk register which can be held centrally and viewed by a range of personnel, thus developing a common picture of the risks facing the business. Over time, as more risks are added, the organisation can perform more advanced analysis, including identifying the root causes driving risks across the business and attempting to target these in the design of new equipment and operations. The risk register then becomes a source of risk intelligence for the business, not simply a repository of information.

5 4D Simulation and review of critical operations
A key area of interest in management of risk is design or planning for new procedures. An approach was developed in the TOSCA project to better plan and assess complex changes in an organisation. This methodology combines the human factors method of task analysis with 4D process simulation to model the system and identify areas for improvement, both in terms of process safety and production efficiency. 4D Simulation is a method that brings together Discrete Event Simulation with a highly accurate 3D model of environment. The discrete event simulation is then run in the 3D model and the results collected and analysed.

The case study here was the periodic inspection of pressurized vessels for liquefied petroleum gas (LPG) storage. The inspection procedure, made of complex manual procedures, is applied rather rarely (at least every five years according to the law, but can be substituted with less disturbing methods, so in reality full internal vessel inspections are done every 10+ years) thus affected to staff turnover, meaning that previous experience and procedures may not be available at the time of testing.

The approach builds on using the principal methods of Task Analysis (TA), as described in Section 3 earlier, and 4D modelling and visualization of the operation under analysis. This renders a clear representation to the analysis team about the abstract details of the operation(s), enabling them to apply the hazard identification methods, qualitative risk categories ranking, as well as efficiency (e.g., in terms of resources needed, time, staffing, equipment, etc.).

The information to feed the task analysis can be gathered from documentation (e.g. procedures) as well as individual experience and 'best guesses'. In the case of a rarely performed procedure, such

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as the case study presented here, the task analysis may be an iterative process that is refined as the procedure becomes clearer. The 4D modelling is a key tool in facilitating this improvement.

Simulation can be defined as the imitation of the operation of a real-world process or system over time. The simulation first requires that a 3D model is developed. This model represents the key characteristics or behaviours of the selected process (Banks, 2001). The model depicts the environment in which the process itself takes place, often in a 3D manner; the simulation depicts the operation of the process over the fourth dimension, time. This paper focuses on the use of discrete-event simulation, which models a process as a discrete sequence of well-defined events in time. Such events occur at a particular instance in time, marking a state change in the process (Robinson, 2004). Processes modelled in a discrete-event simulation must include predetermined starting and ending points, and a list of discrete events that occur in between these points. Discrete-event simulation is commonly used to monitor or predict procedures and processes in various industries, such as manufacturing.

The next step is the hazard identification based on the task analysis. This uses the task analysis outline as the basic functional analysis and then a structured Hazard identification workshop similar to a HAZOP study (Kletz, 2006) is performed, where the nodes are individual (sub)tasks instead of parts of a plant. The approach, as described in Section 3 earlier, can be referred to as a Task HAZID (Leva et al., 2012). The hazard identification study for this case study involved a team workshop exercise with the team containing the appropriate expertise, including knowledge of the plant and the planned operation, safety analysis, and human factors knowledge. The identification of hazards was accompanied at the same time with a semi-quantitative risk category estimation in order to separate between safety and productivity issues. That involved assigning the consequence classes on a 1 to 5 point scale, and similarly assigning their likelihood of occurrence, while risk values were simply provided by multiplying both.

Following the safety analysis, the optimization process can be applied in two steps. The first is optimization of the 4D model and its (sub)tasks is performed with implementation and operating costs as the dependant variables. The optimization was then done through an iterative method which tests each iterative arrangement over a statistically significant number of simulation runs. The result is a local optimization within the system based on cost. The second step applies to the results of the task analysis and the Task HAZID study, where the initial list of tasks is next refined and subjected to further optimization. We suggest that this optimization be done when hazards are already revealed (thus, e.g., after Task HAZID) and the team can concentrate on the further aspects, e.g., time duration of the main tasks, pertaining costs, etc. Finally a sensitivity analysis is done using a Pareto type optimization on a given system/activity aspect can be applied and opportunities for further improvements searched for and documented.

The application of this method to the case study resulted in 20 specific recommendations for the organisation on how to better plan this infrequent and demanding testing procedure. The approach is currently being trialled on an additional case study (related to equipment overhaul in a power plant) where significant time pressures mean the task has to be streamlined wherever possible, without compromising safety or quality. Initial results from application of this method have reduced the time needed by almost 30% and the simulation produced will be used to train the workers in advance of the real procedure, familiarising them with the operation and highlighting possible risks in the process.

This method is more time-consuming and difficult to apply than the two previously discussed; however, it can provide real benefits for organisations undertaking processes which are not fully

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understood, drawing out different views of stakeholders involved and providing a platform on which to safely test how different procedures may work in practice.

6 Conclusions

This paper has detailed three test beds describing methods for managing safety applicable to SMEs. Each has its own context for application and provides different outputs. The first is applicable for developing a greater awareness among staff and management of the hazards involved in a particular activity, and identifying new methods to control the risks. The second provides on-going support to the identification and management of risks across a business, and the third is applicable to complex or rarely performed activities that can benefit from a detailed analysis to improve safety and productivity. All the methods attempt to improve the information available to the organisation, whilst also supporting specific design or operational goals.

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The SME-specific prevention service of AUVA: AUVAsicher

Barbara Libowitzky

With the prevention model AUVAsicher, the AUVA (Allgemeine Unfallversicherungsanstalt) the Austrian Workers´ Compensation Board, thus the social insurance for employees, pupils and students provides a prevention service for business with up to 50 employees that is free of charge. This service is in line with the legal requirements of the Austrian Workers Healthy and Protection Act (ASchG), the Austrian employee protection legislation.

The EU accession in 1995 brought along some changes in the field of prevention in Austria.

Among other terms, the framework directive on the "implementation of measures to improve safety and health of employees at work" became anchored in Austrian national law.

This happened due to the Workers Healthy and Protection Act (ASchG) which was passed on January 1st in 1995. This law stipulated that all companies are required to provide preventive services for their employees as of July 2000. Depending on the number of employees in a company, the AUVA is obliged to provide counselling by occupational physicians and safety engineers in annual or biennial intervals.

To meet the special needs of small and medium enterprises in terms of occupational safety and health, the AUVA was entrusted by the parliament to provide a cost-free prevention service model. This model is called AUVAsicher. Any company can participate in the program if its staff are insured with AUVA.

Numbers and facts

The AUVA (Austrian Workers´ Compensation Board) is the social insurance for occupational risks and work-related illnesses for more than 3.3 million employees and 1.4 million pupils and students in Austria. Its great duties are: prevention of occupational accidents and diseases, occupational medical care, occupational accidents post traumatic treatment, rehabilitation, financial compensation and research.

1.5 million of the 3.3 million employees could be counselled by AUVAsicher, since they are working in small enterprises up to 50 staff with a maximum of five branch locations. Currently , almost 60% of the employees and workers covered by the services of AUVAsicher.

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AUVAsicher

AUVAsicher is a free-of-charge occupational health and safety service for small and medium-sized enterprises. AUVAsicher is available for companies up to 50 employees per office/departments and up to 250 employees in the entire company. If the company employs trainees and/or disabled people, the number of employees receiving this coverage increases up to 53. Within AUVAsicher, also part-time staff are full headcounts.

Alternatives to AUVAsicher?

Every entrepreneur and every business owner (even those up to 50 employees) decide between the AUVAsicher service and private safety engineers and/or occupational medical physicians. The cost for private counselling has to be borne by the company itself. Another possibility is to contract a safety engineer or an occupational health physician. In that case (of safety engineer counselling) it is also possible that the employers themselves assume the safety counseling, as far as the counselor possess the statutory requirements qualifications (§ 78b ASchG).

Structure of AUVAsicher

The AUVA general manager and top quality management officer is also the head of AUVAsicher. He is supported by the coordinators in four regional offices (Vienna, Salzburg, Linz and Graz). The duty of the coordinator is to align the activities of the safety engineers and the occupational medical physicians. The coordinators are supported in all provinces of Austria by a respective officer.
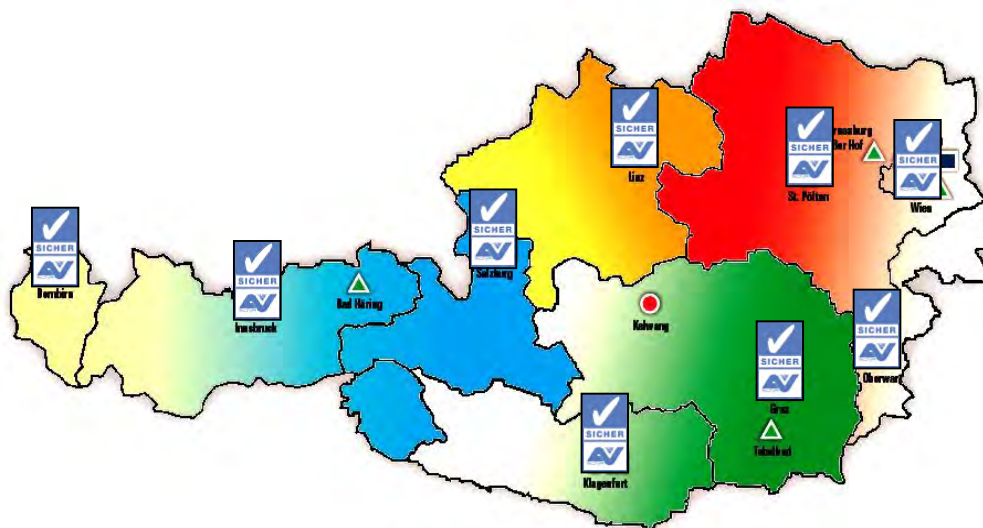
The budget of AUVAsicher is approximately 22 million Euros, whereof about 7.5 million Euros are expended for personnel costs. The reminder relates to operating expenses and investments.

More than half of the AUVAsicher employees are independent contractors. The independent occupational physicians and safety technicians are individually contracted to the AUVA.

In 2013 AUVAsicher employed 271 persons. 202 of them were independent contractors (68 safety technicians-independent contractors and 134 occupational physicians-independent contractors).

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Types of counselling

There are 2 types of counselling:

Normal-case counselling

> Companies with 1-10 employees get an AUVAsicher-counselling every 2 year. Larger companies with 11-50 employees get this service every year. The topics of the normal-case counselling cover for example first aid, prescribed investigations, ergonomics and workplace design or work-related and mental stress. In 2013 the consulting focus was on asbestos and hand injury prevention.

> If additional support is needed by a company, there is the possibility to make use of a special case counselling (free-of-charge).

Specific-case counselling

> Companies get specific counselling, if a company has new machineries, personnel protective equipment or specific measurements. In the year 2013 AUVAsicher supervised 3.753 specific-cases.

Operating time of occupational physicians and safety engineers

Occupational physicians: Austrian workplaces with 1 to 10 employees get a 1 hour counseling service by occupational medical physicians. Enterprises with between 11 and 20 employees get supervised 1.6 hours and companies with 21 to 50 employees 3.6 hours.

Safety engineers: Safety engineers supervise small companies (1 to 10 employees) 1.2 hours, medium companies with 11-20 employees 2.4 hours and companies with 21-50 employees 4.8 hours.

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Quality assurance

In order to maintain high quality in AUVAsicher, quality-circles take place monthly in the prevention centers. The quality-circles provide time to exchange experiences and information as well as develop and discuss topics with high priority.

AUVAsicher has a lot of advertising and promotion activities. For example events and conferences with reprehensive interest groups, press conferences, the largest prevention Congress in Austria (Forum Prävention), publications in professional papers, direct mailings or the annual AUVAsicher-days in Wagrain.

The quality management is focused on four main objectives:

1. Essential reduction of the number of workplace accidents and occupational diseases
   Promotion of innovations

2. Substantial reduction of work-related diseases and awareness raising measures for workplace health promotion
3. Reinforcing the market leadership
4. Increasing the customer´s loyalty

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New self-regulation initiatives to discourage unfair employment practices in the Netherlands

H. van Lieshout & A. Scholing[18]

Abstract. Unfair competition on employment conditions has negative consequences for different actors. In a race to the bottom to lower labour costs, employers sometimes use dubious labour constructions. Fair employers are at a price disadvantage and will lose market share or even go bankrupt. Workers are underpaid or even worse: they may be a victim of exploitation. And the state loses incomes, as unfair employers don't pay (full) taxes and premiums for pension and social security systems. In some sectors in the Netherlands, unfair competition has led to such severe problems that parties joined forces and developed self-regulation initiatives, such as a certification system, to combat such dubious practices. This paper examines such initiatives and develops a conceptual framework for their analysis. We will discuss the underlying problem of unfair competition, different recent initiatives of self-regulation that have developed in the Netherlands, and a conceptual frame-work for their analysis.

1   Introduction: Unfair competition on labour costs and its victims

Entrepreneurs are trying to reduce labour costs to keep their company profitable, in particular in sectors producing standard goods or services at low prices and with relatively high (international) competition. As their profit margins are under considerable pressure, they try to keep labour costs as low as possible, resulting in a 'race to the bottom'. At that bottom, some entrepreneurs are using dubious employment practices. This is allowing them to bypass the national and sector-level labour and social security legislation and collective bargaining agreements (CBA), such as the obligation to pay minimum wage and/or pay social insurance contributions.

Often, such dubious practices relate to flexible employment relations for foreign workers. In the Netherlands, labour costs are higher than in Eastern-Europe. Especially since the EU enlargement with Middle- and East-European countries in 2004 and 2007, labour migration from these countries has increased. Most of it is legal and helpful. But some entrepreneurs hire foreign workers by using dubious employment practices. Foreign workers may accept this because it may offer them some benefits. But often, it does not. Foreign workers may not know their full rights under Dutch regulations, and thus not realize that they are being withheld their full benefits. Or they may know, but feel unable to resist because they need the work and income (which may still be more than they could expect at home). One way of withholding them their full rights is by disguising what should be a regular employment relation as a case of contracting of a posted worker from a foreign company. The European Directive on the posting of workers determines that the just the main clauses from Dutch collective bargaining agreements (CBA) applies, so employers using posted foreign workers do not have to observe each and every clause, avoiding some costs.

Alas, workers are not the only victim of dubious employment practices such as fake contracting arrangements. The state and social insurance funds lose out on income due to unpaid tax contributions and levies.

A third category of victims is often neglected: other entrepreneurs. Dubious employment practise imply unfair competition for other entrepreneurs that do abide by each and every rule. Unfair employers unfairly cut costs, which may allow them to lower prices, and gain market share at the expense of fair employers. As a worst case scenario, the fair employers might even end up bankrupt. Or ... some of them might end up starting to use dubious employment practices themselves, simply to avoid bankruptcy. Besides competing fair employers, bad employers may also harm other entrepreneurs: suppliers and customers in their production or service chain. Negative publicity in relation to unfair employment practices may harm the suppliers' and

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customers' image as well. Emerging legislation might even make them share some liability for unfair practices (see below). As a worst case scenario, the negative consequences may pose a threat to the survival of an entire sector.

The government enforces labour legislation and regulation and its SZW Inspectorate oversees employer's compliance with labour and other relevant legislation (i.e., paying at least minimum wage). But in the Netherlands social partners (employer's associations and unions) are responsible for implementing and enforcing extra-statutory collective bargaining agreements (CBA) - i.e., paying according to the correct wage scale in the CBA. Employers' organisations and trade unions inform their members about CBA and expect them to comply, but rarely formally organize compliance (a 'CBA police'). Trade unions inform and consult workers on their rights, and may help them complain to their employers when workers show them evidence of not receiving their full benefits. If that does not help the employer change his behaviour, individual employees can of course press charges under private law against the employer. But not all workers are willing or able to go to that length. That may apply in particular to foreign workers hired through dubious employment practices, as they are often very dependent on their employer/contractor for not just work, but also accommodation.

Unfair competition on labour costs mostly occurs in sectors where labour costs constitute a large share of total costs; not surprisingly, these are also sectors with high numbers of foreign workers. Dutch sectors experiencing the greatest shift to foreign workers are the temporary employment sector, the construction industry, industry, the agricultural and horticultural industries, the wholesale trade and transport[19]. In some of these sectors, the negative results of unfair competition resulted in such a dire situation that the parties decided to act and join hands in self-regulatory efforts to address the problem.

An example of such an initiative for self-regulation is a new certification system for the Mushroom sector[20]. The problems caused by unfair competition in that Dutch sector had grown so serious, that the social partners, firms and retailers in the sector joined forces and developed a certification system in 2011. This and other examples of self-regulation efforts to address this problem will be discussed in section 2.

The problem confronting the actors that developed and develop such initiatives, is that there is no applied knowledge base to consult for different examples, road maps to create them, their results when applied elsewhere, let alone insight to if and how such initiatives can successfully address the issue. One of those actors, the agricultural employers' association LTO Noord, has asked the Flexicurity research group of Hanze University of Applied Sciences to help organize research on such self-regulation initiatives. The research should be a first step in providing a knowledge base for future actors that want to set up self-regulatory systems to consult, as well as for actors already involved in them, that want to enhance and/or expand their initiative. It fits in the current search of the government and social partners into effective ways of combating unfair employment practices. The recent recommendation on labour migration from the Dutch Social-Economic Council, SER (consisting of social partners and independent experts) to the Dutch government[21], discusses self-regulation options and how to them. And it calls on the government and social partners to devise an action plan for fair labour mobility in the EU.

In this paper will discuss a conceptual framework we have develop to organize subsequent empirical research into such self-regulatory initiatives. Before presenting the framework, we will describe a number of the different self-initiatives that have recently been developed in the Netherlands (section

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[19] E. Berkhout, P. Bisschop & M. Volkerink (2014). *Grensoverschrijdend aanbod van personeel. Verschuivingen in nationaliteit en contractvormen op de Nederlandse arbeidsmarkt 2001-2011.* Amsterdam: SEO economisch onderzoek.

[20] 'Fair Produce', discussed in section 2. http://www.fairproduce.nl/?id=29

[21] SER (2014). *Arbeidsmigratie. Advies 14/09.* Den Haag: Sociaal-Economische Raad.

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2). Section 3 presents the conceptual framework and discusses its different elements. Section 4 offers conclusions and discussion.

2   Self-regulation initiatives in practice

In this paragraph we will describe a number of recent initiatives of self-regulation to help combat unfair employment practices, based on desk research.

*Labour Standards Foundation ('*Stichting Normering Arbeid', SNA*)*

One of the longer-standing Dutch self-regulation initiatives in this field dates back to 1998, when the Act on the Allocation of Workers by Intermediaries ('Wet allocatie arbeidskrachten door intermediairs', Waadi) came into force. The temporary employment sector had (and has) a lot of problems with bogus entrepreneurs who don't comply with legislation and collective bargaining agreements when providing labour and/or (sub)contracting work. *Bona fide* agencies suffer from their unfair practices. In addition to losing market share to their unfair competitors, negative publicity about the unfair practices results in a poor image for the *entire* sector – which again may result in a loss of market share. The Waadi held those hiring temporary staff responsible for social insurance contributions and taxes not paid by temporary employment agencies, and thus extended liability from the individual firm to its chain partners.
To allow bona fide agencies to set themselves apart from the bogus agencies and to reduce the risk of liability claims for those hiring in temporary staff, various employers' associations and unions reached joint agreements. Parties set standards that temporary employment firms have to meet. When approved, the firms were included in a register. A total of five registers were developed for various sectors, such as the Agricultural Casual Work Register ('Register Inleenarbeid Agrarisch', RIA).
To increase transparency, parties then decided to create a single transparent set of standards from the five different registers. That resulted in the creation of the Labour Standards Foundation (SNA) in 2006, and of NEN standard 4400-1 for Dutch temporary employment agencies, later supplemented with NEN 4400-2 for foreign ones. If firms meet the NEN norms, they acquire an SNA certificate. The certificate should help customers to distinguish bona fide entrepreneurs from bogus competitors and thereby help these clients reduce the risk of being held liable for illegal practices by their suppliers.

Foundation for compliance with CBA Temporary Employment Agencies

Another self-regulation initiative concerning temporary employment agencies is the Foundation for compliance with CBA Temporary Employment Agencies ('Stichting Naleving CAO voor Uitzendkrachten', SNCU). This is in fact a 'CBA police' as is rarely found. The foundation was set up in 2004 by employers' associations and unions in the temporary employment sector to stimulate compliance with the collective bargaining agreement in the sector. The SNCU provides information for this purpose and investigates agencies suspected at risk of non-compliance with the CBA. If any violations are found, the SNCU orders the agency to rectify them, and it may impose damage compensation if the violations have financially adverse effects for the temporary workers. In 2011, the SNCU entered into an agreement with the SNA for sharing information. Agencies that refuse to cooperate in an SNCU investigation are reported to SNA, which may result in the SNA certification being refused or withdrawn. Vice versa, information from SNA may cause the SNCU to start an investigation. The cooperation should strengthen both self-regulation initiatives and contribute to effective enforcement.

Fair Produce Nederland

In doing so, they jointly tried to break a negative spiral in which the sector found itself at that time. Entrepreneurs were receiving low market prices for their product in the market, while having relatively high production costs - particular as compared to foreign competitors. Labour forms a significant proportion of those production costs, and Dutch labour is obviously a little more expensive as compared to Eastern Europe. Because the entrepreneurs cannot affect the market price individually, they try to increase their return by reducing their production costs. In doing so, some Dutch

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mushroom entrepreneurs unfortunately opted for dubious employment practices in recent years. (Often foreign) Workers were brought in who were underpaid (less than the applicable minimum wage). Cutting costs this way allowed them to lower their prices, which resulted in unfair price competition relative to fair employers paying full wages and benefits. This actually caused the collapse of various fair employers in the Dutch mushroom sector. Sadly enough, their bankrupt estate was sometimes bought up by one of the unfair competitors. The economic loss for individual fair entrepreneurs (and their workers) and the entire sector (including dealers and retailers) was even larger, as a result of the negative publicity that started to emerge in relation to the unfair practices.

In 2011, employers' associations, unions, and traders' organisations from the sector joined forces to set up the Fair Produce Nederland (FPN) foundation and developed a certification system for good employment practices in that sector. The FPN foundation and its certification system were explicitly established and introduced to break this negative spiral, to help eliminate unfair employment practices, and help fair employers to continue their business in a fair and profitable manner. FPN defines a fair employer as an employer who pays a fair wage and ensures a good treatment and housing of its workers. The FPN certificate must give fair employers an advantage in the market for mushrooms by persuading retailers to choose for FPN certified mushrooms. Growers and traders who meet certification requirements (such as: paying fair wages in accordance with Dutch legislation, providing good accommodation and good working conditions) are certified

The board of the FPN foundation is composed of nine representatives, who are appointed by the stakeholders. The board is assisted by an advisory council. The standards of the quality mark are developed jointly by the foundation, an independent audit body and some specialists in the field of growing, trade and employment law. The standards are based on the concept of being a good employer as defined by Dutch labour law, but the certification systems goes beyond that. According to FPN, 90% of the entrepreneurs in the sector are now certified, and many retailers only do business with certified entrepreneurs.

FNV Eemshaven

The Eemshaven port in the Netherlands hosted significant construction work in recent years, primarily because of the construction of two power stations. Due to the specialist knowledge required for the construction of a power station, and the small number of firms in the world that are able to build such a power station, the construction of one of the power stations ended up being granted to a foreign firm as main contractor. That company then brought in various Dutch and foreign entrepreneurs who, in turn, brought in their own subcontractors, who in turn may have involved their own contractors and so on, creating a long chain of contractors to sub-sub-sub-subcontractors. Within that chain - and especially in its last links - a great deal went wrong in relation to the terms and conditions of employment and working conditions of the (often foreign) workers. To prevent and address unfair employment practices, two unions belonging to the same Dutch Trade Union Federation (FNV Bouw and FNV Bondgenoten) decided to cooperate in this area under the name FNV Eemshaven. FNV Eemshaven tried different ways of improving the terms and conditions of employment of (foreign) workers. One avenue was to enter into a covenant with one of the most important contractors to cooperate on fair terms and conditions of employment (such as CBA-compliant wage payment) throughout their subcontracting chain, and including temporary workers. FNV Eemshaven also reported on compliance issues with SNCU and a similar sector authority in the construction sector ('Technisch Bureau Bouwnijverheid', TBB). In this way, as well as through legal proceedings by FNV Eemshaven and its members, firms' violations failing to comply with labour regulations have been addressed.

The coordinated activity by FNV unions is, obviously, a *form* of self-regulation, but differs from the other examples discussed in this section by being a *unilateral* rather than a multi-party[22] action. It offers an interesting contrasting example to those multi-party self-regulation initiatives for comparative purposes. Later, FNV initiated public-private cooperation between social partners and the SZW Inspectorate, which was positively evaluated by them. More cooperation between those parties is one of the suggested improvements as advised by the Social-Economic Council in its case analysis and advice[23].

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[22] Unilateral in the sense that only unions were involved, not other parties. Obviously, there were *two* unions (from the same federation) that joint forces.

[23] Cf. SER (2014). *Arbeidsmigratie. Advies 14/09*. Den Haag: Sociaal-Economische Raad. Bijlage 3: 165-201.

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Painting sector

In the painting sector, firms have already been struggling with unfair competition stemming from unfair employment practices for years. On the one hand, that is the result of the many informal work in the sector, whilst on the other hand, it is down to the ever-increasing group of foreign workers who have added to the pool of informal work or are otherwise employed through dubious employment practices. The Union Internationale des Entrepreneurs de Peintures (Uniep), the European umbrella association for painting and maintenance firms from fourteen European countries, had research conducted into competition in relation to labour costs in 2013[24].Painting the firms are increasingly experiencing competition in relation to labour costs, mainly caused by the large influx of foreign workers who are willing to work for lower wages. As a result of the pressure on labour costs, many firms have had to make some of their permanent staff redundant and hire temporary workers in their place. The firms fear that over time, they will no longer be able to deliver the quality of work they aspire.
Firms also fear a shortage of skilled workers over time; the current employment growth comes primarily from foreign temporary workers. The quality of work is an issue. A majority of the firms interviewed is pleading for registration. The sector has hosted a pilot with a registration obligation in Rotterdam. Data from various sources were pooled to identify illegal activity and enforce compliance. The sector is also taking unilateral action without the state. 'Onderhoud NL', an association of Dutch painters and related firms, is introducing a certificate known as 'the Vakbewijs', in cooperation with a general construction contractor's employers' association, 'Aannemersfederatie Nederland Bouw & Infra. A foundation, 'Stichting Vakbewijs Nederland', was created in 2012. The 'Vakbewijs' is a personal card that workers in the construction industry can use to identify themselves and prove their qualifications.

ID12

A similar initiative along the lines of introducing a worker ID card is ID12, an ID card based on the Swedish example, ID06. ID06 is a private system that has been introduced in a number of Scandinavian countries at the request of different sectors, where it successfully works to prevent illegal labour, tax and levy evasion, and unfair competition[25]. The Dutch state decided to consider introducing an ID card of this type in the Netherlands, given the problems with dubious employment practices[26]. A pilot in the mushroom sector started on 1 January 2014. Details that may be included on the card are the employer's and the employee's name and address, citizen service number ('BSN'), employment permit, training records and (if applicable) a Declaration of Independent Contractor Status ('VAR') for the self-employed. An evaluation of the pilot is scheduled for December 2015. Social partners in the construction sector are considering to introduce the initiative in the construction industry.

Cleaning industry

In January 2013, the employers' organisation for Cleaning and Business Services (OSB) has also introduced a certification system. The sector was facing various development such as declining cleaning budgets, increasing price competition and short-term contracts. To ensure sustainable market conditions, it introduced a certification system to show that a company is reliable and places a high emphasis on quality. The quality mark incorporates three components and is largely based on existing standards. Firms need to comply with the aforementioned NEN 440-1 standard, and the Code for responsible market conduct. A number of cleaning-specific requirements also apply. To become and remain a member of OSB, the company must possess the OSB certificate. Here we see a unilateral action by an employer's association to prevent dubious employment practices.

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[24] Marketing Consultancy bv (2013). *Competition based on labour costs.* Commissioned by UNIEP.

[25] *Kamerstukken II 2012/13*, 17 050, 427. Kamerbrief van 17 maart 2013 van minister Asscher aan de Tweede Kamer over misbruik en oneigenlijk gebruik op het gebied van belastingen, sociale zekerheid en subsidies

[26] *Kamerstukken II 2012/13*, 29407, 173. Kamerbrief van 10 juli 2013 van minister Asscher aan de Tweede Kamer over pilot ID12 in de champignonsector.

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3   Conceptual framework

We developed a conceptual framework to analyse such self-regulation initiatives from the desk research on them, as well as the more extensive interaction we've had with FPN on their development and the need for a stronger knowledge base on such initiatives. We distinguish four main components:
1. The chain of production/service and its actor constellation;
2. The initiative to address the issue;
3. The organisation of the self-regulatory effort;
4. Certification.

3.1   The chain

Regulation of entrepreneurs in general, and regulation to stimulate their good employment/contracting practices in particular, is typically a case of multi-level governance: regulations and actions of several actors at different levels influence each other. An initial component of analysis is therefore to explore the field, its actors and their relations in a sector. What are the typical links in the production/service chain, and what does the actor constellation look like?

In the mushroom sector, for example, it is useful to analyse the entire chain from production up to and including sale to consumers. The following types of actors are involved:

1. *workers;*
2. *producers;*
3. *dealers;*
4. *retailers;*
5. *consumers.*

Growers do not sell mushrooms directly to consumers, but to dealers, which they then sell on to retailers, who ultimately sell the mushrooms to consumers. While the problem to be addressed was merely the employment practices of producers, the FPN initiative sought to change their behaviour by changing the market downstream. If dealers, retailers and consumers would want to exclusively buy from certified fair employers, the price competition from unfair competitors would effectively be eliminated. Producers could choose to use fair employment practices and be certified, or find it hard to sell their mushrooms. Inclusion of those other parties further upstream in the chain thus was an essential ingredient to the FPN initiative. Certification systems will be stronger as more parties change their decisions (in particular, their purchases) based on certification (or the lack thereof).

3.2   Initiative

The literature contains different definitions for self-regulation. Self-regulation at the very least implies that, at one point in time, one or more parties decide to address an issue by creating regulation. The issue is usually negative effects from market (or state) failures. We consider it important to understand why actors came into action. One the hand, we want to understand the (perceived) negative effects of market and state failure that actors want to address. On the other, we want to know why and how these actors came into action. Who has taken the initiative to self-regulation? What was the position of other relevant actors? Which alternatives were considered, and by who? How did one finally arrive at the particular type of initiative that emerged? What commitment and investment (in terms of time and money) did various actors offer? The initial phase often offers a lot of insight into both perspectives on the problem and the conception of control from which this particular initiative seems worthwhile.

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3.3   Organisation

The third component of the analysis relates to the organisation of the initiative in the particular shape it ended up taking. Is it a unilateral or joint initiative? If joint, which actors are involved? How is the initiative funded? Who makes which decisions? Does the initiative involve certification in some form? Does it include some form of firm review?

3.4   Certification

In general, there are various instruments that self-regulation can use; Baarsma[27] mapped out 22 different ones. She distinguishes five clusters of types of instruments from the users' perspective. Baarsma defines certification as an 'informative instrument' that is often chosen when the market is disrupted by information asymmetry between the supplier and the consumer. That applies here: the customer does not even know which firm has grown the mushrooms when buying a basket in their supermarket, let alone that he/she would know how that firm treats its workers. Certification offers customers more information to use in their purchasing decision – with FPN, the can now choose to exclusively buy mushrooms from certified fair producers.

When analysing certification, we distinguish three components to analyse:
1. *standards;*
2. *certification system;*
3. *value.*

The three components are obviously related and influence one another. We will discuss them briefly in the following sections.

3.4.1   Standards

The basis of certification is that parties lay down standards that must be met to be certified. The reason to want to be certified is to distinguish yourself from others (product, services, firms or people) who are not certified.

Certification implies that standards have to be agreed upon. It is important to know both who sets these standards, and what they are. One would expect a union to come up with a different set of standards than an employers' association, unilaterally. Which parties have a vote? What is the process according which standards are set (and possibly modified later). Is their feasibility for the target group (here, usually enterpreneurs) being taken into account? And their enforceability?

Regarding the standards and their content, an important is issue how demanding they are. Are they easy to meet or very hard to meet? Labour standards could for instance merely mirror minimum legal requirements, or could include requirements from collective bargaining agreements and beyond. Easier standards may help the adoption of a certification system and allow the system to become relevant. But higher standards will make the certificate more worthwhile for those who do achieve it, as they will have distinguished themselves from a larger group of others that fail to meet. That is …
as long as relevant others (such as customers) do know and recognize the certificate. If not, is has little value
And do I have to meet each and every individual standard? Or can I fail to meet one but make up for it by going above beyond the required level on another standard?
This also begs the question of scope. Do the standards limit themselves to a core domain (i.e. wages)? Or do they cover not just an entire domain, but even cover related ones (i.e. not just all labour conditions, but also housing and sustainability).

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[27] Baarsma, B. e.a. (2003). *Zelf doen? Inventarisatiestudie van zelfreguleringsinstrumenten.* Amsterdam: Ministerie van Economische Zaken.

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Standard development also has to deal with competition or anti-trust law. In the Netherlands, the Authority for Consumers & Markets (ACM) in a general sense is responsible for promoting opportunities and options for firms and consumers. It ensures fair competition between businesses, and protects consumer interests. Self-regulation must pass its tests.

3.4.2   Certification system

No certificate can be awarded without a certification system. If I give myself a label, we don't consider it certification. There has to be another party involved. Probably the simplest form is that that there is a club I can join (i.e. an employer' association). I may only have to register and pay a contribution to achieve their membership certificate. But I will also have to follow their rules in order to keep it. And the club may have more extensive membership requirements, as we saw in the OSB case in section 2. I might even need to have my firm audited in other to get certified.

We discussed the standards themselves separately in section 3.4.1. Here, we focus on the process of getting certified. What do I need to do to get certified, what is the method of certification? Do I just fill in a questionnaire, or am I being audited. If so, by who, and what information and access do I have to give them. Is there just one audit before entry on a moment that I choose? Of can I be audited at any time? And, if I have been certified, what do I need to do to keep my certificate? Am I being monitored, and in what way(s)? And in what ways can I be de-certified?

An organisation must be responsible for this certification process. Who is the assigned organisation? Is it a unilateral organisation or a multi-lateral on, consisting of various stakeholders? If an organisation accredited by the Dutch Accreditation Council should typically make the quality mark more powerful.

A good case analysis includes:
- *a retrospective analysis of the motives, debates and ultimate choice of this specific form of testing or testing process between all actors concerned (the basic principles);*
- *the same also applies to the specific operationalisation (the details, such as the choice of the auditing party);*
- *an evaluative analysis of current practice (how do all of those parties currently view the initial experiences);*
- *options for reviewing and/or optimising the chosen system.*

As far as the basic principles are concerned, the establishment of a joint foundation of the main stakeholders in the sector and its production/service chain often is an essential component. As far as the certification method, the choice for audits is an important one. An audit is a more reliable (but of course also more elaborate) instrument than self-reporting by the entrepreneur. But a pre-announced audit is probably less reliable than an unannounced one. And a one-off inspection before the certificate is awarded is probably less reliable than a certification system that includes continued monitoring and repeat visits. If audits are chose, a relevant choice is who will perform the audits. Are they a form of peer review, are they done by personnel from certification organisation, or are they performed by independent contractors? The emergence of self-regulatory systems as discussed in section 2 has create a market in the Netherlands for specified certification firms, of which VRO certification was one of the first, but is no longer the only one.

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3.4.3   Value

The aim of certification is to positively distinguish the party that is being certified from others that lack the certificate. Certification thus has value. We should distinguish between private and public value.

Firstly, certification has private value to the person obtaining it, in our case usually the entrepreneur. There are two ways in which value can be created. Firstly, rules and regulations can exclusively grant certain advantages or disadvantages to the (un)certified (without a driving licence, I am allowed to have a car but not drive it).
Secondly, a quality mark may informally increase the (possibility of) certain advantages or disadvantages (without a Fair Trade certificate, some consumers won't buy my coffee). A central aspect of the private value here is that they should help my market share. Customers will more readily choose for me because the certificate enhances their trust in my firm. Or customers will avoid uncertified competitors, and some of them will then turn to me and my firm. Theoretically, this (perceived) value should be high enough to at least offset and preferably outweigh the costs that certification brings. Remember that these are forms of self-regulation, which means that firms usually pay at least part or even all of the costs of not just their own certification, but the entire certification system as well.
(Private) Value can thus come from more than one source. In the driving licence example, it is created by the state; for Fair Trade products, the Fair Trade certification systems enables consumers to exclude some products from consideration.

(Private) Value is also necessary for any certification to survive long-term. If certification does not have value, no one will try to obtain it. If no one tries to obtain it, nobody will know the certificate, and it will not have any actual value in practice. Vice versa: if a certificate has value, more entrepreneurs will try to obtain it, which means that it will be recognised and can actually become relevant in the relevant markets. If many have tried, and some failed, the certificate apparently does make a distinction.

Secondly, certification – in particular certification aimed at combatting and preventing unfair employment practices - must have public value. The certification systems that interest us here, were introduced as a way of preventing unfair competition by dubions employment practices. The public value of such (private) systems would lie in achieving their intend result of reducing unfair employment practices and increasing market share and profitability of fair employers.

4   Conclusion and discussion

In recent years, various self-regulatory initiatives to combat dubious employment practices (and the unfair competition stemming from them) have emerged in the Netherlands. We hope to be able to analyse some of them more extensively with the conceptual model we proposed in section 3. We hope such an analysis would help in establishing a body of knowledge to benefit practitioners involved in such initiatives, as well as elaborating the conceptual model.

That there, apparently, is both room and a perceived need for such initiatives in the Netherlands, is at least partially caused by stagnation on alternative measures. There is an obvious public task in governing markets to allow them to flourish, and the perceived growth of unfair employment practices would might indicate some state failure as well as market failure. Neoliberal policy tendencies in recent years surely have not created a high appreciation and ample funding for public agencies that inspecting firms, such as the SZW Inspectorate. That inspectorate has in fact been helpful in uncovering the negative spiral in the mushroom sector through some reports and specific policy attention. It also, unfortunately, found that some dubious employment practices are difficult to detect and even harder to prove in court.

One specific example of the prevailing political sentiment concerns the notion of a public permit system. The abolition of the previous legally required permit system for temporary employment agencies was in fact one of the 'flexibilisation' highlights in the Dutch 'Flexicurity' social pact in the

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nineties. This is what employers gained, while returning a collectively bargaing and later legally adopted system that would give temporary employment works more employment security with rising tenure. One obvious fear at the time was that illegal employment brokers ('*koppelbazen*') and illegal employment practices would grow. Since, the government has refrained from re-introducing a public permit system for the temporary employment sector (or another sector at risk). But the discussion about a permit system re-emerges on a regular basis. The current Secretary of State on Social Affairs and Employment has recently questioned whether self-regulatory initiatives are effective enough[28].

A key point is the somewhat strange demarcation of responsibilities for compliance. Even though most Dutch collective bargaining agreements (CBA) are declared 'binding' by the state to extend their coverage to all firms and their workers in that sector (regardless of their membership of any employer's association that signed the agreement), public compliance investigations are limited to legal transgression. If the inspectorate finds you pay the minimum wage but not the CBA wage, it could not do anything. Social partners (employer's associations and unions) are responsible for implementing and enforcing CBA, but this has mostly remained limit to unions helping their members with individual complaints about transgressions. This demarcation may stem more from a desire of the social partners – and obviously the employers in particular - to keep the state out of this field, than from any state choice on the matter. To some extent, self-regulatory efforts from employers might even partially be motivated by the wish to actually prevent the state stepping in: it's better to self-regulate than to be regulated (by a new public permit system, for instance).

The sense of urgency concerning dubious employment practices in the Netherlands has grown in recent years. And it not only leads to an emergence of self-regulatory initiatives, but also to an intensification and innovation of public policies. In 2010, the EU labour migration project[29] began taking measures to prevent exploitation by rogue employers: improved recording of EU citizens, informing economic migrants about their rights and obligations and facilitating good accommodation. To combat rogue employment agencies, in 2012 a separate programme was developed with an action plan[30]. With the free access for Romanians and Bulgarians to the Dutch labour market since 1 January 2014, an increasing influx of economic migrants was expected, which might increase downward pressure on employment conditions. The action plan has resulted in a Legislative Proposal ('Wetsvoorstel Aanpak Schijnconstructies' or WAS), which was submitted to parliament on 12 December 2014, and passed both its houses in the summer of 2015. The WAS includes various measures for preventing entrepreneurs from bypassing legislation and collective labour agreement agreements by faking employment or contraction relations. For example, chain liability applies to salary, implying that not just the employer but also the employer's client may be held liable for paying the full salary and benefits under the applicable CBA. Employers must also pay the full minimum wage and do so by Giro. They cannot make any deductions on the minimum wage, or pay part of it in the form of expenses. If an employer is suspected of not observing the rules and regulations, employers' organisations, trade unions and the SZW Inspectorate will share information. And earlier plans will be realised in order to 'name and shame' unfair employers: the SZW Inspectorate will divulge names of inspected firms that have committed transgressions such as underpaying their staff.

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[28] *Kamerstukken II 2013/14*, 17050, 473. Brief van 12 mei 2014 van minister Asscher (SZW) aan de Tweede Kamer over de aanpak van malafide uitzendbureaus en zelfregulering.

[29] *Kamerstukken II 2010/11*, 29407,118. Brief van minister Kamp (SZW) van 18 april 2011 aan de Tweede Kamer inzake vrij verkeer van werknemers uit nieuwe EU-lidstaten.

[30] *Kamerstukken II 2010/11*, 29407, 132. Brief van minister Kamp (SZW)van 23 november 2011 aan de Tweede Kamer inzake vrij verkeer van werknemers uit nieuwe EU-lidstaten.

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While public policy on employer compliance with regulation might have some obvious advantages in effectiveness above private initiatives, they nevertheless remain an interesting case on their own. At the heart of the matter is what is fair. If the majority of a business community is convinced that fair – for workers and firms – is to play by the rules (both laws and those negotiated in the sector) and acts according to this conviction, it at the very least increases the chances of public compliance policies being successful, and might go a long way towards preventing unfair employment practices. And while they are themselves a matter of public policy, policy changes

included in the WAS (such as chain liability) might in turn reinforce self-regulatory initiatives in this field. It becomes part of my business to be able to trust the employment practices of my suppliers

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Preventing mismatch? A regional labour market pilot.

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Abstract. In 2013 the Centre of Applied Labour Market Research (Kenniscentrum Arbeid, KCA) has developed a method for data collection to get an insight in employer's future demand for staff. The method is developed to contribute to solve an action problem in the Eemsdelta region. Despite indications of a threat of shortage of technicians in that region, none of the regional actors undertakes action. They miss detailed information about the employers' future demand for staff. To be able to take tailor-made measures, the actors must have a proper idea of the labour market problems which can be traced back to company level. For each job opening must be clear to which profession it is related and to which educational specialism and educational level. These information appears to be not available. For employers it is, understandable, difficult to estimate their future demand for staff, because a lot of uncertain factors influences that need. Especially SME's who often don't have a HR-officer are missing the knowledge and time or money to invest in making a future picture of their need for staff. And data from existing labour market information sources can't be translated well at regional or local level, never mind at company level. Without detailed information about the future employer's demand for staff, possible problems stay latent. There is no sense of urgency for the employers to take action and the regional policy makers are missing information to develop specific educational and labour market policy. To get the needed detailed information, it has to be obtained from the employers themselves, at company level. During a research pilot in 2013 KCA has designed a method for data collection and practiced it with nine companies in the Eemsdelta region. The results indicate that the method works. In a relatively labour-extensive way the needed information can be obtained. At company level it gives the employer insight in his actual and future staff requirements and makes him aware of possible problems. As regards to the policy makers, the pilot was too small for a complete regional picture, but it demonstrates that the anonymised data of the individual companies can be merged to one umbrella data-file. From that file analyses can be made to find trends and possible problems at the labour market, both at regional and sectoral level and to obtain input for developing effective policy. The successful results of the pilot offers good reasons for a follow-up study with much more companies and to develop the method into a complete labour market monitor, by broadening the method with data about the labour supply and data of new employers.

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1 Introduction

Discrepancies on the labour market may cause problems for the actors. Depending on the problems, they will choose a strategy to try to prevent the problems, or in any case to limit adverse effects. Employers in the Eemsdelta region – roughly the area encompassing the 'DEAL' municipalities: Delfzijl, Eemsmond, Appingedam and Loppersum - were faced with the threat of shortages of technical workers over five years ago. That threat resulted in and was confirmed by an employers' survey conducted by regional employers' organisation Samenwerkende Bedrijven Eemsdelta (SBE). That information was not specific enough, however, to take direct action. Most employers don't understand or don't sufficiently understand their future staffing requirements, so they are unaware or not sufficiently aware of the scale of the problems that pose a threat for their individual company, and the precise positions/jobs it relates to. Without that necessary information, there is no sense of urgency to take action, or the necessary specific understanding to be able to take direct measures. With the lack of such a specific understanding of employers' demand for staff, the regional policymakers are also missing the necessary information to be able to develop specific educational and labour market policy with and on behalf of those employers.

There is therefore an action problem – despite recognised indications of a threat of shortage, it is difficult to achieve targeted policy – resulting from a lack of (company and job-specific) information ("names and shirt numbers", according to a local alderman). As an intervention and possible contribution to resolving the information gap and therefore helping to break through the regional actors' action deadlock, the Centre of Applied Labour Market Research (KCA) at Hanze University of Applied Sciences, Groningen has designed a method for data collection. The primary aim of the method focuses on individual employers, to help them to gain an understanding of their current and future demand for staff. The secondary aim is collective: by collecting and aggregating that information on behalf of several companies, the necessary detailed picture is created, which labour market actors are able to use to take direct action – both individually and together. The method was developed and simultaneously tested in practice during a pilot project in the Eemsdelta (Van Lieshout, Geling & Scholing, 2013).

In this paper, we will study the research during the pilot in detail. We will discuss the background to the information problem and the resulting action problem, and how, from those problems, the specific design and operationalisation of the data collection method was developed. Paragraph 2 deals with the main actors, their interests and the perceived labour market problems. The paragraph is concluded with the formulation of the draft question that forms the basis of the development of the data collection method (2.5). In paragraph 3, we outline the specific labour market problems in the Eemsdelta region. In paragraph 4, we then back up our reason for choosing the applied method. We discuss the specific operationalisation of the method in paragraph 5, before finally reaching our decision with a number of conclusions in paragraph 6.

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2   Action problems on the Regional Labour Market

2.1   A few Labour Market Concepts

The formal labour market is all the demand for and supply of paid labour. The demand for labour is heterogeneous. Employees and potential employees differ significantly from one another in terms of their knowledge and expertise, and jobs differ significantly in terms of the knowledge and skills they require. As a result, the labour market is differentiated and segmented. The market is divided into a large number of segments containing different job groups and jobs (horizontal differentiation) that may vary in terms of level or job and educational level (vertical differentiation). Different qualifications are required for all those different jobs and levels. The term 'qualification' is used in different ways in practice. We follow Van Lieshout, who assumes Hövels' interpretation (in Lieshout, 2007), in which he makes a distinction between available qualifications, essential qualifications and achieved qualifications. The available qualifications are the skills that an employee possesses and the essential qualifications are the duties that an employer wishes to have carried out. The interaction between both then forms the achieved qualifications. Van Lieshout follows Hövels by regarding the term 'qualifications' as a reference to the relationship between a person and a situation, or as the result of the interaction between supply and demand. On the one hand, the qualifications offered by the employee (the skills he has), and on the other hand, the duties that a job and therefore the employer requires. With Van Lieshout (2013; 44), we refer to the qualifications offered as 'skills' and the required qualifications as the 'job requirements'.

The educational institutions are important suppliers of the labour supply. They are responsible for new entrants the labour market (initial education) and for maintaining the level and/or supplementing the qualifications of the existing labour supply (post-initial education). With the labour market as a significantly differentiated market, the educational market has also been differentiated with a wide range of educational specialisms and levels. Employees and potential employees select a study programme from that differentiated range of study programmes, and the possibility of getting a job afterwards plays an important role. Due to all kinds of economic and social developments, the demand for labour is subject to change. That change may be of a cyclical nature, which means that there is more or less demand for certain qualifications at a particular time, but the demand may also be subject to structural change, because a certain profession or even sector disappears and with it, also the demand for qualifications that are required for those jobs. It will not always be possible to match the supply directly to that changing demand. The existing supply on the labour market is not sufficient or insufficiently mobile to meet that changing demand and the training of new supply takes time — an average professional study programme takes four years to complete. In practice, supply and demand do not therefore always match each other, thereby creating discrepancies in the labour market. In section 1.4, we look at the discrepancies that may develop on the regional labour market in further detail and the consequences of these discrepancies for the actors.

2.2   Actors and their Interests

In order to gain a good understanding of the action problems that have developed in our practical example of the Eemsdelta, in this paragraph we will discuss the actors concerned and their interests. The first group relates to the employers. Their interest is having the ability to possess sufficient employees who are as well-qualified as possible. As we discussed earlier, employers' demand for labour is changing over time as a result of all kinds of developments — both internal and external. External developments such as the economic crisis, increasing competition, technological innovation or more stringent regulations may change the demand for a particular product or service, causing a company to change what it produces. A company may intensify or reduce its business activities, set up the manufacturing process or workflow differently or start to develop completely new business activities. With changes in business activities, the necessary labour is also changing. The labour demand may change depending on the type and level of necessary qualifications, but also the

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number of necessary employees. Internal developments may also affect the employer's demand for labour, because employees leave, either voluntarily or involuntarily, or due to natural turnover. With the departure of employees, certain professional qualifications disappear from the company and it may be necessary to replenish them. When that gap opens up, it can be translated into one or more vacancies. The employer may then fill the vacancy internally, such as by training current staff, for example, or by means of internal flow-through. Whenever internal implementation doesn't work or is undesirable, the employer may decide to advertise the vacancy externally and attract new employees from the labour market. The employer will always try to draw the best candidate from the market for him, preferably at as low costs as possible.

The extent to which the employer succeeds in this depends on the labour supply, which is how we arrive at the second group of actors that we differentiate from our practical example on the regional labour market, the employees and potential employees. An employee's decision to put himself forward for a vacancy depends on all kinds of factors such as his qualifications, for example - to what extent do they match the vacancy and which ones does he want to be able to use in his work -, the employment conditions offered, preference for a particular sector or type of organisation, the number of hours that he wants to work and travel distance. Because employers prefer to look for the best qualified people, the chance of getting a job is mainly determined by the extent to which a person possesses professional qualifications. In the Netherlands, a diploma at havo (upper general secondary education), vwo (pre-university education) or mbo (upper secondary vocational education) level 2 or above counts as a necessary basic qualification for standing a real chance of getting a job. In addition to the learning obligation up to age 16, a qualification obligation therefore applies to young people until they have obtained a basic qualification or until they reach the age of 18. As employees become better qualified, their job prospects will increase. The development into a knowledge economy and society has reinforced the importance of qualifications. It's not just about obtaining a qualification once, but also about constantly improving or supplementing that (life-long learning). The professional qualification is still the main indicator for many employers that someone possesses particular knowledge and expertise.

The differentiation on the labour and educational markets and the changes that occur in supply and demand result in supply and demand not always matching. The consequence is that some employees are unemployed because there is insufficient demand for labour, or because their qualifications don't match those required for existing vacancies. Social provisions exist for those employees, which leads us to the third group of actors that we distinguish on the regional labour market, municipalities and the Employee Insurance Agency ('Uitvoeringsinstituut Werknemersverzekeringen', UWV). UWV an autonomous administrative authority commissioned by the Ministry of Social Affairs and Employment (SZW) to implement employee insurances and provide labour market and data services. As bodies responsible for implementing the various social security provisions, their aim is to prevent unemployment on the labour market or to reduce it as far as possible. Over the past few decades, more and more duties and competences in the field of employment and social security come have transferred from the national government to the municipalities. Since the economic crisis in the 1980s and the mass unemployment, a prevalent thought has been that a regional policy approach is necessary in order to be able to tailor policies to regional needs and stimulate coordination of supply and demand on the labour market. Recent legislation makes the municipalities increasingly responsible for welfare benefit recipients and for helping disabled people to find a job. Based on that responsibility, municipalities are interested in a regional labour market that works properly in which there is sufficient demand for labour (vacancies). That doesn't appear to be so simple in practice. Reducing the benefit payment by helping job-seekers to find paid work has a greater chance of success for the unemployed who have a minimum distance to the labour market, because the employer is looking for the best candidate for his

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vacancy. However, the municipalities in the Eemsdelta region have a large database of long-term unemployed who are far removed from the labour market. Also there is the legal obligation to support more disabled people in finding paid work. In practice, we are therefore able to see a difference in interests between employers and municipalities. Where municipalities have an interest in helping as many job-seekers as possible to find a job, especially those who are disabled, it is in employers' interests to find the best-qualified candidate for a vacancy.

2.3   Labour Market Discrepancies

Discrepancies on the labour market are often the result of mismatch problems between educational and labour markets (cf. Van Lieshout, 2007: 59-63). Discrepancies between education and labour always manifest themselves as discrepancies on the labour market; but not all labour market discrepancies are caused by a mismatch with the educational system. In the Netherlands, two useful typologies have been developed. The first is the Van de Grip typology (in Van Lieshout, 2007), in which a distinction is made between quantitative discrepancies (differences in scale of supply and demand) and qualitative discrepancies (as a result of heterogeneity in supply and demand). The second is the Van Hoof and Hövels typology (in Van Lieshout, 2007), in which the actor adopts a central role, a starting point that is in keeping with the actor-centred approach that we adopt in our labour market study. The Van Hoof and Hövels typology explains labour market discrepancies by starting with the perception of the actor who faces the problem. According to Van Lieshout (2007: 62-63), the relevance of this typology lies in showing that matching problems may occur at different levels, that a problem may also have different sides and that the different types of problems may overlap one another. The typology distinguishes between five types of problems:

1. Absorption problems: the number of job openings and school leavers doesn't match and results in long-term unemployment.
2. Staffing problems: employers are unable to find suitable candidates to fill vacancies, whereby the cause is quantitative in nature.
3. Qualification problems: employers are able to fill vacancies but the candidates do not meet the requirements. In this situation, a quantitative problem is avoided, but instead a qualitative problem has been created.
4. Distribution problems: job opportunities are unevenly distributed between different groups of employees.
5. Utilisation problems: the employee is unable to utilise his full potential in education, training or experience.

Viewed from this profile, we are trying to explain the Eemsdelta's labour market problems in practice in further detail. A combination of a number of economic and social developments places the actors in the Eemsdelta in front of necessary challenges in relation to the labour market. Over the past few decades, economic activity in the region has increased significantly (Bureau EZ Eemsdelta, 2012). At the same time, the region is facing a dwindling professional population. Young people are leaving the region and the number of older people is on the increase. The region is also struggling with a low level of participation among the professional population. The region has a large number of unemployed job-seekers (Gardenier et al, 2012). The intake into technical education is relatively low, resulting in a small outflow of school leavers. The regional labour market is therefore simultaneously contending with above-average unemployment (Gardenier et al, 2012) and an expected relatively large number of future vacant positions for technical positions in particular (Van Lieshout, Geling & Van Emst, 2012). The fear of staff shortages formed the reason for several actors in the region, including regional employers' association Samenwerkende Bedrijven Eemsdelta (SBE) and the Seaports Xperience Center (SXC), to map out the expected problems on the labour market. For this reason, in 2008 and 2011, employer surveys were conducted into the expected demand for staff for the period up to 2020. The results are showing an increasing threat of a shortage for technical jobs in

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particular (see also paragraph 3). The concern that it will no longer be possible to fill the sometimes long-term vacancies anymore was therefore confirmed. The discrepancy therefore manifests itself in the Eemsdelta in problems at the employer's level because it no longer threatens to be able to meet their staffing requirement. According to Van Hoof and Hövels' typology, there is a staffing problem.

2.4   Information problems

Employers can choose different strategies to prevent or limit the expected staffing problems. An initial option is internal training and to actively encourage mobility. By training current staff, he can create transfers and thereby fill the vacancies that have been created. If the extent remains the same, that results in another vacancy, however, generally at a lower level. A (different) vacancy will therefore have to be filled externally. If that appears to be difficult, the employer may decide to amend his recruitment strategy, by going to look in a wider region, for example. If that offers insufficient solace, he can opt for further-reaching strategies such as offering more salary or changing the way in which labour is organised in such a way that there is no vacancy or there is a vacancy that is easier to fill.

Except for at the employer's level, measures can also be taken at another level to combat the staff shortages or expected staff shortages. One option is to create a greater influx of qualified workers into a labour market segment through the initial education system. A disadvantage to this option is that an average professional study programme takes four years to complete and therefore in the short term, does not offer any solace for the employer, who expects staffing problems either now or very shortly. Municipalities and UWV also have an interest in measures. For them, shortages offer opportunities to reduce their database of job-seekers. As we discussed earlier, the Eemsdelta has a long-term database of workers who are often insufficiently qualified, and retraining or additional training is therefore necessary to be able to successfully mediate on behalf of the job-seekers.

Despite the threat of staff shortages and the opportunities to intervene, we can see that the actors in the Eemsdelta region are failing to take action. The employers appear aware of the problems that pose a threat, and did a small survey through their regional employers'' association, but stopped short for further actions. Municipalities and the UWV, for whom the expected shortages are an opportunity to reduce their database of job-seekers, are not achieving policy measures. The underlying problem appears to lie in the information gap. Choosing and designing a targeted solution strategy requires more detailed understanding of the specific problem and that understanding is missing. What is necessary in terms of understanding the companies' expected demand for staff. Previous employer surveys have provided information about this, however, but it is not sufficiently detailed. Level of education and job level are only designated as lower, higher or middle in these surveys, which is insufficient to determine the specific jobs and corresponding requirements in question. Employers do understand their current requirements; insofar as no problems occur when meeting those requirements, they don't feel the need to take action. They often don't have a specific idea of their future staffing requirements; the dependence on all kinds of internal and external factors and the conjunctural sensitivity of the economy and the labour market make it difficult to make specific predictions. The information possessed by the companies to be able to make a somewhat backed-up prediction is spread across various staff members and sources in the company and is often not translated specifically into a long-term staff plan, for example. The smaller and medium-sized firms (SMEs) in particular do not have a separate HRM position and don't have the time and/or expertise to formulate such a plan. It is often too expensive to consider hiring in an external agency. As long as no specific problems manifest themselves in their provision of staff and potential problems are not made visible in concrete data, an employer will not see the need to take action.

Municipalities and the UWV also need that insight into expected staffing requirements in order to be able to take targeted measures. In order to be able to fulfil their responsibility for job-seekers, as well as their wider responsibility for a regional labour market that operates properly, they need information

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in order to be able to develop policy. Municipalities need specific information about employers' personnel requirements, preferably at company level, so that it can be seen with the employer whether and how candidates from the database of job-seekers are able to fill the vacancies. Understanding of the demand for staff is also necessary in order to be able to develop training policy. Because given the qualitative connection problem of the database of job-seekers that often possess no or too low qualifications identified earlier, effective ways of combating unemployment only seems to be possible with specific training measures. But specific training policy requires detailed understanding of the demand for labour, or concrete information about employers' staffing requirements in terms of a specific professional qualification.

Despite the concern about shortages of technical staff, which are confirmed by the results of employer surveys, both employers and municipalities in the Eemsdelta region are failing to take action. The crux of that action problem therefore lies in an information gap. Initially, the information problem is resulting in individual employers not being or being insufficiently aware of the threat of labour market problems in practice and therefore not taking any preventative measures. Secondly, they are aware of a problem, but are missing detailed information to formulate a specific solution strategy. Because the employers themselves do not have a good idea of how their demand for labour is developing, it is not easy to create effective labour market and training policy at regional level for public and private labour market intermediaries (municipalities, UWV, educational institutions) either.

2.5   Draft Question

Breaking through the action problem seems to lie in resolving the underlying information gap in relation to employers' current and expected staffing requirements. The employer surveys conducted earlier in the region have not delivered sufficient detailed information. Existing labour market information sources do not appear to be able to meet the necessary information requirements at regional and company level, as revealed by a study by the former Council for Work and Income (Raad voor Werk en Inkomen) (Folkeringa, Grijpstra, Klaver and Verhoeven, 2012). That means that the necessary information must be generated in practice and that may be best with the employers themselves, but now they don't have that information to hand and (for the time being) are not mapping it out either. Existing staff scheduling and strategic staff scheduling tools require more money, time and expertise than many employers have or want to bring in for that purpose – especially if they are not yet aware of potential problems (see also paragraph 4.2). There is therefore need for a method, other than the existing one, to generate that information relating to the demand for staff. The complexity when developing that method doesn't just relate to the method itself, but also its implementation.

What information needs to be gathered at company level to gain a good idea of staffing requirements at both company level and umbrella level is not so difficult to map out. Much more difficult is the question under what conditions employers will be willing to supply information about their staffing requirements. Implementation of the method also requires commitment from more parties than just employers. It must be easy to generate individual company data, before combining and analysing it to create a regional labour market picture for the region and thereby offer a basis for policy makers. What's more, to get as adequate an idea of the labour market as possible, the information must be generated from as many companies as possible. Collecting the necessary company data is therefore a very labour-intensive job and therefore expensive. That requires the parties to be willing to invest in this.

The draft question actually relates to the development of a type of project consisting of a method for collecting data plus a way of implementing it that should satisfy the necessary conditions. A type of project with which an objective should be achieved at two levels. Initially that objective is action-oriented; the employer must be 'tempted' to map out his future staffing requirements. Secondly, the

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objective lies on the level of knowledge, whereby the method must deliver sufficient information for regional policy makers, as well as for the employer. That means that it's not sufficient just to gather information at company level, but that on the basis of that individual company information, a cross-company (regional and/or sectoral) image is also generated. As a main question to this draft question, the following question has been formulated: What type of project can (particularly smaller to medium-sized) employers be 'tempted' with to generate detailed information about their current and future staffing requirements, in order to be able to create a company and cross-company picture of the labour market discrepancies to be expected on the basis of this?

The research that we have conducted on the basis of this draft question has been set up in the form of a pilot project in which the data collection method has been determined and simultaneously tested in practice with nine companies from the Eemsdelta region. With the pilot, an answer has been sought to three sub-questions, in order to ultimately come up with a good design for the intended type of project. The first sub-question focuses on the knowledge objective and therefore on the method itself and says: What is the minimum information required and how can it easily be generated? This question focuses on the more substantive and technical design of the method. It must be easy to gather and analyse the data from the different companies to come up with an overall picture. The second sub-question answered with the pilot project focuses on the action objective. As previously stated, employers must be 'tempted' to map out their future staffing requirements. Data must also be generated from as many companies as possible. That demands that considerable time and costs are invested by both employers and researchers. The second sub-question therefore relates to the implementation of the method, whereby it relates to its feasibility: How is the method manageable in terms of time and costs and is there (political) willingness to invest in it? Finally, the extent to which the method actually delivers results is important for the draft question. The third sub-question therefore relates to: Does the type of project developed work in practice and does it deliver what is intended? Does the type of project deliver willingness among employers to provide the necessary information and does that information then deliver the necessary basis that is required for the actors to be able to act.

3   Information Gap in the Eemsdelta region

In this paragraph, we are studying in further detail the information gap that forms the basis of the action problems on the labour market in the Eemsdelta region. The threat of staff shortages form the reason for mapping out the expected problems on the labour market in the Eemsdelta region. In 2009, a report was published in response to a labour market study conducted in 2008 into the expected demand for staff for the period 2008-2020 (Dijk, 2008). The result of the employers' survey, commissioned by regional employers' association Samenwerkende Bedrijven Eemsdelta (SBE), distributed among 72 members, was an expected substantial demand for replacement and expansion. The response is 52% (37 of the 71 companies). The members expected to attract 1745 new people, of which 80% of the vacancies were technical in nature. The results of this labour market study deliver general data, namely the expected number of job openings in technical and non-technical positions, divided into vacancies at three training levels: lbo (lower secondary vocational education), mbo (upper secondary vocational education) and hbo (professionally oriented higher education) level. A side-effect of the results is that they contribute to the awareness of employers and other stakeholders in relation to the expected problems in the future provision of staff.

In 2011, KCA was commissioned by SBE, the Seaports Xperience Center (SXC) and the Technology Education Labour Market Groningen Eemsdelta Task Force (Taskforce Technologie Onderwijs Arbeidsmarkt Groningen Eemsdelta, TTOA) to conduct a similar labour market study. The clients require an up-to-date understanding of the future regional demand on the labour market. Based on

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the wish to be able to compare data from 2008 with the results of the new labour market research that is to be conducted, a similar structure is being chosen as that of the employers' survey from 2008. The research group is being extended and the expected new vacancies are being requested in particular, divided into demand for expansion and replacement. The demand for expansion concerns the vacancies you expect as a result of the company's growth. With the demand for replacement, it concerns vacancies that are created as a result of employees leaving. In the survey, the job levels are described in further detail: higher (management and the board within organisations), middle management (manages the implementing staff and forms the link between the shop floor and the management of the organisation) and lower (implementing staff). These data are gathered for three periods, namely 2011-2012; 2013-2014 and 2015-2020. In addition to the survey, commissioned by the clients in three sectors (Chemistry, Transport & Logistics and Industrial Services, Metal sector), interviews and additional desk research were also conducted.

The response among SBE members this time is 57% (51 out of the 89 companies), which is virtually the same population as from the 2008 survey. The obtained data point towards an increased expected demand for staff during the period 2011-2020, compared to the survey from 2008, with an expected peak in 2013-2014. Assuming that the average found is representative for all SBE members, it can be assumed that the expected total demand in 2011-2020 for all SBE members is 3227 job openings. Separated by level, 58% of the expected demand relates to lower, i.e. implementing level, 33% of the expected demand relates to middle management, and 9% to the higher positions. Over the next five years, the region will face a considerable outflow of technicians, whilst on the demand side, the demand for labour concentrates on technically trained staff. Two-thirds of the expected job openings relate to technical positions (Van Lieshout et al, 2012).

The results of the latest survey are resulting in an increased sense of urgency, especially among employers who face vacancies that are difficult to fill in the short term. As a result of the high number of expected job openings, concerns about future labour market problems are also increasing in municipalities, the Province and training institutions. The actors need a proper idea of the regional labour market problems, which can be traced back to company level, so that tailor-made measures can be taken for an individual company or cluster of companies. The aforementioned actors believe that collaborating with other parties has a strengthening effect when it comes to achieving results, such as increasing the intake in the study programmes, outflow from the databases of the UWV work area, increasing the quality of education and strengthening the economy (Rhoda, 2011). Opportunities and challenges that exceed the local level and demand a regional, multi-level approach. People recognise that more specific, detailed information is required than has been obtained so far by means of the survey. In order to be able to act, in order to prevent potential regional problems on the labour market, the actors are missing the necessary detailed information for each job, specified according to the educational specialism and level of education.

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4   Available Labour market Information Sources and Data Collection Methods

A lot of sources provide labour market information. An inventory research conducted in 2011 revealed a total of 119 existing labour market information sources, of which 71 are national, 32 sectoral and 16 regional sources (Witjes & Uitert, 2011). But as we will discuss in this paragraph, that data doesn't give the picture that the actors in the Eemsdelta region need. The necessary information is a detailed understanding of the companies' future demand for staff. The companies themselves often don't have that insight or only for the short time and not on the longer term. And existing tools for staff scheduling such as a long-term staff plan that can help to get insight in their future staff demand, they often don't use. In particular SMEs often miss expertise, time and money to use that tools. Furthermore, as we will also discuss in this paragraph, that tools do not always supply the correct information that is necessary for the actors to develop regional labour market policy and to take collective action.

4.1   Usability of Labour market Information sources at regional level

As mentioned above, an inventory in 2011 revealed 119 labour market information sources. The large number of sources produces a substantial quantity and diversity of labour market information. Over the past few years, the need for regional labour market information has increased. The focus of policy makers increasingly focuses on the regional labour market, which is partly due to the further-reaching transfer of government duties to municipal level, including in the field of work and income. A good implementation of those duties demands a labour market policy that is tailored to the region. The increasing complexity of the labour market combined with regional differences makes a regional policy approach more necessary. In current practice, national and international developments for each region may turn out very differently, as shown by the economic crisis. The impact of the crisis differs depending on a region's specific situation, which is determined by all kinds of factors, such as the type and amount of activity, available labour force and geographical location.

Labour market policy development at regional level requires insight into that regional labour market and developments on that market. Despite the wide range of labour market information, in practice it appears that the actors' information requirements cannot always be met, especially for actors at regional level. In 2011, the former Council for Work and Income (Raad voor Werk en Inkomen, RWI) had a two-part study conducted into labour market information sources in the form of an inventory and analysis of existing sources and a study into the users of those sources. The inventory and analysis (Folkeringa, Grijpstra, Klaver & Verhoeven, 2012) resulted in the conclusion that the labour market information available at regional level fell short in a number of areas to be able to meet the regional information requirements. According to the user survey (Gardenier, Edzes & Bosgraaf, 2011), it's not so much the quantity of data as being able to translate the data to their own region that is difficult for the actors. One of the problems identified is that sources use different regional classifications that prevent data from being compared properly. The used regional classifications also make it difficult to translate data to a specific region that differs from the regional classification as used by the source. Another noted problem is that little information is available about jobs and/or qualifications. And that is precisely the information that is necessary to be able to link the demand for labour to the supply.

Other research into the availability and usability of labour market information sources, in particular for municipalities, was conducted in 2011 by the Inspectorate for Work and Income (Inspectie voor Werk en Inkomen, IWI, 2011). It was investigated what labour market information municipalities require in order to be able to match job-seekers with vacancies and the extent to which available sources are able to meet that need. For short-term policy plans, such as developing training projects with employers, they want to have an insight into specific, current vacancies. That insight is not provided by formal sources, they offer not sufficient specific information. Also for long-term plans the formal

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labour market information sources appears not to give the proper information and therefore only a small number of municipalities use the formal sources. In addition, larger municipalities in particular conduct their own research in the form of monitors and surveys, for example. Criticism of the sources is that data is out of date, too abstract and doesn't provide any information about the level of the vacancies. Another important result of the research is the outcome that the municipalities consider contacts with employers and their own network as vital sources of labour market information. Contact with employers provides further information about vacancies; not just about job requirements but also whether an employer is open to a candidate from a particular target group, for example. We will now look closer at a number of the existing labour market information sources and discuss their usability at regional level.

4.1.1 UWV

An important national supplier of labour market information is the UWV, the only party in the Netherlands that is legally appointed to disclose labour market information. The UWV supplies various information products[31]. Specifically focused on the region, the UWV produces the Basisset Regionale Arbeidsmarktinformatie (Basic Set of Regional Labour Market Information). Based on a classification of 35 labour market regions[32], every month a PDF file is formed for each region containing the current status of unemployment benefits and vacancies registered with the UWV for that region. The Basisset is based on personal data that's available at the UWV. The disadvantage of this is that as far as the database of vacancies is concerned, it only includes a proportion of all the vacancies in the Netherlands. A minority of employers reports vacancies to the UWV, and even then, mainly lower-level vacancies. For vacancies at professionally oriented higher education and university education level, employers are on the lookout for alternative recruitment channels. It is estimated that around 10 to 15% of all vacancies are reported to the UWV[33]. Another disadvantage of the UWV database of vacancies is that, looking at the specific requirements of the actors in the Eemsdelta region, when it comes to understanding future demand for staff, the UWV database only contains current vacancies. It does not therefore provide any forecasts of expected vacancies or developments in vacancies. Also the classification into 35 labour market regions limits the value of information at regional level. The labour market regions adopted are often wider and therefore more differentiated than the specific region for which the information is required. With regard to the Eemsdelta region, that area falls under the Groningen labour market region, consisting of 27 municipalities with Groningen as the central municipality. Those municipalities vary significantly in terms of size, but also in terms of character, such as metropolitan, urban or national, and therefore they also vary in terms of social developments and problems. It is therefore not possible to deduce a specific enough picture for the Eemsdelta region from the Groningen labour market region. For the usability of other UWV information products for the Eemsdelta region, the same limitations apply as for the Basisset. It only concerns information about the vacancies registered with the UWV and it doesn't contain any forecasts.

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[31] This information can be found at werk.nl.

[32] Until mid-2012, it was assumed that there were 30 labour market regions, but by splitting a number of regions, there are now a total of 35 labour market regions.

[33] 'Labour Market Information Sources Fact Sheets' annex, p. 29. The fact sheets are an annex to the report commissioned by the RWI, which was drawn up by Research voor Beleid (Folkeringa et al, 2012).

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The data is also not specific enough in terms of content. In order to be able to match up job-seekers with vacancies or to train future workers, it must be clear what position the vacancies concerns and what professional and educational requirements apply to this. The UWV does not provide such detailed data. At the most, a distinction is made between level of education in terms of lower, secondary and higher, or a distinction between professional level in terms of elementary, lower, secondary and higher and university, for example.

4.1.2   Statistics Netherlands

Aside from the UWV, various other sources generate labour market information at national level. When it concerns understanding the demand for staff, like the actors in the Eemsdelta region want, data from Statistic Netherlands (Centraal Bureau voor Statistiek, CBS) is available. Every month the CBS conducts what is known as the 'Kwartaalenquête vacatures' (Quarterly vacancies survey) among a sample of around 22,000 companies and institutions in the Netherlands into unfilled, arisen and filled vacancies in the Netherlands. Although the vacancies can be specified by business sectors and sizes, that is not possible for each region, and it only relates to the current vacancies and not a

forecast of expected vacancies. The 'Structuuronderzoek' (Structural survey), which the CBS conducts every two years, is more detailed. This study also takes the form of a survey among a sample of around 22,000 institutions and companies. The data are detailed depending on the type of vacancy, necessary education and job and depending on a number of regional classifications. But those regional classifications too are too general to be able to translate effectively to a specific region such as the Eemsdelta, as well as missing from the research forecasts. Neither database covers the entire vacancy market, but they can be tailored to the region, sector and level of education. But these databases too only relate to current vacancies and do not provide forecasts.

4.1.3 ROA

Aside from limited options for tailoring national sources to a specific region and the insufficient detail of the data (specifically professional and educational specifications of the demand for staff), we are also able to see that few forecast data are available. Most sources give the current circumstances and developments in the current circumstances, and do not provide forecasts for the longer term. At national level, the ROA conducts research into future labour market developments. From four programme lines, the ROA conducts various research projects in the field of the educational and employment market. One of those projects relates to the Educational and Labour Market Project (Project Onderwijs-Arbeidsmarkt, POA), whose aim it is to provide an understanding of the connection between the educational and the labour market by mapping out current and expected developments on the labour market. For this purpose, detailed labour market information is generated depending on the sector, profession and study programme. The data is recorded in the ROA's Labour Market Information System (AIS). The data largely comes from various national studies such as the CBS's Professional Population Survey (Enquête Beroepsbevolking, EBB) and the school-leavers' surveys[34]. Based on the data in the AIS, the ROA publishes a report every two years containing a six-year mid-term forecast for supply and demand on the Dutch labour market specified by study programme and job. Despite the forecast details and the details of education and job, the data nevertheless is unable to fully meet the information required by the labour market actors in the Eemsdelta region. The biggest problem is that, just like the other sources discussed earlier, it is also difficult to translate the ROA data to a specific region. Until recently, the ROA data were not

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[34] The BVE monitor, HBO monitor and WO monitor.

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regionalised at all, but in the 2013 report, some of the data were differentiated by region for the first time, including the number of job openings by educational category. The differentiation by region was made based on the 35 labour market regions also adopted by the UWV. As we established earlier, the disadvantage of that regional classification is that the Groningen labour market region that the Eemsdelta falls under consists of different municipalities in order to derive a specific picture for the Eemsdelta from the overall picture for that region.

4.1.4 Labour market information sources at sectoral and local level

The main sectoral suppliers of labour market information are the Centres of Expertise on Voctional Education, Training and the Labour Market (Kenniscentra voor Beroep en Bedrijfsleven) and their umbrella organisation, the Foundation for Cooperation on Vocational Education, Training and the Labour Market (S-BB). On the Kansopwerk.nl website, they publish information on the opportunities on the work placement and labour market within the different sectors. The Centres of Expertise conduct annual labour market research for this purpose. They draw many of the data from the national sources discussed earlier. In addition, in the information they supply, they also adopt the labour market region classification adopted by the UWV.

Finally, at regional and local level, there are various initiatives of regional and local actors for labour market research. For the Northern Netherlands, for example, every year since 2008, the Northern Labour Market Survey (Noordelijke Arbeidsmarktverkenning) has been conducted into the developments in the economy and into the three northern provinces on the labour market. The last survey was conducted in 2012 (Gardenier, Westerhof & Rijn, 2012). With regard to the demand for labour, the report describes the developments over the past few years, but does not give forecasts of expected job growth, for example. What's more, the data is not specific enough in terms of education and profession, and has been regionalised at provincial level.

4.2 Usability of labour market information sources in the Eemsdelta region

The findings in the former paragraphs about the usability of labour market information sources at regional level correspond to the actors' situation in the Eemsdelta region. Available labour market information sources are unable to meet their information requirements. The data is of too high an aggregation level to be able to translate it into their   specific region. Forecasts concerning future demand for staff and developments in the Eemsdelta area are also missing, and hasn't been specified in terms of necessary qualifications. As a result, the municipalities and the UWV in the Eemsdelta region lack the information they need to be able to take specific policy measures. What's more, they not only require data, or 'names and shirt numbers', as a local alderman said, but with it the opportunity to be able to enter into specific discussions with an employer about a vacancy, to determine whether and how a match can be created between the employer's demand and the supply from the database of job-seekers. Ideally, the demand for staff should therefore be clear at company level. That is also important for the employers themselves, who don't feel a sufficient sense of urgency to take action. As long as they don't experience any problems with their staffing and potential problems are not visible in specific data for their company, they will not take any action. Available data sources are unable to meet this need. That is only possible if the companies generate their own data, which can then be used to form a picture for the region.

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4.3   Data collection at company level

Paragraph 1 outlines interests and problems of various actors, including the employers. In general, employers now experience fewer staffing problems as a result of a short-term focus on staff scheduling. Employers' main interests lie in filling vacancies in the short term. Many employers do not place a high priority on problems in future predicted job openings, with the consequence that they are paying less attention to structural staff scheduling. A study recently conducted on behalf of the Dutch Association for Personnel Management & Organisation Development (Nederlandse Vereniging voor Personeelsmanagement & Organisatieontwikkeling), (NVP section, HR Operation & Innovation, 2013) has revealed that 35% of the 137 respondent organisations are working on strategic staff scheduling (SPP). The reason for this is the expected changes in the scale of the staffing of their own organisation (63%) and the necessary competences of current staff (65%). The impact of the development of the labour market on the scale of the staffing (45%) and the required competences (47%) score significantly lower as a factor[35]. The study has also revealed that the focus mainly lies on short and medium-term staffing problems. In this paragraph, we will consider staff scheduling and strategic staff scheduling as an HR tool in relation to the outlined problems in this paper in further detail.

In the 1960s, staff scheduling first became important as a result of a narrow labour market and the aim to control labour costs. During the decades that followed, the attention paid to staff scheduling appeared to correlate with demographic developments and fluctuations on the labour market: if employers have little difficulty attracting staff, attention to staff scheduling disappears into the background. Evers and Verhoeven (1999, 141) outline the known fact of the scheduling paradox: 'as circumstances become more unstable, the need for certainty by means of scheduling is increasing; as uncertainty increases, the use of scheduling techniques becomes increasingly more problematic, however'. What's more, the speed at which varying requirements are placed on production and staff play a role when it comes to whether or not to use staff scheduling. If these requirements are not subject to change as quickly, it is easier to plan long term. Over the past few years, staff scheduling and strategic staff scheduling is of importance once again, due to the demographic developments and the resulting staff shortages. The level of problems experienced determines whether or not to use staff scheduling, whilst the aim of the tool is to be able to indicate future developments and problems and to respond to these. The advantage of staff scheduling and strategic staff scheduling is that it provides both HRM and management with an insight into the points for attention in relation to the use of staff within the organisation. On the basis of this, actions can be taken if required in the field of recruitment and selection, training and development.

4.3.1   Staff scheduling and strategic staff scheduling tools

A multitude of tools are available to employers who understand the need for staff scheduling and strategic staff scheduling and want to understand the difference or future difference between the available and required qualitative and quantitative deployment of staff. The aggregation level and the scheduling horizon determine the choice of method for staff scheduling and strategic staff scheduling. With regard to the aggregation level, an organisation can be viewed at different levels: at the level of the entire organisation, the location and at departmental or job level. If a distinction is made between specific features of the different levels, problems in homogeneous groups can be

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[35] Of the 137 organisations that took part in the study, 36% belonged to the category small organisation (up to 250 employees, 53% to the category medium-sized organisation (up to 3000 employees) and 8% to major organisations (>3000 employees).

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mapped out. Staff policy can be tailored to this (Evers & Verhoeven, 1999). The scheduling horizon covers the period for which the schedule is created. A longer-term schedule is central to a strategic focus. A medium-term scheduling horizon is often adopted, however, for a period of three to five years (Dekker & Schlundt Bodien, 2001).

A lot of statistical information can be drawn out of a staff information system, such as the number, ages and positions of employees. Staff dynamics and demographic are more difficult to map out, however, as is predicting future use of staff on the basis of this. By this we mean the intake, transfer and outflow. This also applies to the qualitative description of the deployment of staff, such as recording the qualifications of current staff and the potential for qualifications among the same group of employees. HR literature describes a multitude of quantitative and qualitative staff scheduling tools. The IDU matrix and Push and Pull models are suitable tools for predicting the quantitative deployment of staff.

The flows of the workforce are central to the IDU matrix. Intake occurs from education and the external labour market. Transfer relates to the employees who transfer to other positions and the outflow relates to the departure of employees for voluntary or involuntary reasons. By completing an IDU matrix, the intake (instroom, I), transfer (doorstroom, D) and outflow (uitstroom, U) can be made visible during a particular period. Therefore, with the IDU matrix, the staff dynamics of an organisational unit and/or a selection of positions, it can be mapped out how the current workforce moves through the organisation with a scheduling period of three to five years (Speelman, 2010). The matrix contains opportunities for further analysis. In addition to the actual staff changes, the average staffing level can also be calculated, on the basis of which key figures relating to the intake, transfer and outflow intensity can be derived. If an employer possesses IDU matrices lasting several years, trends in staff flows can be revealed. On the basis of staff movements in the past in relation to progress and internal mobility, such as transfer and promotion, predictions can be made into the future deployment of staff over a period of X number of years should the policy remain unchanged. Evers, Van Laanen & Sipkens (1993) refer to this as a Push model. A model such as this assumes that certain intake, transfer and outflow characteristics exist. The workforce is 'pushed' in a particular direction along a well-known presumed pattern, taking into account future staffing requirements. A pull model takes future staffing requirements as the starting point, looking at vacancies that arise in different categories as a result of turnover and/or anticipated expansion of the workforce. These vacancies are filled by means of internal mobility. The model therefore gives an idea of the extent to which the internal supply will meet the future demand for labour. As it is difficult to map out the staff required within an organisation, use of the Pull model is rather complex.

In addition to the quantitative tools, there are also methods that are suitable for making a qualitative analysis of the workforce. The focus here lies on requirements, competences, development potential and employee performance. An assessment system is often used to obtain greater insight into the quality of employees. An assessment system is mainly used to evaluate employee performance, but it can also be used to obtain information at a strategic level that supports decisions at that level. A staff schedule for example can be drawn up on the basis of this. Depending on the aim and the recorded indicators, a particular method can be chosen. There is a rough classification to be made into the classification method, scaling or narrative description. With the classification method, an employee is compared with another employee. With the scaling method, an assessor indicates on a scale whether the employee has achieved an unsatisfactory or satisfactory score, and with a narrative description, an assessor describes the employee's behaviour. With a qualitative analysis, the scaling method is often used. This method is based on the HR3P model developed by the Boston Consulting Group and further developed by Evers et al (1993). HR3P stands for the Human Resources Performance

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Potential Portfolio. The model consists of a matrix in which employees can be scored individually for their performance and development potential. The completed matrix gives an employer insight into the quality of the employees and their development opportunities, and weak points in future availability come to light. On the basis of this, an employer can determine what measures are required. The HR3P tool is particularly powerful combined with information about the dynamics of the workforce and a vision of the required future use of staff. 'By comparing the results of the HR3P method to the information about the formation, future requirements and turnover/mobility, the question of to what extent the available human potential can be transformed into the aimed-for workforce over time will become clear' (Evers et al, 1993, 138). Another model that can be used to make a qualitative analysis and has a great deal in common with the HR3P matrix is the competence matrix. In this matrix, developed by consultancy De Crux (Verhaagen & Van Vliet, 2010), performance is compared to competences that are important for performing the position in question. The current situation will be mapped out using the matrix. What's more, for the same competences and employees, a forecast will be drawn up to show how things should be in a year's time. The difference with the HR3P matrix is therefore clear: this matrix focuses more on the potential for development, whereas the competence matrix focuses on satisfying certain competences.

4.3.2   Usability of staff scheduling and strategic staff scheduling tools in the Eemsdelta pilot

The tools described can be used to create a quantitative and qualitative analysis of the workforce, so that an insight can be gained into current and future staffing levels, in order that direct action can be taken. Despite the fact that sufficient staff scheduling and strategic staff scheduling tools are available that employers can use to get a good idea of their staffing levels, these are only used to a limited extent. Employers do not always possess information that is necessary for certain tools. It appears difficult to produce a qualitative description of the deployment of staff. Arguments such as technical complexity, the lack of legitimate quality assessment tools and fear of the subjectivity of assessments are often named as reasons not to assess the quality of the labour supply (Speelman, 2010, 48).

Several labour market studies (2008, 2011) have revealed that the Eemsdelta region is struggling with above-average unemployment and can expect a relatively large number of vacancies, often of a technical nature, in the near future. The threat of staff shortages highlights the importance of mapping out the expected problems on the labour market. With the exception of a few major organisations, most employers do not possess a long-term staff schedule or strategic staff schedule. Many employers in the region, from SMEs in particular, do not have a detailed insight into long-term staffing requirements. Existing labour market information sources do not provide the necessary detailed information. The staff scheduling and strategic staff scheduling tools described require from employers to have detailed information to hand, as this is often not available, or, in any case, not the data that is necessary to make a qualitative analysis of the workforce. What's more, the available staff scheduling and strategic staff scheduling tools deliver more data that exceed the region's goal. Data relating to requirements, competences, development potential and performance at company level do not deliver the necessary information to be able to jointly tackle regional labour market problems as actors. What's more, the use of staff scheduling and strategic staff scheduling tools requires knowledge and for employers to make a considerable investment in terms of time and money to supply the data. In order to be able to act properly in relation to regional labour market problems, the various actors (employers, municipalities and educational institutions) must possess detailed information for each job, specifying the educational specialism and level of education. That requires insight into current and expected vacancies, specifying these essential qualifications. As long as this information is not available at company level, this results in a joint action problem.

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## 5   Description of the Data Collection Method in the pilot

The KCA has developed a data collection method that can provide the basis for

resolving the awkwardness at taking action experienced by the actors in the region (Van Lieshout et al, 2013). The method can be used to obtain a detailed and well-founded insight into a regional labour market situation in a structural and detailed manner. The demand for labour is mapped out for each company and/or cluster of companies, and then it is combined to produce a regional outline of the labour market situation. At company level, measurements are taken at the level of the precise demand for staff: what job it relates to, and what level of education and educational specialism. It therefore becomes clear for each individual company where the future staffing requirements lie; by combining these data, a regional picture of the labour market problems can be formed. It is important that the detailed overview is 'monitored' regularly, so that it remains up to date and is compared to labour market information from other sources at various levels. In this chapter, we provide an explanation of the type of project developed, consisting of a data collection method and the way in which this has been implemented. For a detailed description of the method, we refer to the article of Van Lieshout et al (2013).

Companies take part in the study on a voluntary basis. Companies that don't have a current understanding of their future staffing requirements but want to, will be investigated. An initial conversation will then take place with a researcher from the KCA. The aim of this visit is threefold. First of all, it can be determined what information is available within the company. Secondly, the sector or branch can be determined and finally agreements can be reached in relation to providing the information necessary for the study. Companies that recently made their own future staffing requirements clear are being asked to confidentially provide a long-term staff schedule such as this for the study. In this case, no company research is conducted, but the company's information will be used to analyse all participating companies at a higher level. For each company, the researcher passes through the four stages of the method and the relevant data are mapped out by means of a fixed format (Excel document). A company report is drawn up based on the formats completed for each company. Each company receives a similar report in terms of structure, in which fixed components and terminology are used, with the content tailored to the company-specific situation. Using a fixed format and terminology makes it possible to link the individual report findings and to explain identified staffing problems centrally. If required, the researcher will explain the results in the company report in further detail in a final discussion.

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5.1　　The four stages of the data collection method to go through

In the data collection method, we make a distinction between the concept job structure and the concept workforce. With the concept job structure, we mean the different positions within the company. With the concept workforce, we mean the individuals who occupy these positions. It is important to map out both: after all, labour market problems are the result of discrepancies between both, such as an unoccupied or long-term unoccupied vacancy. From the job structure, both the current situation (current job structure, otherwise known as HAS) and the future situation are mapped out (future job structure (TAS)). This also applies to the workforce, namely the current workforce (HPB) and the future workforce (TPB)[36], on the basis of which an estimate of the number of job openings can finally be made. What data and calculations are necessary for this are explained in further detail in this paragraph. A diagram of the data collection method can be found in figure 5.1.

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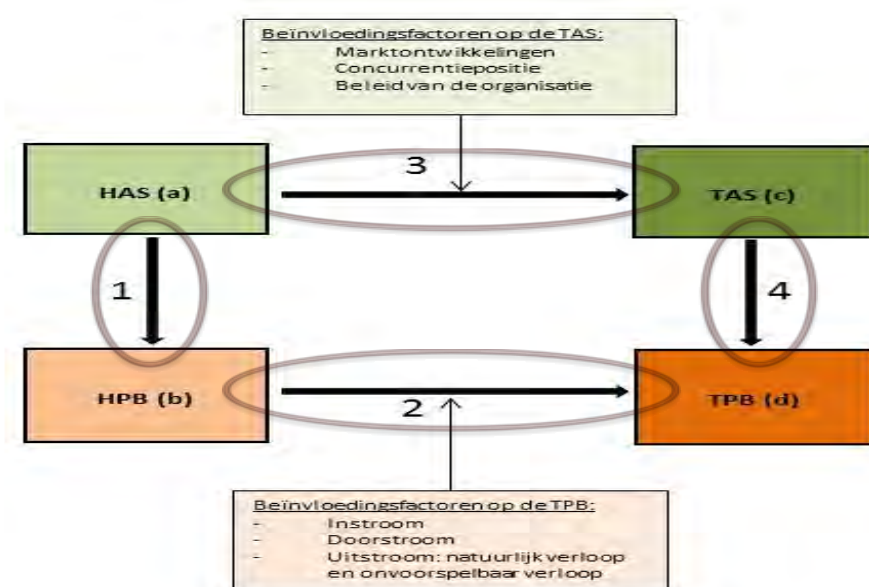
[36] Abbreviations used in the data collection method model:

HAS: Current job structure (Huidige arbeidsplaatsenstructuur)

TAS: Future job structure (Toekomstige arbeidsplaatsenstructuur)

HPB: Current workforce (Huidig personeelsbestand)

TPB: Future workforce (Toekomstig personeelsbestand)

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5.1.1 Stage 1: mapping out the current job structure and current workforce

The method is gone through in four stages at company level. During the first stage, the current situation in relation to staffing is mapped out. During this stage, data is collected in relation to the current job structure (HAS) and current workforce (HPB), and any discrepancies between them will be examined. To map out the HAS, a list is made of the positions present, the level of education required for each position, the educational specialism required and the number of FTE for each position. The positions, also including position(s) that are structurally filled by flexible workers, are mapped out based on the International Standard Classification of Occupations (ISCO). By adopting this coding, the data can be compared with other national, regional and international data.

To assess the requisite level of education for each position, we use a classification used by the CBS, known as the Standard Educational Classification (Standaard Opleidingsindeling, SOI). The educational specialism is mapped out using the CREBO register for secondary study programmes and the CROHO register for higher study programmes. Here too, listing via the standard coding for these registers makes comparisons with other national and regional data possible. Finally, it is recorded for each position how many full-time units (FTE) of formation space exist. To map out the HPB, the number of FTE and people per position and the date of birth, sex and nationality of each employee is listed. These characteristics are important because predictions can be made for the future on the basis of these. The current number of FTE and people is necessary in order to be able to make an estimate of the future number of employees. The dates of birth provide an insight into the age distribution of the company's employees and makes it clear whether it is an ageing population and/or that it applies to all or specific jobs, for example. The dates of birth can also be used to calculate the year in which an employee reaches pensionable age and is expected to leave. When calculating expected retirements, any specific company agreements or branch agreements about applicable pensionable age must be taken into account. Sex is important in order to verify the extent to which attracting more women may be an opportunity for rectifying shortcomings, for example. As far as nationality is concerned, it is only determined whether an employee is a Dutch national or not. Listing the Dutch nationality gives an idea of for what positions and to what extent workers are brought in from abroad. Once the HAS and the HPB have been determined, these can be confronted with one another and existing discrepancies become visible.

5.1.2 Stage 2: extrapolation of the TPB

In stage 2, extrapolation of the TPB takes place on the basis of the HPB, whereby a number of influential factors (intake, transfer and outflow as a result of retirement and regular progression) is included, resulting in an idea of the expected demand for replacement over the next few years. The TPB consists of the demand for replacement and the demand for expansion. A five-year period forms the basis for the future situation. In this stage, we make an estimate of the demand for replacement. In this method, the TPB concerns current staff minus the employees who are retiring, minus the percentage of other turnover. Using the listed dates of birth and the applicable pensionable age, it can be calculated which employees will reach pensionable age over the next five years. For the pensionable age that applies to the company, the applicable collective labour agreement scheme will be considered. What's more, the expected outflow of staff for reasons other than retirement will be estimated. This relates to the employees who will leave the company within the next five years – in order to go and work for another company, because they will be out of work or incapacitated for work, or because they are leaving the labour market. For the calculation, we will first look to see whether the company has its own outflow figures for the past few years; in that case, the outflow percentage to be used will be determined on the basis of this. If the company doesn't have any outflow data, mobility figures for the sector in question will be considered. If no data is available there

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either, mobility figures will be considered on the basis of national research. Once stages 1 and 2 have been completed, a discussion will take place with the company about the results and identified discrepancies between the HAS and the HPB, in other words in the current situation. This discussion with the manager or HR manager is also the start of the third stage in which the expected job structure will be mapped out. Therefore, during the discussion the manager or HR manager will be questioned about his expectations for the future job structure of the company.

5.1.3 Stage 3: mapping out the expected job structure

In stage 3, the expected job structure will be mapped out (as it will be again in five years' time), including a number of influential factors, such as market developments, competitive position and the organisation's policy. The difference between the current and expected job structure is the demand for expansion. In order to assess the future job structure, an interview is held with the manager or HR manager of the company in question. This discussion takes place once the first two stages have been completed and the data relating to the HAS and HPB have been entered. The manager or HR manager receives that data and is given at least a week to think about the TAS. During this period, the contact person also has the opportunity to discuss potential future changes in policy with colleagues within the company. In an interview, the manager or HR manager will then have an estimate made of the future situation for each position, whereby the underlying causes are discussed. In so far as is available, written company sources will also be used. The researcher (in so far as is available), will also look at recent relevant report(s) about labour market expectations in the sector in question.

5.1.4 Stage 4: determining the expected job openings and possible problems to fulfill vacancies

In the fourth and last stage, the data from the preceding stages will be confronted: the expected discrepancy between the TAS and the TPB will be determined, or the number of expected job openings and the extent to which that discrepancy may result in staffing problems. The difference between the TAS and the TPB is the sum of the demand for expansion and demand for replacement and the result is the number of expected job openings. The number of job openings alone is not yet sufficient to determine whether staffing problems may occur. This will only be the case if the job openings relate to positions for which it is difficult to recruit staff. The expected job openings are therefore compared to national data from the ROA (2011) about future labour market problems. Data is used such as the ROA, which presents various wider labour market segments. For each labour market segment, the ROA has stated whether these segments will deliver an ample or narrow labour supply in 2018. According to the shortage or scope within the labour market segment, the extent to which a certain job opening may be a labour market problem can be determined.

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5.2 Implementation of the pilot

In order to test the effect and the result of the data collection method in practice, SBE, SXC and the KCA have decided to conduct a pilot. As stated in 4.1, the developed data collection method is labour-intensive. In the pilot, it has been decided to include fourth-year students from the HRM study programme at Hanze UAS in the collection of data and formulation of the company reports. The students conducted the study as part of their graduation research.

A learning studio was set up for the collaboration between the students, professor and lecturer-researchers. Together with the students, the steps for each company to take were mapped out. Specifically, the next step-by-step plan was determined and gone through with all nine companies: 1) In an introductory discussion by the student with the company, information is given on the Excel sheet to be completed and arrangements made in relation to supplying data; 2) The company enters its own details in relation to the HAS and HPB on the Excel sheet; 3) After at least a week, an interview will be held by the student with a manager or HR manager of the company about the Excel sheet completed so far. During this interview, the company is asked for its expectation in relation to the TAS and any further additions and comments are listed and discussed. For each company, the students have incorporated the data they have been given into the Excel sheet and drawn up a company report on the basis of this. The professor and researchers of the professorship have inspected all Excel documents and the company reports that have been drawn up. The company received the final report along with the offer to have an explanatory discussion with the professor and/or researcher about the results in the company report.

The research related to the development of a type of project consisting of a data collection method plus an implementation method that must satisfy the necessary conditions. Firstly, it should make the employers aware of the importance of and encourage them to generate understanding of their current and future demand for staff. First of all, the approach for the participating companies resulted in improved understanding of their own situation and labour market problems or the threat of such problems. In the surveys from 2008 and 2011, data was gathered in relation to what companies thought they knew about their expected staff development. Their supply of jobs and the staffing of those jobs, as well as mapping out the future development, was now backed up with facts. The feedback to the information obtained, including an analysis of the results at company level, in a concise company report, produced a sharper insight. That will then increase the possibility of employers themselves taking direct action to try to prevent problems. Secondly, the data collection method also had to deliver information at individual company level, on the basis of which a cross-company (regional and/or sectoral) picture could also be generated. The sum of the data obtained from the company surveys supplied the required detailed information for the labour market stakeholders in the region. The data was incorporated into an umbrella report produced by the professor and lecturer-researchers. The data was also more reliable, because the underlying data collection is much more specific than the previous surveys (information at company level). The new approach also has one disadvantage: it is more labour-intensive than a survey. The company studies demand a substantial number of hours from the researcher(s), and from one (or more) company representative(s). Furthermore, it is not possible to investigate all companies in one go. By repeating this approach for a number of years, however, a wide regional overview is created. With this approach, it is necessary to update the information for each company every year.

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6   Conclusions

In this paragraph, we answer the sub-questions in order to be able to answer the research question. We conclude the paragraph with a few recommendations for follow-up research.

The first sub-question focused on the substantive and technical design of the data collection method, namely what information is necessary and how can this easily be generated? A point for attention when implementing the data collection method is the uniform way of collection data and reporting. In order to be able to compare companies and potential agreements in staffing requirements and problems in relation to staffing requirements at umbrella level, it is essential that the data can be compared. Therefore for listing positions and comparing them with one another, it has become apparent that it is desirable to use a uniform code for this. The ISCO code[37], an international code for jobs that is also used by the CBS, appeared to be the best choice for this. It also appeared desirable to state a separate code for the level of education in addition to the CREBO and CROHO codes for the educational specialism. The SOI code was chosen,[38] which is also used by the CBS and other educational institutions. During the pilot, a standard Excel format was developed for collecting and processing data. The Excel sheet developed has turned out to be a good approach for mapping out the necessary data for each company in a clear-cut way. Based on the findings from the pilot, the Excel sheet has been amended and refined so that the necessary data can be collected and coded even more easily and clearly in follow-up research. The standard structure for the company report developed during the pilot was also developed further based on the findings, so that the information value for the company increases, as well as its usability for comparison at umbrella level. Because the company receives the completed Excel sheet for the company report by e-mail, the company can use it to conduct its own further work. Future changes can be incorporated into the data sheet, so that an up-to-date image can be formed once again. The company has therefore obtained a tool for monitoring the structure of developments in staff requirements. The individual updates can then be used to create an update at umbrella level.

 The second sub-question related to the implementation and, in particular, the feasibility of the method: How is the method manageable in terms of time and costs and is there a willingness or political willingness to invest in it? The results of the pilot indicate that the method works and makes it possible in a relatively labour-extensive way to obtain the necessary data at the necessary level of detail. Aside from the Excel sheet, the company report has also turned out to be a valuable informative tool for the companies. In the report, the data available from the company about the hobs and staffing are linked and analysed in such a way that the company gets a specific idea of the current and expected staffing situation — an idea that most companies from the pilot didn't previously have. The report therefore contributed to the companies' awareness of potential staffing problems and the need to anticipate these. In order to then determine and directly anticipate those expected staffing problems, the company report offers useful information and management information, supplemented with the data from the Excel document.

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[37] The International Standard of Classification of Occupation (ISCO) is an international classification of jobs based on agreement in terms of the level and specialism of the necessary skills to practise that job.

[38] The Standard Classification of Education ('Standaard Onderwijsindeling') is a classification of study programmes depending on the level and specialism.

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The third sub-question focuses on employees' willingness to provide necessary information and whether the information then provides the necessary basis for the actors to be able to act: Does the type of project developed work in practice and does it deliver what is intended? It can be concluded that the method is feasible. A number of points for attention have turned out to be important for successful implementation. Firstly, the preparatory stage plays an important role. For the model to be implemented in practice, it is necessary for the companies to collaborate; for each individual company, the stages of the method must be gone through. Participation in the study is voluntary and the company must be willing to supply the requested data to make time available for supplying the data. Clear advance information about the data requested, the expected investment in terms of time and the ultimate result for the company appeared to have a positive effect on companies' willingness to take part in the study.

In this paragraph, the three sub-questions and therefore also the following research question have been answered consecutively: With what type project can (particularly smaller to medium-sized) employers be 'tempted' to generate detailed information about their current and future staffing requirements, in order to be able to create a cross-business and cross-company idea of the labour market discrepancies to be expected? The method has turned out to have multiple outcomes, and the added value lies at both individual company level and regional level. It delivers more detailed qualitative information that was so far missed by the regional actors, in order to be able to take targeted measures to prevent future staffing problems or to anticipate them. Creating a completely regional picture requires a considerable number of companies to volunteer to take part in the study. The pilot has clarified that this approach makes it possible to compare companies' data and to look for commonalities. Those connections can be made at both regional and sectoral level. Data from the companies can be anonymised and merged in an umbrella data sheet. On the basis of that sheet, it can be determined, for example, that several companies are experiencing problems when it comes to filling a particular position, on the basis of which companies may seek collaboration with an educational institution to train more candidates. The comparability of the data by coding in criteria adopted nationally and internationally also makes comparison possible with other labour market information sources.

All in all, based on the pilot, no verdicts can be drawn for the Eemsdelta as a region. The number of companies taking part in the pilot was too small for this, whereby the influence of one company was also too great on the overall picture. Creating a completely regional picture requires a longer project, with many more companies volunteering to take part in the study. National and regional 'sector plans' have recently been submitted throughout the Netherlands, in order to combat unemployment and train employees with the help of a national subsidy. In the context of a labour market crisis, which still has a medium-term perspective on shortages in the labour market in technical jobs in particular, there is a major need for a detailed picture of the regional labour market and its development. And in the end, a regional labour market is no more or less than the sum of the regional companies' internal labour markets. The method developed by the KCA in this pilot tries to create a proper picture of the current and future demand for staff, and their workforce, as easily as possible. In addition to being company-specific, that picture is also job-specific: i.e. specified both horizontally (depending on the job/specialism) and vertically (depending on the level of education). That specificity means that it is possible to take direct action on problems that pose a threat after the study. Ideally, precisely such a picture should form the start of a regional sector plan such as this: a well-filled database should soon translate into a well-substantiated and detailed sector plan, whereby by retraining people who are threatened by redundancy at company X, it can help to counteract the effects of the ageing population at company Y. What's also important is that the method starts with the main actor: the employer. By mapping out his current and future internal labour market with and on behalf of that employer, he will gain a better understanding of the risks and problems that pose a threat. National

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research doesn't reach many employers. We suspect that the main result of a larger-scale study with this method could lie in more pro-active employment practices for preventing labour market problems. Once again, a condition is of course imposed on this. It is expected that more pro-active employers, and employers who already suspect problems, will already participate more and sooner in a study of this type. The picture resulting from such a study will therefore never be entirely

representative for a region. That is a drawback for a scientific analysis; to reach an effective regional labour market policy, that is not the case at all. After all, proactive companies cannot resolve labour market problems on their own either. If in the follow-up study, several companies also expect a considerable demand for expansion or replacement for the same jobs, they - and educational institutions, municipalities and the UWV - can take joint action. Secondly, a follow-up project such as this results in a detailed picture of the current and expected labour market development in the region. Once the database has been filled with tens or hundreds of companies, the cross-company development of job openings (and any redundant staff) can be analysed in a job-specific way, and problems identified.

The method developed by the KCA is not yet a complete regional labour market monitor. It maps out the expected demand for labour within existing companies in an effective and detailed manner, but those companies must face the expected labour supply. Within the pilot, the expected company demand faces the ROA's national data on expected shortages on the labour market. In a follow-up project – parallel to larger-scale implementation of the KCA method – more specific regional data on the expected supply (such as expected graduates) could also be collected. A second issue for the potential further expansion of regional monitoring is the expected demand for new employers. To summarise, the pilot offers good reason to use the developed and tested method at many more companies over the next few years, in order to help those companies and devise a regional analysis. The current and expected labour market situation offers even more reason to do so. Unemployment and the threat of unemployment currently calls for training and retraining; and a good training plan requires a proper picture of the labour market. Within the limitations of time and money, the method developed by the KCA is an effective and efficient way of obtaining that picture. By means of that picture, the labour market policy in the region can be mapped out in further detail, unemployment and the threat of unemployment be translated into new job opportunities, and help to prevent future shortages. A well-filled regional labour market database is an important tool for both current and future labour market problems and combating them.

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Mental stress in SMEs

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Abstract.

A work aid specifically for the target group small enterprise has been developed in the present project. In five steps, it covers the process of risk assessment of mental stress: in-house communication, analysis of the load situation with all decisive factors, participation-oriented deriving actions, impact assessment and documentation. What is new about the action aid is the structured coupling of a survey instrument to a procedure of moderation which enables the development of effective measures with little effort.

1 Introduction

In many cases, mental stress results from a very high workload with an unfavourable distribution of often prolonged working times, social conflicts, defective ergonomic design or the interaction of several mental stress factors such as disturbances if concentration is required and the time pressure high.

On the basis of the BIBB/BAuA Workers' Survey 2011/2012, the stress report (2013) of BAuA documents that in Germany, many employees describe mental stress as severe. 58 % indicate that they have to manage various tasks, 52 % work under considerable time and performance pressure and 44% are disturbed and interrupted at work. In many fields of modern work life, mental stress plays a significant role. There can be no doubt that also in small and medium-sized enterprises, mental stress factors are increasingly relevant for the development of work-related diseases (Beck, 2011).

Mental stress occurs in all commercial sectors. In particular in electrical occupations, an increasing time and performance pressure can be recorded. The findings of the stress report point out that strains resulting from working times and distribution of work are of paramount importance for the employees: besides the number of working hours, questions of work intensification as well as aspects of flexibility with regard to time, atypical allocation of working time, short-term shift-plans etc. play a major role in this context

According to the EU directive 89/391/EWG, employers are responsible for the prevention of work-related health risks. This directive requires enterprises to record all potential work-related hazards as early as possible. On the basis of this analysis and with the objective to design the working conditions in an increasingly human-oriented manner, effective measures should be derived and implemented.

Only 41 % of micro-enterprises (< 10 employees or turnover/balance sheet total ≤ 2 million €) show a risk assessment (GDA company survey 2011). And only in a minority of enterprises, an assessment of mental stress among the employees is made. It is likely that as yet, most of the micro-enterprises have refrained from an analysis of mental stress because those responsible consider the issue as too difficult to manage and an analysis as too work-intensive/costly. In an internal survey of OSH experts

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(technical supervisors), one of the questions asked was if there are any approaches to increase the probability of implementation. Three starting points could be identified:

First: In many cases, the knowledge level of the employers about their responsibility to prevent work-related health hazards including mental factors is rather limited. The possible economic benefit, which could be a better performance of the employees, an improvement of the internal processes, the avoidance of dangers resulting from human failure and accidents and the reduction of sickness-related absences, is rarely recognized.

Second: It is supposed that micro-entrepreneurs are not experienced in collecting and assessing psychological factors. In contrast to their dealing with other risk factors (mechanical or electrical risks etc.), the employers haven't acquired much knowledge outside their occupation. In this case, it seems promising to count on a well structured and simple action assistance requiring only little time and financial resources.

Third: The motivation to tackle this issue only rarely seems to exist. Reservations against mental diseases may play a role in this case. Employers falsely assume that in the framework of the risk assessment of mental stress, the personal sensitivities of single persons are considered. On the other hand, the employers don't understand that rather the systematic capture of mental factors can contribute to the healthy design of workplaces than just caring for and listening to the employees. In addition, many employers of micro-enterprises have little opportunity to delegate. In other terms, they often put off a number of urgent tasks. This is why the willingness to take up this issue often only arises where health problems in connection with mental stress are obvious.

2 Objectives of the project

The above mentioned approaches should be taken into consideration in this project. Given that the average number of employees in this sector is about 6.4 employees, in a first step, micro-enterprises of the electrical trade were the target groups (source: Central Association of Electrical and Installation Trades – Zentralverband der Deutschen Elektro- und Informationstechnischen Handwerke (ZVEH)). This shows that there is a great demand. It seemed reasonable to analyse and to consider the specific requirements of micro-enterprises and to develop a work aid that responds to the particular motivational and economic conditions of the sector. However, this work aid should be applicable beyond the sector. In order to be applicable in micro-enterprises of other sectors as well, the work aid shouldn't show any characteristic features limiting their range. The objective was therefore to develop a simple, well structured work aid, which comprises the overall process of risk assessment of mental stress and enables the employer to develop and implement effective measures and to control their effectiveness without further auxiliary aids or external support. The resulting risk assessments should correspond to the requirements formulated in the GDA guideline "consultation and monitoring in the event of mental stress at the workplace".

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3 The action assistance: together towards healthy working conditions of the BGETEM

In a repetitive development process, in other terms in short cycles consisting of concept development and practical tests in the target group, an ideal process of risk assessment of mental stress in small enterprises was designed. It involves five steps: internal communication, analysis of the stress situation with all essential factors, participation-oriented derivation of measures, planning of measures and impact review. The main idea is to present the essential information in a concise yet descriptive manner. A structure is to be offered that can be perceived intuitively and that is robust enough to balance minor errors and inaccuracies. Some steps foreseen in many concepts for risk assessment of mental stress could be eliminated (see: GDA recommendations for the risk assessment of mental stress). A determination of similar activities with regard to mental stress for instance appears to be dispensable. (In micro-enterprises, it is hardly possible to distinguish between operating condition and individual characteristics depending on the employee.) Other steps can either be merged or don't need to be explicitly mentioned in the process description. The steps determination and assessment of mental stress can be merged since traceable threshold values are being offered. Mentioning the step documentation however appears to be dispensable because by the use of action assistance alone, all requirements concerning a documentation are achieved.

One thing that is new about the action assistance is: "Together towards healthy working conditions" is the structured connection of a survey instrument to a moderation procedure in order to enable the development of effective measures with little effort. Besides the explications in the brochure, the single steps are clearly and comprehensibly listed on 2 posters for employers. Thus, the performing employer doesn't have to leaf through the brochure but directly receives the memory aids listed on the posters that are needed for a good implementation without faltering. With arrows, a graphical transition to the next step has also been implemented. The indication of processing time and material provides additional orientation.

The checklist mental stress of the statutory accident insurance is used as a survey instrument. This is a scientifically well established checklist to record mental stress (Mühlpfordt 2003). 19 questions cover the fields of work activity, work organisation and social affairs.

4 The moderated group discussion

The survey serves to get an idea of the load situation. The result of the survey will be published on the evaluation poster "To determine load". Thus, the pressure situation becomes transparent and increases the willingness to actively raise the participation of employees in the following procedure. The most important load factors should be taken up in the subsequent group discussion moderated by the employer.

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Fig.1: evaluation poster: "finding solutions"

The moderated group discussion is clearly structured by the evaluation poster "finding solutions". The key questions are defined, their sequential processing ranges from the analysis (Which situation comes to your mind when you think about this issue …?) to the search for causes (What are the causes?), the problem-solving (Which operational solutions would be suited?) and up to the preparation of a successful implementation (What should you pay attention to?). During the group discussion, the central contents are made available to all participants on the solution poster. This doesn't only serve the documentation but also helps the moderator/employer to find solutions within the discussion.

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Fig.2: evaluation poster: and "finding solutions"

5 The risk assessment of mental stress

The moderated group discussion serves the determination of mental stress at work. By the solution-oriented proceedings, the assessment of mental stress and the derivation of measures are evident. However, the employer is the person responsible and takes the final decisions. The action assistance offers a separate roadmap for these steps, which makes it easy to plan the concrete implementation. It includes those responsible, the date of implementation and the effectiveness check.

If the above mentioned steps are performed as intended, the employer fulfils the requirements for the documentation of the risk assessment (§ 6 German Occupational Safety Act) as defined in the framework directive 89/391 EWG in small enterprises with 10 employees or less.

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6 Problems/Difficulties/Challenges

The implementation requires that the employees can work for 90 minutes with the employer undisturbed. However, this condition won't be easy to accomplish in small enterprises with frequent service activities that are very typical for the electrical trade.

A second difficulty could be that the employer feels inhibited about functioning as a moderator. Especially in craft enterprises, the employers can't always be expected to have adequate communicative skills.

Up to now, the feedback from the users is promising. The work aid is currently being evaluated by a scientific content analysis. Indicators are: type of application of the features of the activity assistance, development of solutions, use and evaluation of the activity assistance as well as of the process and results achieved. The authors don't consider the development of the activity assistance "Together towards healthy work conditions" of the BGETEM as a completed project but expect a regular adjustment in order to obtain the practicability. It is a daily challenge for us to keep the activity assistance for the target group of the employers attractive in the long term.

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CHALLENGING WORKING CONDITIONS OF INDIAN WORKERS WORKING IN SMALL SCALE INDUSTRIES AND PREVENTIVE MEASURES

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Small scale industries are the backbone as source of livlihood for Indian families. A large population of india is totally dependent on small scale industries as a ventures to create income for the families. Small scale industries are growing like mashroom in India. Hence population think nothing more than small scale industries as a easiest setup to genrate income. Small scale industries are seen at following levels-

a) **At domestic level**

b) **Family level**

c) **Organizational level**

d) **Governmental and Non- Governmental goverend levels**

At domestic level such industries are run by the indiviual family in their own residence or related areas. At family level relatives of a family join together and setup a unit of venture. Besides this their are several popular persanlities who are known for creating and managing commerical units. They setup ventures and accomodate workers. The last type of small scale industries are managed by the governmental and non- governmental organizations. In India the three major areas where small scale industries are seen at three levels are i.e. in the residence, seperate unit and units goverened by governmental and non- goverenmental organizations.

Efforts were made to study the existing of small scale industries of different levels, status of workers, health of the workers, problems faced by the workers, injuries and accidents among workers and to think about the strategies to safegaured the workers in such industruies for this workers working as backsmith workers,workers in tourism and hospitality, women workers in handicraft industry and workers in resturants were selected. The details about these investigation are given below:

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Small scale industry at domestic level

One of such unorganised sector at domestic level in which the conditions of workers are very miserable is forge smith's. A forge smith's is a person who forges, or shapes, metal by first heating it until it is red-hot, then uses tools like chisels and hammers to force the metal into the shape he desires, and the process is known as Forging which is defined as the plastic deformation of metals by applying compressive forces by manual or power hammers, presses, or special forging machines (**DeGarmo *et al*., 1988).**

Small scale industry at Family level

Hospitality industry has brought tremendous growth to the global economy in Indian families by providing services ranging from accommodation, sightseeing, fooding as well as other services related to the tourism industry. These tourism industry are managed by group of two to three related families and are not only provides employment but also plays a vital role in the economic returns of the family, state and the country as a whole in the form of foreign exchange. These family industries are also providing opportunity to the people to interact with people from different cultures. Hence, Hospitality industry plays a major role in the development of economies.

Small scale industry at Organizational level

In India the city of Lucknow of Uttar pradesh has a prominent place in the history of India particularly for its art, historical monuments and rich cultural heritage. Lucknow is also known around the world over for its many fine handicrafts. This craft has attracted several known business communities from all over India to setup their commerical units in Lucknow city and involving large number of craft women and men. Chikankari is considered to be the most popular handicrafts amongst these and is recognized worldwide. It is a fine art of embroidery made with untwisted yarn with the help of the needle on a fine cloth, who have involved large number of female workers.

Small scale industry at Governmental and Non- Governmental goverend levels

The hotel, restaurant and catering sector covers a wide range of different Businesses, including hotels, pubs and restaurants, contract caterers in various industrial and commercial premises, fast-food ,cafes and bistros run by governmental abd non-governmental organizations. It plays an important role as a job creator in the service sector and in the economy as a whole in many States. The hotels and restaurant sector includes a range of tasks and jobs that pose different risks. The complexity of the sector makes it difficult to present an exhaustive view of the situation. Much attention goes towards working in kitchens. The hotels, restaurants and catering sector employs more than 7.8 million people in the India and is characterized by high job demands (in particular due to direct contacts with clients) and high physical workload. Ergonomics is a scientific discipline, which is concerned with improving the productivity, health, safety and comfort of people, as well as

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promoting effective interaction between people, technology they are using and the environment in which both must operate.
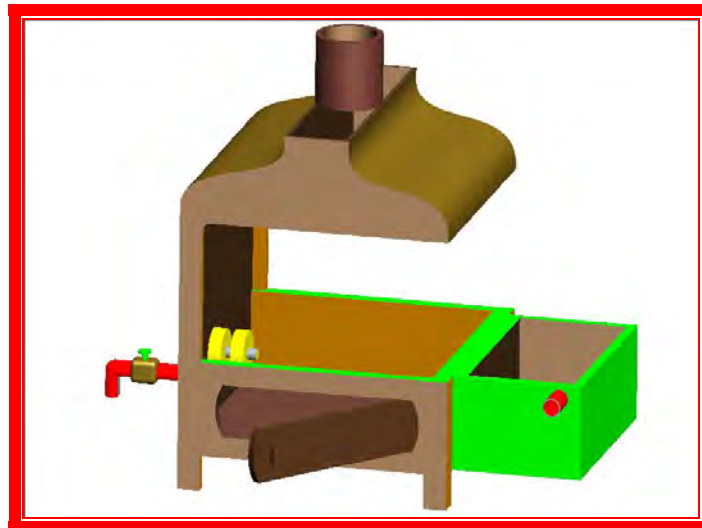
Health problems, injuries and accidents among workers in four small scale industries

- It was found from the investigation that maximum of total workers (93 percent) had reported body ache as their major common illness and burns (80 percent) as main chronic illness. Mechanical hazards were mainly reported by workers involved in striking, physical hazards by hammering workers, whereas biological and chemical hazards were mostly reported by workers involved in cooling. High RPE score was found during striking operation.

- Health problems to the workers of different departments (front office, housekeeping, food production unit, food service unit and tours and travel unit) of hospitality industry and these health problems were arising due to their service time. When comparison was made between hotel workers in different departments it was observed that in the front office department maximum 56.7 percent workers respond that they were quite often suffering with the visual fatigue problem due to service while in the department of housekeeping they said that they quite often suffered with the slips, trips/falls problem. On the other hand, it was found that highly 68.9 percent workers who were working in the food production department reported that they were almost never suffering with ischemic heart disease and 62.9 percent food service department workers' said that they almost always suffered with manual handling problem. At the end of the comparison, tours and travel department workers' felt that 57.9 percent were quite often suffering with the respiratory infection health problems due to service.

- It was found that awkward posture typically includes reaching behind, twisting, working overhead, kneeling forward and backward bending. Awkward posture during work, increase risk for injury. Poor neck posture leads to a forward head position which is one of the most common causes of neck, head and shoulder tension and pain. This can result injuries like sprain and strain of the neck leading to weak neck muscle.

- The table 2 exhibits that 15 percent of the workers were having the pain and discomfort in the shoulders while doing the activity. Whereas 12.5 percent were experiencing it in the neck. Approximately 31 percent respondents were having a pain or discomfort at the lower back a lot. As the same 23 percent respondents were facing it in the legs and feet a lot. To some extent pain or discomfort was felt by nearly 11 percent of the workers and 8 percent workers faced it in the elbow and forearm respectively. In short it was found that due to present job 27.5 percent worker's neck and shoulders got damaged due to pain and discomfort. 18 percent worker's elbow/forearm/wrist/finger, 31 percent worker's upper back/lower back and 23 percent people leg/ feet respectively. Figure showed the graphical representation on the basis of pain in the body part.

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SUGGESTIVE MEASURES

1. **Design of furnace**

- **A total of 40 backsmith workers were selected for calculating percentile of the dimensions. The design of the furnace is shown in fig 1. The description of the various components of the furnace is given below.**
- **The hearth:** It is the bottom surface of furnace; it carries coal therefore provided with fire bricks lining to withstand the extensive heat produced due to the combustion of coal. In the absence of this lining the heat produced, and will directly effect the surface of hearth.
- **Tuyere:** It is the opening in the hearth for the supply of air under pressure for the combustion of coal. The tuyere opening should be cleared from time to time so that the slag may not collect there to choke the opening.
- **Pipe :** it is used to connect the blower (source of air) to tuyere. A valve is incorporated in the pipe, just before the place where it is connected with the tuyere, to control the supply of air to the furnace.
- **The chimney:** It is provided at the top enables an easy escape of smoke and gases produced due to burning of coal.
- **Water tank:** It is provided in the front of the forge, which carries water for the purpose of cooling or quencing
- **This furnace can also be made to have masonry construction provided with all the attachments like chimney, tuyeres, blower, water tank etc.**

Solid view of Furnace

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2. **Actions to reduce accidents/injuries holding of workshop to educate workers for safety and development and dissemination of educational package**
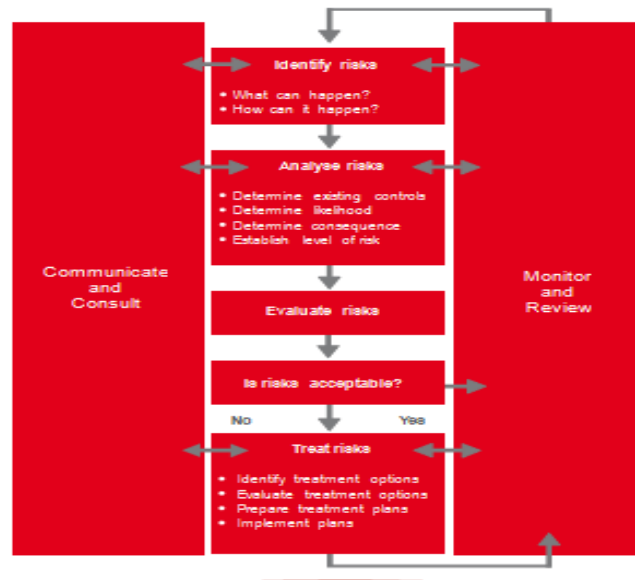
- **Surveillance program**
- **Training on tips to safety at workers**
- **Films on safe culture for workers**

3. **Ergonomically sound workstations and protective gloves**

To reduce the hazards (injury) among female workers involved in chickankari handicraft work workstation and gloves introduce with the aim to reduce musculo skeletal disorders, backpain and injury to fingers and plam of hand.

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4. Designing through Auto CAD ergonomically functional and aesthetically sound relaxing chair

All the anthropometric measurement of workers was analyzed and on the basis of that, the final dimensions shown in the table 1were used for the design and development of relaxing chair for restaurant workers.

Table 1.: Dimensions of designing of relaxing chair for workers

Measurements	5th percentile	50th percentile	95th percentile
Sitting height	89	90.6	96.5
Sitting eye level height	72.89	79.5	85
Buttock popliteal ht.	43.9	49.5	54.86
Buttock to knee	54	59	64.77
Sitting popliteal ht.	39.37	43.9	49
Sitting knee ht.	49	54.3	59.4
Thigh clearance	10.9	14.47	17.5
Waist depth	18	24.6	31.24
Elbow rest ht.	18	24	29
Sitting hip breadth	31	35.56	40
Forearm to forearm breadth	35	42	50.5
Hand thickness at meta carpals	2.79	3	3.3
Hand length	17.6	18.62	19.02
Palm length	10.13	10.43	10.73

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The Hotel, Restaurant, and Catering Trade - Design of Demographic Change

C. Nordbrock[1] and B. Schlote-Sautter[2]

[1] German Social Accident Insurance Institution for the foodstuffs and catering industry
[2] German Social Accident Insurance Institution for the foodstuffs and catering industry

Abstract. The project INDIGHO "Innovation and Demographic Change in the Hotel, Restaurant and Catering Trade" (Horeca) (2012-2015) dealt with effects of demographic change in this sector. Its major objective was to improve the awareness for the present situation and to increase the retention of professionals in the field, while supporting safe and healthy work (INDIGHO, 2013).

1 Introduction

As part of the research project INDIGHO, the age structure of the workforce of 310 Horeca enterprises was collected by means of an online survey between August 2012 and December 2012 (Hemke & Elsässer, 2013). These results were complemented by analyzes using data from the Federal Office of Statistics (Schlote-Sautter et al, 2013).

2 The Horeca Sector in Germany – German Federal Statistical Office

In Germany predominantly female employees work in the Horeca trade (57,7% female vs. 42,3% male in 2010). The age structure in this trade is particularly young (see figure 1, Data of the Federal Office of Statistics).

Fig. 1: Age structure of the Horeca workforce in percent in Germany
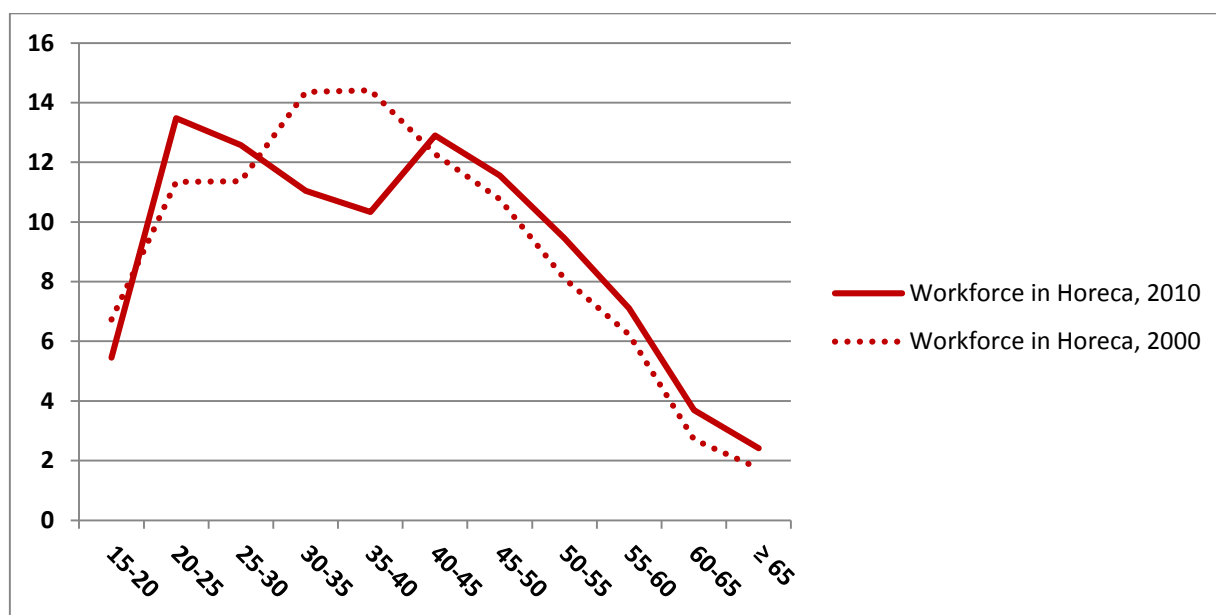
Fig. 2: Age structure of the workforce of all branches of trade in percent in Germany (Data of the Federal Office of Statistics).

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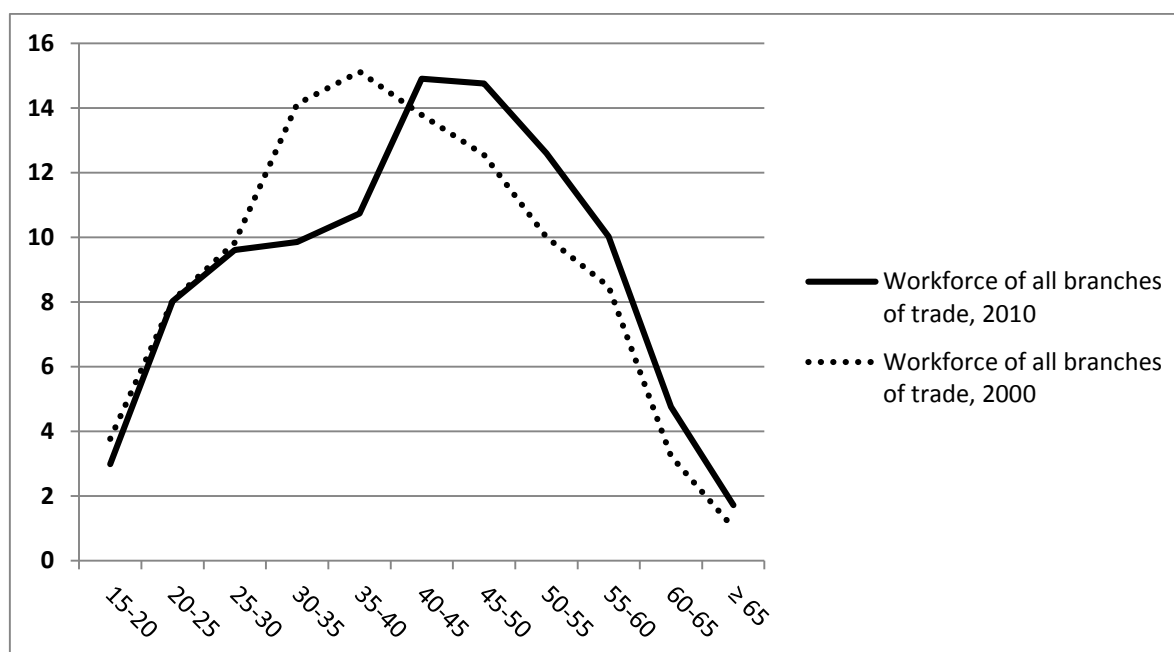
In all branches of trade the percentage of workers of age 50 years and more increased by 6.3 percent, from 22.8 percent in 2000 to 29.1 percent in 2010. In the Horeca trade, however, it only increased by 3.9 percent from 18,8 percent to 22.7 percent, respectively.

At the same time the percentage of workers below 30 years of age dropped by 1.5 percent (from 21.9 percent in 2000 to 20.4 percent in 2010) in all branches of trade, while the high rate of young employees in the Horeca sector even increased by 2.1 percent (29.4 percent in 2000 and 31.5 percent in 2010)!

Within the period of these ten years the number of part-time workers increased considerably. Another feature of the Horeca trade is its high percentage of workers with a migration background: 39.5%.

3 The Situation of Older Employees in the Horeca Trade: Data from the Survey

About 50 percent of the respondents of the age structure survey worked in a hotel or boarding house, about a quarter in restaurants (Hemke & Elsässer, 2013). The other respondents had a job in coffee bars, pubs and other establishments. Almost half of the respondents worked in small enterprises with up to ten employees.

About 20 percent of the respondents in the survey were 50 years or older.

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Fig. 3: Type of enterprise where respondents worked (n = 310, missing n=8)
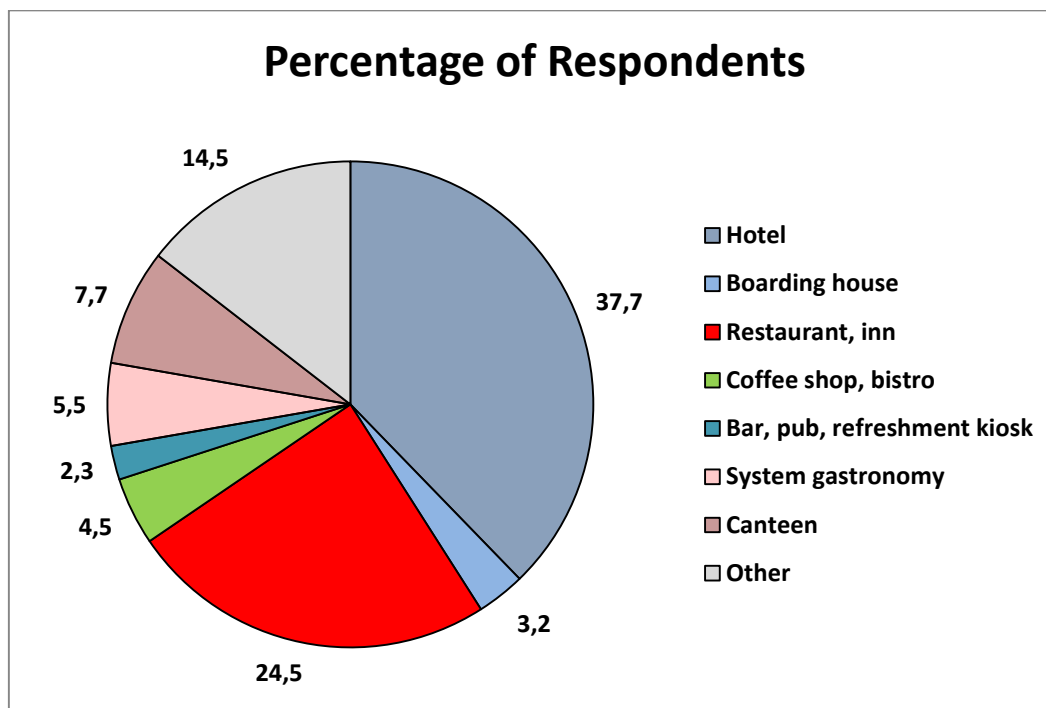
Mostly respondents of age 50 years or older were employed in enterprises with more than 50 employees (Fig. 4).

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Fig. 4: Size of enterprises where respondents of 50 years and older worked
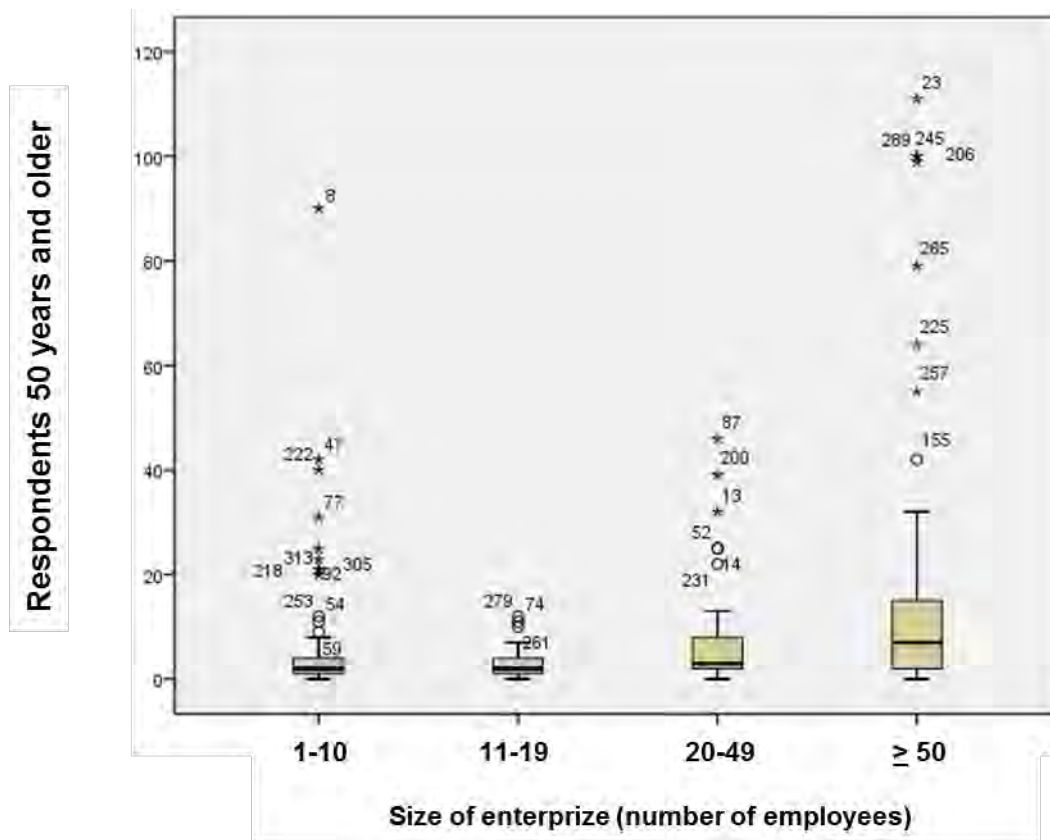
In 2013, an online survey was started researching which work areas are a good fit for employees above the age of 50 years in Horeca (Fig. 5). Especially in administration, reception work and building services, the employability of older workers was perceived at least as good as or better than for younger individuals. Furthermore respondents see a good fit in the service and kitchen area as well. Only in the floor service the employment of older workers compared to younger worker is perceived as more difficult. The survey shows, that the catering and hospitality industry offers a wide range of employment and career opportunities, not only for young people.

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Fig. 5: Perceived employment options for older workers in different areas of work in the Horeca trade
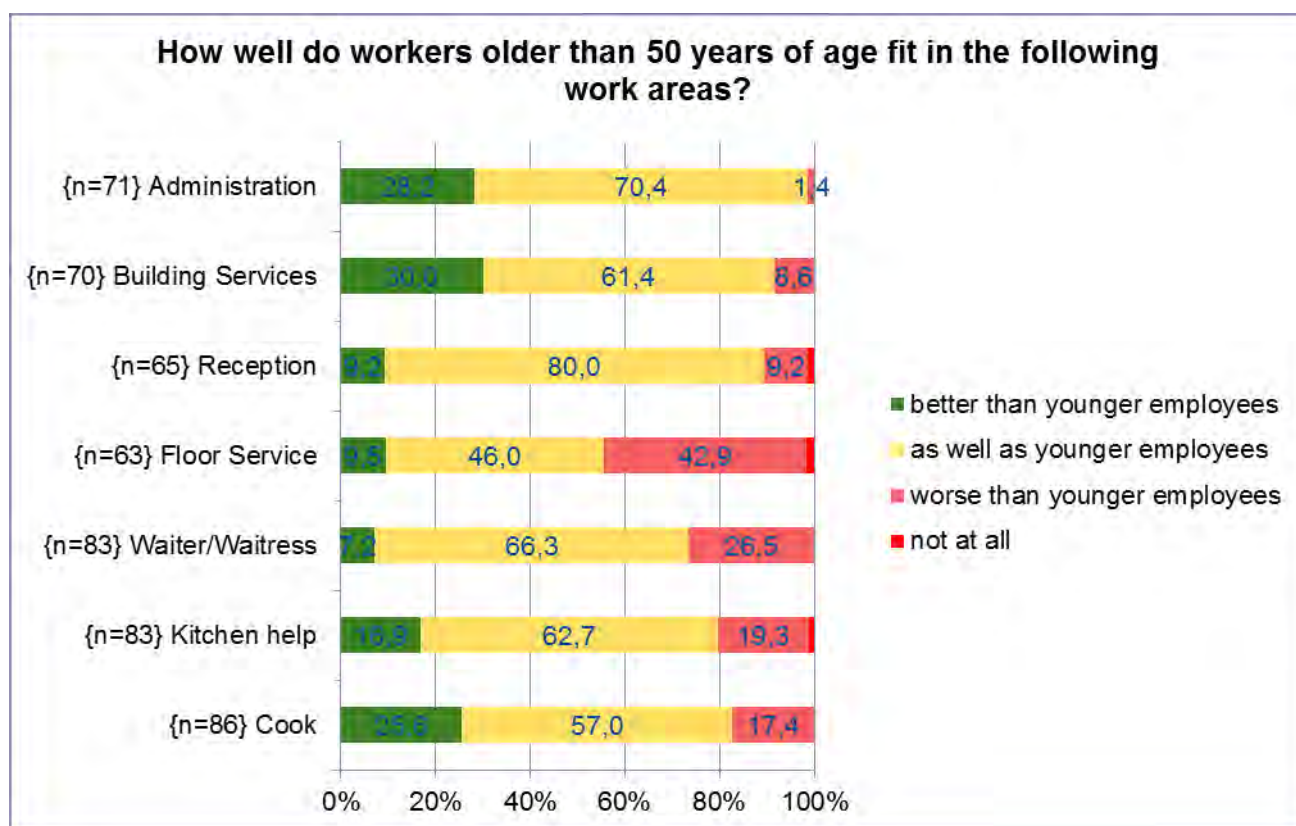
4 Conclusions (possible employment options)

Older employees have possible employment option in the catering and hospitality industry if they get the chance to be hired!

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SMEs cooperate to meet social procurement conditions

P.A.T. Oden[39]

Abstract A growing amount of (semi) public organizations in the Netherlands write tenders with mandatory social conditions. It is important for SMEs to focus on social procurement in their business strategy. SMEs should be proactive and try to affect the conditions (semi) public organizations write in their tenders. On the other hand, (semi) public organizations should facilitate SMEs by developing transparent procurement processes and by organizing information meetings with SMEs. The most important factor for an effective social procurement procedure seems to be the dialogue between SMEs, purchasers and the persons responsible for matching target groups. Because it seems easier for SMEs to meet social procurement conditions if they cooperate with other SMEs and set up labour pools, we performed an exploratory research on the formation of labour pools. The labour pools can be set up by SMEs in the same branch or in a cooperation chain. Our research shows that entrepreneurs require a lot of perseverance in developing a labour pool. It also appears that labour pools without commitment of public authorities are not effective.

1 Introduction

From 2008 the rate of unemployment in the Netherlands increased because of the economic crisis. The rate of unemployment in the Netherlands increased from 3.8 percent in 2008 to 9 percent in the first quarter of 2014. At the beginning of 2014 438,000 unemployment benefits were provided, the highest number ever. In addition, more than 400,000 people received a social assistance benefit.[40]

In order to stimulate employment, the Dutch government develops all kinds of instruments, which might create extra jobs. One of the instruments is socially sustainable public procurement, in short social procurement.[41] In 2011 the national government decided that tenders higher than EUR 200,000 should have the mandatory social condition that enterprises who got the tender should create extra jobs for persons who receive an unemployment or disability benefit and who have a so called distance to the labour market. Because the purchasing volume of the National Government in the Netherlands amounts to more than a billion euros it seems possible to create jobs with this instrument. Because (semi) public organizations are also willing to contribute to stimulate employment, they put mandatory social conditions in their tender calls too.

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[40] Edzes, Dorenbos & Van Dijk, 2015

[41] In the Netherlands socially sustainable public procurement is called social return, which is the abbreviation for social return on investment (SROI)

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MKB-Nederland Noord, a regional office of the Royal Association MKB-Nederland - the largest entrepreneurs' organization in the Netherlands – noted that small and medium-sized entrepreneurs (SMEs[42]) in the North of the Netherlands often lack knowledge of meeting the conditions to spend part of the value of the tender on persons with a distance to the labour market. MKB-Nederland Noord stated this might cause an unfair competition of SMEs with large companies, who have more opportunities to meet social conditions in tenders. So MKB-Nederland Noord requested the Centre of Applied Labour Market Research of the Hanze University of Groningen (Hanze UAS) to support SMEs in fulfilling social conditions in public procurement.

Together with professor Louis Polstra MSc. (Labour Participation), also member of the Centre of Applied Labour Market Research, and professor Gert Walhof MBA (Purchasing Management) of the Centre of Applied Research Entrepreneurship, we set up a research project. The research project aimed to develop recommendations for SMEs to improve their knowledge about social procurement and indirectly their competitiveness.

Below we will present the results of this research that was performed in the period between March 2012 and March 2014.[43] One of the main conclusions of the research on social procurement was that entrepreneurs argued it would be easier to comply to social conditions in tender calls if they cooperate with other entrepreneurs. One of the entrepreneurs, who participated in the research on social procurement, asked us whether a cooperative was suitable as legal form of a labour pool he wanted to develop. Also, Bouwend Nederland Regio Noord, an association of construction and infrastructure companies, requested us to advise them about the development of a labour pool entrepreneurs were setting-up. We decided to perform a research project on the formation of labour pools by entrepreneurs. We studied the legal aspects of the formation of labour pools as well as the experiences of entrepreneurs with labour pools.[44]

Before a description of the results of the research on social procurement and labour pools can be given we will present an explanation about the regulation of social procurement.

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[42] In this research SME was defined according to the Dutch definition: a company with less than 250 employees, an annual turnover of 50 million euros or less, or a balance sheet total of EUR 43 million or less.

[43] See also: Oden & Beukeveld (ed.), 2014

[44] See also: Oden, Beukeveld & Van der Woude, 2015

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2 Social procurement

2.1 European regulations

In the European Union social procurement is regulated by the 'Procurement Directives'.[45] Firstly we will describe the main principles of the regulations of the European Union, because these regulations largely determine the policy of social procurement in the Netherlands.

The Procurement Directives give the opportunity to take account of social considerations in tenders, provided they are linked to the subject matter of the contract and are proportionate to its requirements and as long as the principles of value for money and equal access for all EU suppliers are observed. The European Commission describes that social considerations may be applied if they promote, among others:[46]

'(…)
- diversity policies and employment opportunities for persons from disadvantaged groups (e.g. migrant workers, ethnic minorities, religious minorities, people with low educational attainment, etc.);
- promotion of employment opportunities for people with disabilities, including through inclusive and accessible work environments.'

According to the European Commission contract performance clauses are generally the most appropriate stage of the procedure to include social considerations relating to employment and labour conditions of the workers involved in performance of the contract. Sustainability requirements may also be incorporated in the technical specifications of a public tender, in the contract performance conditions and in the award criteria. As stated before, the social dimension must be linked to the subject matter of the contract (meaning the actual supplies, services or works which the contracting authority wants to buy) and comply with all EU rules and principles applicable to technical specifications in public procurement.

Potential bidders are allowed to submit socially responsible variants. The contracting authority can use variants to support social standards by allowing comparison between standard solutions and social options (based on the same standard technical requirements). Companies are free to make offers based either on the standard solution or on the variant, unless indicated otherwise by the contracting authority.

European regulations allow public authorities to organize a dialogue with potential bidders before finalizing the specifications, because this can help to identify opportunities to promote equal opportunities and sustainability. According to the European Commission these discussions can establish the best scope for requirements so that they are commercially viable, by making sensible arrangements for allocating and managing risk. Comparing current services with what is provided elsewhere could also help. The European Commission stresses it should be avoided that any particular supplier is put at an advantage.

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[45] Directive 2004/17/EC of the European Parliament and of the Council of 31 March 2004 coordinating the procurement procedures of entities operating in the water, energy, transport and postal services sectors and Directive 2004/18/EC of the European Parliament and of the Council of 31 March 2004 on the coordination of procedures for the award of public works contracts, public supply contracts and public service contracts.

[46] European Commission, 5, 2010, the following is also largely based on the Guide *Buying Social*

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The contracting authorities cannot limit competition to bidders that already have an office within a certain geographical area. Purchasers are also not permitted to reserve performance of contracts for particular classes of firm, as that would breach the equal treatment requirements of EU law. As an exception, Member States are allowed to grant preferences to enable sheltered workshops[47] to exist without having to compete with other economic operators. This is allowed because sheltered workshops and sheltered employment programs contribute towards the integration or reintegration of people with disabilities in the labour market, but might not be able to obtain contracts under normal conditions of competition. In 2014 this possibility is extended with social businesses whose main aim is to support the social and professional integration or reintegration of disabled and disadvantaged persons, such as the unemployed, members of disadvantaged minorities or otherwise socially marginalized groups.[48]

In 2014 new regulations were adopted by the European Parliament and the Council of the European Union and enter into force on 18 April 2016.[49] Member States have to implement the new rules into national law before April 2016.

The new Directives describe that public procurement plays a key role in the Europe 2020 strategy and that it is one of the market-based instruments to be used to achieve smart, sustainable and inclusive growth while ensuring the most efficient use of public funds. Main goals of the Procurement Directives of 2014 are the facilitation of the participation of small and medium-sized enterprises (SMEs) in public procurement and enabling procurers to make better use of public procurement in support of common societal goals. The legislation simplifies public procurement procedures and makes them more flexible. The principles, which determine the policy on social procurement, are clarified.

Now the European regulations are being set out, the Dutch regulations will be clarified.

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[47] In these workplaces most of the employees are handicapped persons. These sheltered workshops have different names in the different Member State. The Directives cover all similar entities (no matter what they are called) provided at least 50 % (in the new Directives 30%) of the staff employed are disabled or disadvantaged persons.

[48] Directive 2014/24/EU and Directive 2014/25/EU

[49] The new Directives are: Directive 2014/23/EU of the European Parliament and of the Council of 26 February 2014 on the award of concession contracts, Directive 2014/24/EU of the European Parliament and of the Council of 26 February 2014 on public procurement and repealing Directive 2004/18/EC and Directive 2014/25/EU of the European Parliament and of the Council of 26 February 2014 on procurement by entities operating in the water, energy, transport and postal services sectors and repealing Directive 2004/18/EC.

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2.2 Social procurement in the Netherlands

In the Netherlands the following organizations are obliged to set out tender calls:

- The national government;
- Municipalities, provinces and water boards;
- Bodies governed by public law (such as universities and schools);
- Special-sector companies (such as water, energy, transport and postal).

European directives prescribe the threshold, above which Member States are obliged to set out a European procurement. Every two years the threshold is determined by the European Union. Procurement Law of the Member States regulates procurements under this threshold. In the Netherlands the Procurement Act 2012 regulates this. In order to implement the new Directives into this law the Dutch government is preparing a legislative proposal. In the proposal it is written that the ambitions of the Dutch Procurement Act 2012 connect with the new European Directives. According to the Dutch government the new Directives may facilitate the implementation of social procurement policy. In particular two procedures, which already were possible, but are now included in the new Directives, namely market consultation and innovation partnership, may contribute to this. Market consultation gives contracting authorities the opportunity to inform entrepreneurs about the procurement plans and requirements before launching a procurement procedure. Innovation partnership gives contracting authorities the possibility to limit the number of candidates invited to submit a tender in order to obtain an innovative product, work or service. The Dutch government also considers the possibility of granting preference to sheltered workshops as well as social businesses is align with the Dutch legislation, which stimulates labour participation of disabled and disadvantages person.

With regard to social procurement the Dutch government decided in 2011 that tenders above EUR 200,000 should consist of the social condition that enterprises who got the tender should create extra jobs for persons with a distance to the labour market. Next to the national government some provinces and a majority of the municipalities in the Netherlands implemented social procurement. According to TNO, a Dutch independent research organization, in 2010 between 42% and 62% of the municipalities in the Netherlands applied social procurement.[50] Especially larger municipalities, with 50,000 or more inhabitants, apply this policy. TNO also showed that social procurement is relatively much applied in the sectors caring, landscaping, cleaning and construction. Honours students of the Hanze UAS found that in 2012 in the North of the Netherlands the three provinces, as well as about two-thirds of the municipalities applied social procurement.

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[50] TNO 2010. In this research 90 municipalities were questioned; this concerned the largest municipalities of the 441 municipalities in the Netherlands.

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3 SMEs and social procurement

As described above, in 2011 MKB-Nederland Noord requested us to support SMEs in the North of the Netherlands to fulfill social conditions in public procurement.

The research consisted of five subprojects:

1. A study of best practices in the Netherlands;
2. Development of recommendations;
3. Focus groups of entrepreneurs, purchasers and persons who supply target groups: discussion about the recommendations;
4. Implementation of the recommendations in SMEs and evaluation of the recommendation through interviews and a survey;
5. Roadshow: dissemination of the results of the research.

Three professors, five lecturers and fourteen students carried out (some of) the subprojects. In the following paragraph a brief description of the conducted study will be given including the main results of the five subprojects.

3.1 Best practices of social procurement in the Netherlands

In our research five municipalities in the Netherlands were considered best practices: Amsterdam, De Drechtsteden, Helmond, Maastricht and Rotterdam. Lecturers together with students, who prepared their graduation paper, studied the success factors and failures of these best practices. The students, lecturers and two of the professors had monthly meetings. In these learning communities the students worked on the research design and exchanged experiences about doing research.

The most important results of the study of the best practices:
  ➢ SMEs are best served when there is one front office where they can ask all their questions about social procurement.
  ➢ A creative formulation of the tender call offers more possibilities to SMEs to meet the mandatory social conditions in tenders.
  ➢ In order to get an appropriate formulation of social conditions in tenders it is important to organize a dialogue between SMEs and purchasers before the tender call is set out.
  ➢ For a successful implementation of social procurement it is necessary that SMEs, buyers and organizations that supply target groups cooperate.
  ➢ Before target groups can be placed on workplaces in SMEs, it is important that they are trained in labour skills.

One of the results is that a creative formulation of the tender would give SMEs more opportunities to get the tender awarded. For instance, it is very difficult for a removal firm to set up a workplace for disabled people. It makes it easier if the company is allowed to give the candidate an administrative job. However, a study on the legal permissibility of social procurement in the Netherlands by two of our legal lecturers showed that the Dutch Procurement Act 2012 prescribes that the social conditions in a tender have to be in a proportionate relation to the subject matter of the contract.[51] In the Netherlands only procurements of very small amounts give the opportunity to be creative in the description of the social conditions. The conclusion must be that because the law does not fully take into account the possibilities SMEs have in their organization to place persons with a distance to the labour market, it makes it very difficult for them to meet social conditions in tender calls. So the current Dutch law is not supportive of SMEs.

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[51] Hornstra & Werkman-Bouwkamp, 2013

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3.2 Development of recommendations

In the second subproject the lecturers and professors formulated recommendations about social procurement on the basis of the information of the best practice research. The recommendations were not only aimed at SMEs, but we also developed recommendations for purchasers and for persons who supply the target groups.

For each category we developed three core recommendations:[52]

SMEs:
1. Public procurement could be interesting for you as SME and then social procurement is automatically included.
2. Make sure you have influence on the decision making process about social procurement;
3. Make arrangements in your organization in order to be able to apply social procurement.

Purchasers:
1. Social procurement is part of the strategic policy of your organization. Make sure this strategic policy is applied and carried out by all organization levels.
2. Develop a purchasing policy in which social procurement is included transparantly.
3. Make sure to be transparent and consistent in the application of social procurement policy.

People who supply target groups:
1. Make sure to be transparent and consistent in the placement of target groups and give priority to unburdening SMEs.

3.3 Focus groups

In the third subproject of the research we presented the recommendations to SMEs, purchasers and persons who supply target groups. The first focus group meeting we organized was with SMEs, the second one was with purchasers and persons who supply targets groups and finally we invited SMEs as well as purchasers and persons who supply targets groups. The information we got from the focus groups confirmed and strengthened the recommendations we had formulated.

Other results from the focus groups are:

➢ SMEs came to the understanding that there are different target groups, which can be deployed: not only unemployed, but also disabled people and even apprentices.
➢ SMEs came to the understanding that they could choose target groups, which match best with the tasks in their organization.
➢ SMEs stated procurement is a time-consuming activity and they experience it as an extra burden if social conditions are included in tenders. SMEs got the idea they could cooperate and thus increase their chances in a tender call. For example, a removal firm, a painting firm and a cleaning firm discovered they could create chain cooperation in order to meet the social conditions more easily.
➢ Purchasers came to the understanding they can formulate criteria in tender calls, which stimulate SMEs to promote themselves with social procurement and thus be invited.
➢ During the last focus group meeting, where all participants of the research met, a mutual understanding arose between the SMEs, the purchasers and the persons who supply targets groups. This showed that dialogue is crucial in a social procurement process in which SMEs can really participate.

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[52] This paper is not suitable for a full description of the sub recommendations. For a full description see: Oden & Beukeveld, 2014.

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3.4 Implementation and evaluation

During the research the following five stages in a tender process were differentiated:

1. Pre-phase before the tender takes place: SMEs should promote themselves in the market. The business operations of SMEs are decisive.
2. Preparation phase: formulation of the tender documents.
3. Contracting phase.
4. Implementation phase.
5. Monitoring phase.

The results of the best practices and focus groups show that the contracting phase is not the most problematic for SMEs during the procurement process. Once SMEs are invited to join the procurement process they are able to make proper arrangements. The other stages are more problematic.

Public authorities often do not pay special attention to SMEs (phase 1). As a result, the formulation of social conditions in tenders is such that SMEs cannot meet those conditions (phase 2). In order to avoid these problems and to improve the competitiveness of SMEs with 10 – 50 employees the best practices and the focus groups showed that it is important for SMEs to proactively influence both the pre-phase as well as the preparation phase. It is also important contracting authorities invite SMEs for information meetings in the pre-phase. In these meetings the contracting authorities can show in what way social procurement could be feasible for SMEs. Also SMEs can show in what way they can meet the social procurement conditions. Another advantage of these meetings is that SMEs get the opportunity to meet other companies with which they can start cooperation, which makes it easier to meet the conditions of social procurement.

With regard to the implementation phase and the monitoring phase the research shows that companies often do not stick to the agreements, which derive from the tender. On the other hand the authorities do not always check whether the agreements are fulfilled or not; nor do they apply sanctions.

To study the processes of social procurement we implemented the recommendations in five SMEs. Because the research shows that the pre-phase and the preparation phase (stage 1 and 2) are important, in this part of the research we concentrated on the successes and failures in these phases.

Firstly, lecturers, in the role of consultants, implemented the recommendations. Secondly, other lecturers interviewed representatives of the SME about their experiences with the recommendations. After a few months the representatives were interviewed again.

The results of the interviews gave a confirmation of the results of the focus groups. Important results were:
- ➢ To fulfil social procurement conditions it is attractive for SMEs to cooperate in a chain.
- ➢ It is important to unburden SMEs with regard to the costs and guidance of the target groups.
- ➢ Cooperation and coordination of the contract authorities, SMEs and the persons who supply target groups: the triangle of these three groups turned out to be crucial for the success of the implementation of social procurement.

In order to get information about the contracting phase we set out a survey. Although, the response was only eight percent the results of this survey gave a confirmation of the former results.

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3.5 Roadshow: dissemination of the results of the research

At the end of the project we made a fan-shaped leaflet with the recommendations, which were the result of our research. We used those leaflets to disseminate the recommendations among other SMEs than the participants in the research. We requested a graduate student of Hanze UAS to study how we could disseminate the recommendations in the best way possible. This graduate research showed that SMEs could best be approached during meetings they were already visiting.

We decided to join the Week of Entrepreneurs of MKB-Nederland, which was in Groningen in October 2013. We dispersed the leaflet among the attendees and advised SMEs about social procurement. Also, one of the professors, a lecturer and an entrepreneur gave an interview about the recommendations through a google-hangout movie, which was made by MKB-Nederland. We also presented the research at a meeting of a local business association.

The recommendations and the publications of the research were presented on Internet and linked with the websites of organizations, such as MKB-Nederland Noord, the Procurement Platform Groningen, the Association of Dutch Municipalities and several purchasing advisory organizations.

3.6 A negative effect of social procurement: crowding out

In our research we noticed that social procurement could lead to the following unwanted situations. A municipality decided that unemployed people should realize the transportation of disabled children and set out a tender call in which this was one of the mandatory conditions. They decided that a company was awarded the procurement if it could fulfill this condition. However, this caused that employees of the company, who were responsible for transportation up to this point, were fired. Even employees who just had a job in this company as a bus driver and were very happy with their job, after years of unemployment. For a long time they had received social benefits and now they had to turn to the Social Benefit Office again. This negative consequence of social procurement also occurred in a tender call of a municipality, which concerned mail delivery. Because of this tender the mail deliverers of a company were fired and unemployed people were hired. So the instrument of social procurement caused crowding out of employees.

We requested TNO to do research on the crowding out effect of social procurement and offer strategies to prevent crowding out. The exploratory research of Andriessen and Brouwer does not show whether crowding out actually takes place, but they do give some evidence for crowding out because of social procurement.[53] According to some interviewees crowding out occurs in smaller companies and in certain sectors, such as construction and infrastructure, healthcare, catering and cleaning. This is not surprising because these are sectors in which social procurement is applied most frequently. In this research it appears that crowding out often occurs if there is not a long term placement of employees and in situations where employees lose their job and others have to be hired because of mandatory social conditions in tenders (in the Netherlands this is called a revolving door situation).

The research of Andriessen and Brouwer shows that social procurement candidates sometimes crowd out former employees who were placed on a project of a former social procurement. In this case the contract of the former employee is not extended, because the employer is forced by the tender call to place another candidate on a project.

One has to conclude that if conditions in social procurement cause that companies have to fire employees in order to get new employees these conditions in social procurement are unjust, especially if it concerns short-term projects. Andriessen and Brouwer show that in short-term projects all persons concerned in the social procurement experience disadvantages. The crowded out employees lose their jobs. But also people, who had a social benefit and get a job for a short time, because of the awarded

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[53] Andriessen & Brouwer, 2014

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tender, lose their job after the project is over and fall back in social benefit situation again. These persons get some work experience. But the question is whether this policy really improves their position on the labour market. The employees will most likely not be trained in the short time in which they are employed. Lastly, the concerning companies experience negative consequences too, because they have to let skilled employees go and have to introduce new employees only for a short period. This has a negative effect on the productivity and the profitability of the companies.

Andriessen and Brouwer conclude in their exploratory research that communication is crucial in preventing crowding out. (Semi) public authorities should give entrepreneurs the opportunity to give insight in the consequences for their company if they have to meet social conditions in tenders. If entrepreneurs have to let employees go, in order to meet the social conditions, because they have to hire other employees, such conditions should not be part of the tender call. Entrepreneurs should try to influence contractors and try to get support for alternatives, if necessary through branch associations. Andriessen and Brouwer advise public authorities to have a flexible attitude towards the way entrepreneurs might fulfill the social conditions in tenders.

3.7 Conclusion of research on social procurement

The research project on social procurement showed that a growing amount of (semi) public organizations in the Netherlands formulate tenders with mandatory social conditions. In our research we stress that it is important for SMEs to focus on social procurement in their business strategy and that they should be proactive and try to affect the conditions public and semipublic organizations formulate in their tenders. On the other hand we recommend (semi) public organizations to facilitate SMEs by developing transparent procurement processes and by organizing information meetings with SMEs. The dialogue between SMEs, procurers and the persons who supply target groups appears to be the most important factor for an effective social procurement procedure.

The research also shows that SMEs experienced procurement as a time-consuming activity. They have to provide a lot of information and still are not sure the tenders will be awarded. They experience it as an extra burden that social conditions are included in tenders. SMEs said it would be easier for them to meet social procurement conditions if they cooperate with other SMEs and by setting up labour pools, for instance in the same branch or in a cooperation chain.
4 Labour pools of SMEs

During the research on social procurement some of the participants as well as the manager of the Northern regional office of Bouwend Nederland Regio Noord contacted us about starting cooperation by SMEs. Together with these partners we decided to develop a research project on labour pools set-up by entrepreneurs.

We performed an exploratory research, which consisted of two parts:

1. Legal study: a desk research on the legal aspects of the formation of labour pools by entrepreneurs and on the legal status of the employees in the labour pool;
2. Social science study: interviews with entrepreneurs and key figures of different labour pools about their experiences in practice.

We selected seven practices of collaborating entrepreneurs in the Netherlands. Four of these concerned labour pools that already were founded. We interviewed nine key figures about their experiences with setting up a labour pool. Most of these labour pools had the legal form of a foundation. Because one of the entrepreneur requested us if we could advise him about labour pools in the form of a cooperative, we also examined this legal form. However, in practice there appeared to be no labour pool that had the form of a cooperative. In order to get some information about the practices of a

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cooperative, we examined a workers' cooperative that aims at stimulating employment, as well as an entrepreneurs' cooperative that aims at providing credits and stimulating employment in the region.

4.1 Legal aspects of labour pools

A labour pool can be created by a number of collaborating entrepreneurs who are willing to place qualified employees or apprentices on projects that come out of tenders with mandatory social conditions. The research shows that entrepreneurs prefer to set up a labour pool in the legal form of a foundation.

An advantage of a foundation is that it has no members, so the board can act instantly. Also, a foundation is easily accessible for companies to join. However, a foundation has no profit that can be distributed among those who are affiliated with the foundation. Another disadvantage of the foundation is that the affiliated entrepreneurs cannot join the formal decision-making. Because of this there is less involvement and affiliated partners can withdraw if they wish to. If too many companies withdraw, the continuity within the labour pool can be at risk, because the affiliated companies have to provide the work (experience) places. If the labour pool cannot provide workplaces the potential employees end up in a social benefit situation again, which is contrary to the aim of a labour pool.

The cooperative has a few benefits compared to the foundation. A cooperative can make profit and let members benefit from it. Labour pools may use the profit for insurances, training and pension for the employees (in an employers' cooperative) and for the members (in a workers' cooperative). With the profits also setbacks can be financed in periods with less projects where workers can be placed on. The members are free to join the cooperative and to terminate their membership. This may affect the capital of the cooperative. Because the members are bound by the rules within the cooperative it is possible to regulate under what conditions members are allowed to terminate their membership. In this way the continuation of work (experience) places is guaranteed. Members of a cooperative have control over the exploitation and operations of the cooperative. All members have an equal say in the cooperative. In an employer's cooperative, the companies have a say; in a workers' cooperative, the employees have a say. Cooperatives are highly democratic and there is a strong involvement of the members. However, in a large cooperative the involvement of the members and the internal democracy appears to be low. Another disadvantage of a cooperative is that in principal the members can (by law) be held liable for deficits.

4.2 Labour pools in practice: experiences of entrepreneurs

Setting up a labour pool requires considerable efforts from individual entrepreneurs. As we have seen in our research on social procurement SMEs think it is important to join forces. Yet, the research on experiences of entrepreneurs with labour pools shows that it takes a lot of time and persuasion to bind entrepreneurs to the labour pool. So the creation of a labour pool requires a lot of endurance of entrepreneurs in addition to the business operations of their own company. Setting up a labour pool requires a leading company. Also a well-known company may inspire and stimulate other entrepreneurs to join the labour pool.

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4.2.1 Purpose of a labour pool

For the participants in this research the aim of setting up a labour pool firstly is to provide continuity in the work (experience) places. The entrepreneurs want the employees be properly guided and they want to provide them sustainable workplaces. By cooperation they think that continuity might be guaranteed. By joining a labour pool which aims at training skills and which delivers experienced employees they also expect they will be better prepared for the future labour shortage, due to ageing. They also join the labour pool because they want to have a partnership that can serve as a link towards the municipality. A labour pool makes it easier to have contact with the municipality in an early stage. In this way entrepreneurs may have influence on the matching of the potential employees with the work.

4.2.2 Role of the municipality

The research shows that a good connection with municipalities is crucial for the success of the labour pool. If only employers participate in the labour pool it is not easy to connect with municipalities. Also for the continuity of work in the labour pool the municipality is an important link. The labor pool is dependent of the work (experience) places at the affiliated companies. Because of this, labour pools also depend on awarded tenders. By having an early insight into the planning of procurement, companies may be better prepared. It is therefore important that municipalities are transparent in the planning of their calls for tenders. If municipalities are members of the labour pool it is easier to make good arrangements about this.

4.2.3 Employees in the labour pool

The municipality preselects the employees in the labour pool. However, the research shows that the preselection is not always successful. Entrepreneurs state that too often they get candidates who do not have the appropriate competences. They have the experience of mismatches between the candidates and the work. They would like to have access themselves into the files of the municipalities, because they know what they want and think they can make a better match between the candidate and the work.

In order to get a better matching it appears crucial that there is commitment of municipalities with the labour pool. The research shows that if municipalities were involved in labour pool the matching went better.

The employers pay a certain rate to the labour pool. In that rate the salary and the costs of training and supervision of the employees are taken into account.

The workers are employed in the labour pool on the basis of a regular employment contract. On the basis of this they can be posted at the affiliated companies. The company at which the employee is posted has to pay the salary.

Apprentices who follow training on the job can also be placed in a labour pool. In this case, the contract of employment is connected with the training on the job.

The labour pool is the official employer of the employee and of the apprentice. The labour pool often performs the guidance and management. The guidance is mainly focused on technical skills.

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Sometimes benefit recipients lack employee skills. Entrepreneurs state that they prefer employees who already possess labour skills, such as being on time.

4.2.4 Labour pool as a means to meet the Participation Act

On 1 January 2015 the Participation Act came into force in the Netherlands. This act put together the Dutch regulations on the benefits of unemployed people and disabled people. There is now one law for people with working capacity. The Participation Act is the result of the agreement between the Dutch cabinet, the employers' representatives and the workers' representatives. Also part of the agreements is the regulation that companies have to hire a certain number of disabled persons. The parties agreed that in 2026 125 000 disabled persons should have a job in regular work places. This agreement is being monitored. If at the end of 2016 companies do not have created enough jobs for disabled people a quota is being implemented. The quota implies that companies with more than 25 employees must hire a certain percentage of disabled employees otherwise they are risking a fine.

For entrepreneurs who are willing to be prepared for the new law it is profitable to join a labour pool. In the counting of the jobs with regard to the Participation Act, jobs in labour pools also count. Because these jobs count, joining a labour pool increases the opportunities for employers to comply with the Participation Act and prevent they get a fine. However, our research shows that entrepreneurs hardly take this new law into account.

4.2.5 Conditions for success of labour pools

The conditions for a successful labour pool are:

1. Commitment of companies that offer work:

Labour pools can only offer sufficient jobs if entrepreneurs are committed to the labour pool. It is crucial that entrepreneurs offer workplaces on which they can put employees out of the labour pool. In this way in the long run they have qualified employees who match with the work and who possess employee skills.

2. Commitment of municipalities:

The cooperation and commitment of municipalities are of a big support to the goals of the labour pool. Municipalities can inform the affiliated entrepreneurs in an early stage about tenders. This way, entrepreneurs can be prepared on the oncoming projects and the municipality can match the qualified employees at the right moment.

Experts on the inclusive labour market confirmed the results of our study. Especially the difficulties entrepreneurs face in cooperation with municipalities were emphasized. In addition to our research it is indicated that labour pools can function well for people with an unemployment benefit, but the question is whether the labour pool also functions for people with disabilities, especially those with a mental limitation. It may be difficult to handle for them if they are being placed in several organizations.

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4.3 Conclusion of research on labour pools

This exploratory research shows that SMEs are willing to set up labour pools in order to develop sustainable labour for target groups who have a distance to the labour market. The aim is to let target groups rotate in a labour pool on projects, which emanate from social procurements. Our research shows SMEs require a lot of perseverance in developing a labour pool. It also appears that SMEs want to develop labour pools without the help of public authorities. However, it seems that labour pools without commitment of public authorities are not effective.

5 Instruments that create new jobs

In our research we have seen that Dutch government as well as municipalities and other (semi) public authorities try to create jobs by more or less forcing entrepreneurs to create extra workplaces. Entrepreneurs, especially those who want to undertake social responsibility decide to cooperate and set up a labour pool. Our research shows that they do this because they want to contribute to regional employment and offer employees a sustainable working relationship.

However, in practice it turns out to be difficult to meet the needs of entrepreneurs and to get the right person at the right workplace. At a meeting in the framework of our research entrepreneurs said the matching of candidates must be improved in order to get social procurement working. On the other hand representatives of the municipalities said that entrepreneurs are not always specific in their needs. It turned out to be difficult to bring together the different cultures of entrepreneurs on the one side and (semi) public authorities on the other side.

The question remains whether it is effective to force entrepreneurs to include certain groups in their organization. The current Dutch Government thinks it is and forces entrepreneurs to create workplaces for disabled persons. Without attention to the needs of employers regarding the matching of the candidates and the guidance of them, it may be expected that this policy will not succeed.

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Using governance to understand how to improve an SME's success with introducing ehealth applications in Dutch healthcare organisations

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Abstract

The objectives of the Government with regard to ehealth are still in sharp contrast to the present situation regarding the use of ehealth. This has not so much to do with technical possibilities, nor with supposed healthcare organisations' reluctance to adopt ehealth solutions. Many technically adequate ehealth solutions are available and healthcare managers see the benefits and want to make use of ehealth applications. Still, adoption falls way below stated ambitions. We argue that governance aspects play a role in the limited use of ehealth applications. In a case study, we looked at the adoption of patient portals by hospitals. It shows that on the one hand, many patients are not aware of the benefits of patient portals while at the other hand, these patients would like to make use of these benefits.

The development towards a mature digital organization follows four of phases. The first phase is the Frame phase, in which digital challenges are defined. The second phase is the Focus phase, in which direction is given to the ehealth investments. The next phase is the Engage phase, where the organisation is mobilized. The final phase is the phase of Sustain in which the change is anchored in the organisation. Within the Engage phase, one core bottleneck is that digital transformation is not supported by digital means. In this phase are opportunities for SME's. The Hanze University of Applied Science can combine its expertise in the field of ICT with knowledge of communication and knowledge game design and user experience to contribute to the effective communication on ehealth applications by researching communication patterns and developing communication means.

Introduction

Information and Communication Technology (ICT) is becoming increasingly important in healthcare and healthcare providers are spending significant efforts to reach a level of utilisation of ICT that has become common in other domains. Not only does ICT promise benefits for generic, business-like activities within healthcare organisations, such as planning and operations, billing and accounting, payrolling and procurement, but also for specific healthcare activities related to the core processes of care and cure. In this paper, we use the term 'ehealth' to indicate any use of ICT in healthcare.

Despite the potential of ICT for healthcare, the adoption of ICT by healthcare organisations – both to support business activities and to support care and cure activities – remains problematic [REF]. One example is the failure in the Netherlands to create a standardised, national Electronic Health Record (EHR) (Thole, I.M., & Sigterman, 2011). The opportunities and benefits of adopting ICT by healthcare organisations are well accepted in general, but getting ICT implemented and used extensively offers many domain-specific challenges. And while big companies will have a hard time taking up these challenges, most SMEs would lack the resources to do so successfully. In our research, we try to come up with a better understanding of the mechanisms involved in the adoption of ICT in healthcare organisations to create tools and mechanisms that enable SMEs to enter this fast growing market successfully.

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The slow adoption of ehealth has several causes, some of which are due to the specific nature of healthcare. The approach to innovations in healthcare have been characterised by a lack of homogeneity and by a lack of attention to governance (Locatelli, Restifo, Gastaldi, & Corso, 2012). As an illustration, the abovementioned failure of introducing a national EHR in the Netherlands was also more due to a lack of governance, i.e. lack of communication, than to technical challenges (Twist, 2012). In this paper, we discuss how governance influences the success or failure based on data available for the implementation of one particular ehealth application, i.e., patient portals for hospitals.

We define "governance" as the processes of interaction and decision-making among actors involved in a collective endeavor that optimises achieving intended results and information sharing.

This paper is structured as follows. First, the Dutch healthcare system is described. Second, we examine the ehealth ambitions formulated by the Dutch government. Third, we describe patient portals and their functionality in hospitals. Fourth, we discuss the role of governance is this particular example. Finally, we use this case study to make recommendations for future research into the use of governance by SMEs to ensure successful ehealth applications.

The Dutch healthcare system

The Dutch healthcare system is set up as a free market constrained by government supervision. Every year, the government fixes a basic health insurance policy package, i.e., tariff and covered costs. This package includes basic medical costs and is open to all citizens with no preselection or tests. Health insurance companies offer this package. Health insurance companies offer additional packages for an extra fee, but these may require preselection. The basic package includes a deductible (currently 350 euro), which is also fixed by the government yearly. Health insurance companies sign contracts with healthcare providers to obtain favourable tariffs for all kinds of standardised diseases and interventions. Thus, the major stakeholders are patients, government, health insurance companies and healthcare providers.

Patients are entitled to a basic package and pay a monthly fee. There is a standard, fixed deductible determined by the government. Patients may choose any health insurance company and opt for a higher deductible (resulting in a lower tariff) or for additional coverage, provided the health insurance company accepts the patient for this additional coverage.

Healthcare is organised in primary, secondary, and tertiary care. Primary care is available without referral, secondary and tertiary care only after referral by primary care such as general practitioners or family doctors. General practitioners play an important role in this system, because they act as a gatekeeper and are instrumental in keeping costs and the load on the healthcare system down. Remuneration of secondary and tertiary care is structured in the form of standardised diagnosis-treatment combinations (Diagnose Behandel Combinaties – DBCs). The remuneration for a DBC is set in the contract between health insurance company and healthcare provider. This remuneration is based on the estimated average cost of treatment and not on actual costs.

In 2013, the total cost of healthcare in the Netherlands was €94.2 billion, €5608 per resident.[54] The way the healthcare system is organised in the Netherlands, combined with a high level of organisation of patient interest groups, have put the Netherlands at the top of the Euro Health Consumer Index (Björnberg, 2015) in 2013 and 2014. But it also makes it harder for SMEs to be

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[54] Based on census information by the Dutch national statistics bureau CBS for 2013.

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successful in introducing ehealth applications because of the number of stakeholders involved, the way remuneration is organised, and the way this influences the business case for all stakeholders.

Ehealth in the Dutch healthcare system

Although healthcare in the Netherlands is well-organised, there are some major concerns. Costs are increasing rapidly and the affordability in the long run is questionable: the last 20 years costs have gone up from just €7 billion to over € 90 billion annually. Because the average life span increases, more people are chronically ill and for long periods of time dependent on healthcare.

It is important that patients with chronic diseases can receive care without having to go to a hospital or general practitioner all the time. Self-management, including self-measurements and self-treatment, as well as better access to health information and remote monitoring are important innovations for chronic patients. According to the Dutch Ministry of Health, Welfare, and Sport, ehealth plays a crucial role in making this possible, thereby improving the quality of healthcare, the quality of life, as well as keeping costs down (Schippers & Rijn, 2014).

But while the need is clear, actual adoption of ehealth by healthcare organisations in the Netherlands falls behind in comparison with other countries (KPMG, 2012). Identified barriers are the complexity of the current remuneration system, lack of cooperation, lack of coordination, lack of trust, and lack of knowledge on the potential of ehealth. These are governance issues, not technical issues. This understanding has led to the formulation of a healthcare system-wide agreement to address these governance issues (Convenant Governance eHealth, 2013).

Moreover, the Ministry of Health, Welfare, and Sport has formulated targets for adoption of ehealth by the healthcare system. In a letter to the parliament, the minister of health has formulated targets for the coming 5 years (Schippers & Rijn, 2014):

- 80% of all chronically ill citizens should have access to their medical data regarding medication, test results, and vital functions and be able to use these in mobile and web applications.
- 40% of all citizens should have similar access to their data.
- 75% of all chronically ill (diabetes and COPD) and elderly citizens should be able to self-measure and share the data with a healthcare provider for telemonitoring.
- 100% of all citizens receiving home care should be able to contact a healthcare provider 24/7 via videoconferencing tools (such as Skype or Facetime).

Governance aspects of ehealth

The healthcare sector has certain characteristics which are troublesome for the adoption of ehealth (Locatelli, Restifo, Gastaldi, & Corso, 2012). One of these is the need for reliability and security of data. On the one hand, data must be absolutely reliable: lives depend on it. On the other hand, access to data should only be given to those who have a need and a right to see it because of the privacy of health related data. National and international regulators such as the WHO (World Health Organisation) as well as health insurers all put strong requirements on the reliability and security of health related data. ICT providers may not always have a business case in light of these requirements, including the legal implications of not having been able to maintain the reliability and security requirements.

Another characteristic which hinders the adoption of ehealth is the fact that healthcare organisations have a strict division of responsibility between operational management and medical management. A

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medical professional is by law entitled to making decisions in the treatment of patients based on medical grounds alone. No administrator may overrule these decisions based on operational grounds such as costs. Consequently, an ehealth innovation that may be very attractive to one party in a healthcare organisation may be less so to another party and be blocked by the latter. Furthermore, healthcare organisations, especially hospitals, may have many different specialisations under one roof, each with their own priorities and decision making. The culture in healthcare is still often hierarchical and specialist, which is not supportive of a collaborative, multidisciplinary way of working. Given the fact that many healthcare professionals are not very receptive regarding ICT-based solutions, getting an ehealth application adopted is a complex persuasion and decision making process (Locatelli, Restifo, Gastaldi, & Corso, 2012) (Kane & Labianca, 2011).

Different sectors have different attitudes towards ICT adoption. The banking sector, for example, has a much higher adoption rate than many other sectors, including healthcare. In a worldwide survey, CAP Gemini and MIT studied the level of adoption in different sectors and organisations. In this survey, they used a classification system with 4 classes: *Beginner*, *Conservatives*, *Fashionistas*, and *Digital Masters*. Most healthcare organisations are, according to this survey, *Beginners*. Banks and high tech companies are often *Digital Masters* (Consulting & Sloan, Digital Transformation: a roadmap for billion dollar organizations, 2011) (Consulting & Sloan, Digital Maturity in health care, results from the first global survey, 2014).

It is interesting to analyse the process that *Digital Masters* have followed to get where they are to get an idea of what healthcare organisations have yet to accomplish. The survey distinguishes 4 phases:

1. Frame phase: digital ambitions are being defined.
2. Focus phase: decisions are made in which innovations to invest.
3. Engage phase: the organisation is being mobilised.
4. Sustain phase: the innovation is anchored within the organisation.

The researchers doing the survey, pinpointed issues for the Dutch healthcare system in each of these phases.

Frame phase: while the Dutch policy of allowing bottom up ehealth initiatives to foster freely is well appreciated by the healthcare organisations, it prevents easy upscaling.

Focus phase: Dutch healthcare organisations have a tendency to focus on big and complex applications. However, *Digital Masters* excel at *Think big, act small, move fast*: they concentrate more on low-hanging fruit.

Engage phase: experience shows that mobilising people to adopt ICT-based solutions is more effective using digital means such as e-learning and social media. However, Dutch healthcare organisations show a preference for traditional communication means such as leaflets and phone calls.

Sustain phase: the knowledge and experience to embrace ICT-based solutions fully is not sufficiently available in healthcare organisations. This does not only concern the IT department, but also the digital skills of everybody else involved in delivering care, such as healthcare professionals and patients. "The potential of, e.g., big data is huge, also in healthcare, but achieving it requires skills that didn't use to be present in healthcare organisations." (translated from Dutch) (Consulting, Digitaal als het nieuwe normaal. Een kompas voor digitale transformatie in de zorg., 2015).

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Case: Patient portals

We use the case of Patient Portals for hospitals to further examine the role of governance in the adoption of ehealth. Patient Portals are among the best known (online) ehealth applications (Op zoek naar meerwaarde. eHealth monitor 2014, 2014). Hospitals are exemplary for the complexity of business and healthcare processes and the number of stakeholders involved and therefore serve as a sufficiently challenging environment for studying governance aspects. In the Netherlands, there are three types of hospitals: General Hospitals, so called Top Clinical Hospitals (specialising in one or more healthcare subfields), and Academic Hospitals affiliated with a university.

A Patient Portal is a website which provides patients access to different websites and applications and allows the patients to manage and share their personal health data (Online inzage in mijn medische gegevens Patientenportalen in Nederland, 2011). Several functionalities typically supported by Patient Portals are online registration as a patient, supplying medical history data and filling in survey forms, online consults, and online scheduling of appointments. These are all fairly straightforward functionalities that are common in other sectors such as the banking sector. Patient Portals are instrumental in realizing a substantial part of the government's 5 year ambition.

During the Spring of 2015, a study was done among 118 hospitals in the Netherlands to investigate the current state of the art in Patient Portals and to measure the usage of these Portals. Only 8% of the hospitals has an extensive Patient Portal. Online access to one's own medical records is possible for only 2% of all general hospitals, 18% of the top clinical hospitals and 50% of the academic hospitals. Functionality that is available most is online scheduling of appointments (44.4%), online submitting of medical history and other data (24.4%), and online registration (18.9%). Functionality that is available the least are online access to medical records or lab test results (3.3%) and online consults (2.2%) (Onderzoek patiënten portalen voorjaar 2015, 2015).

Another study by NICTIZ (Dutch Institute for Standardisation and Ehealth) looked at the actual usage of available functionality (Op zoek naar meerwaarde. eHealth monitor 2014, 2014). Results of this study are shown in Table 1. The study is based on a sample of healthcare users from the Consumers Panel Healthcare, a group of 12,000 citizens maintained by NIVEL for monitoring the demands and opinions of the general public as healthcare consumers. NIVEL is a Dutch research organisation studying the development of healthcare in the Netherlands. For this study, only people were included who visited medical specialists in hospitals.

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	%	%	%	%
Online scheduling of an appointment with a healthcare provider	62	12	5	45
Online reminders of appointments with the healthcare provider	64	12	6	49
Online request for repeat prescription from the healthcare provider	73	5	2	50
Online or email Q&A with the healthcare provider	72	7	3	40
Online consult via video conferencing technology	70	2	1	20

Patients who do not know if this is possible
Patients who do know this is possible
Patients who make use of this functionality
Patients who would like to use this functionality

Table 1. Desirable and actual usage of ehealth applications by healthcare users in hospitals.

This table clearly shows that patients hardly know about available ehealth applications. Most of them indicate not to know whether something is available (between 60 and 70%), even though between 40 and 50% indicate to want to use these functionalities if they were available. Patients are the most interested in being able to request a repeat prescription and making an appointment online. Video conferencing is the least interesting, according to the patients (only 20% appear to be interested). The fact that ehealth applications are under-used is understandable given the fact that many patients are not aware of the possibilities.

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Medical specialists were asked for the same functionalities as in the patient survey if the functionality was available and whether the specialists would be interested in having the functionality available. The results are shown in Table 2. Among other things, the table shows that the availability of the functionalities is limited.

	%	%	%	%	%
Online scheduling of an appointment with a healthcare provider	36	2	21	24	17
Online reminders of appointments with the healthcare provider	24	21	41	12	11
Online request for repeat prescription from the healthcare provider	22	14	41	12	11
Online or email Q&A with the healthcare provider	9	4	40	22	25
Online consult via video conferencing technology	3	7	26	32	32
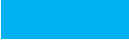
Functionality is available
There are plans to make this possible within 1 year
No plans, but the medical specialist would want this
No plans, and the medical specialist has no preference
No plans, and the medical specialist is against this

Table 2. Desirable and actual usage of ehealth applications by healthcare users in hospitals.

Most ehealth applications have limited availability. Only 36% of the specialists indicate that appointments can be made online. But when they are, patients are not aware of this (62%), even though they would like to be able to use it (45%). A similar situation is seen with online repeat prescriptions. It is possible for 22% of the specialists, 41% support making it possible, and 50% of patients would like to use it. Yet, only 2% of patients does use this functionality.

Communication during the _Engage_ phase

During the _Engage_ phase, the internal and external stakeholders are mobilised to allow for the implementation of digital solutions. As noted earlier, this process of mobilisation in Dutch healthcare providers is rarely supported by digital communication tools, such as e-learning and social media. Rather, communication typically uses more traditional means such as paper leaflets and phone calls that do not support the digitisation process. This is reflected in the way Patient Portals have been introduced. There are initiatives for creating ehealth applications, but both healthcare providers and healthcare users are hardly aware of the possibilities and each other's preferences. This shows that communication is very important and that the currently deployed means of communication are inadequate. So, this suggests that one of the subjects to add to an SME's toolbox for introducing successfully new ehealth application is adequate communication by digital means.

The example of _Digital Masters_ leads to conjecture that the difficult adoption of ehealth is partly to blame on a form of communication with internal and external stakeholders that is too conventional. Appointments are being made by phone and a paper letter is sent to conform an appointment. This may very well lead to the patient's assumption that these are the only means of communication with the healthcare provider. Consequently, patients will be less inclined to see if online services are available for making appointments. Government services such as municipalities and tax authorities

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have been moved online. It is interesting to understand why citizens look online for those services, but not for healthcare related services.

Additionally, the question is what incentives would help patients to turn to ehealth applications. Banks have put a fee on paper copies of bank statements and customers save money using online services. Some municipalities offer certain services only online. Even health insurance companies receive an increasing number of invoices through online channels. An understanding of incentives that work in moving stakeholders to ehealth applications should also be part of an SME's toolbox.

The transition to ehealth applications is not just copying traditional forms of communications to a digital form. New patterns of communication are emerging. Self-management is often mentioned as a means to better and more cost-effective healthcare. But in self-management, the patient will have another role within the healthcare process. In order to be able to do self-measurements and to communicate these with relevant healthcare providers, the patient needs to become an active part of the healthcare process, where patients traditionally could be much more passive while undergoing diagnosis and treatment. Conversely, the healthcare provider has to become more active in sharing knowledge about illnesses and treatment to empower the patients and has to start monitoring the self-management process rather than doing it. The Patient Portal case shows that this does not happen automatically. An SME's toolbox should include methods for to help internal and external stakeholders to understand expected changes in their roles and behaviour and start acting them.

SME's should develop appropriate tools for communicating if they intend to be successful in developing and delivering ehealth applications. Once an SME has mastered these tools, the tools themselves may become a business opportunity for SME's

Conclusions

Demographic change and the advance of technology create needs and opportunity for many new ehealth applications and will offer SME's huge market potential for new ehealth applications. However, seizing the opportunity involves overcoming some complex barriers. To a large extent, these barriers are not technical, but are concerned with issues of governance such as remuneration and communication.

We have seen that stakeholders do not necessarily resist the use of ehealth: stakeholders see the benefits of ehealth applications. The case study of Patient Portals compared with parallel examples of digitisation in other sectors, illustrates various ways in which other approaches to communication will improve adoption of digital solutions. SME's need to develop tools for adequate communication supporting the introduction of new ehealth applications in order to improve adoption of new applications. These tools in themselves may become marketable items in a domain that is lagging in the exploitation of opportunities offered by ICT.

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Intercultural Competence @ SMEs

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Abstract. The experiences with intercultural competence training at the Hanze International Business School Groningen may serve as a blueprint for augmenting professional intercultural behaviour at the SME work floor. The set-up of the training is based on current intercultural communication theory and models, and has as its basic assumption that a change in worldview will make a change in behaviour more likely and feasible. Test results and interviews reveal that the worldviews of 34 participants have changed between the start and the end of the training.

1 Introduction

Our SMEs increasingly need to deal with global competitors, culturally diverse EU workers and clients, immigrant workers from outside EU, pan-national labour & trade regulations, cross-border investors, partners and suppliers, etc. etc. Yet most SMEs still operate from a single domestic location. Whether we like it or not, the paradox is that our domestic economies have become international, and multicultural. How indeed should our SMEs react to foreign clients, workers and partners? How should our SMEs acknowledge the vast variety of cultural preferences in the workplace and markets? What behaviour is effective, and what not, plus who adjusts to whom? And finally, how would SMEs generate innovative ideas from the diversities at the work floor? The good news is: this can be learned.

The Intercultural Competence Learning Lab at the Hanze International Business School Groningen proved in its 4 years of existence to be an effective training for augmented professional intercultural behaviour. With *intercultural* we refer to the actual (daily) interaction between people from different cultural backgrounds. Staff at IBS learned to avoid cultural misunderstandings and conflicts, to improve their productivity, and to leverage the cultural diversity present in the organization. Significant changes were measured among 34 participants indicating internalized adjusted worldviews on how to best deal with cultural differences. The fixed set-up of The Lab includes the exploration of everyday cultural workplace incidents, methods for effective intercultural communication, personal intercultural competence development, and many exercises and simulations in order to explore & experience the difference between effective and less effective cross-cultural behaviour.

For SMEs The Lab can serve as a blueprint for a hands-on training of effective cross-cultural behaviour at the workplace. The unique feature of The Lab is that it serves as a 'community of practice': the workers themselves generate (new) knowledge, take this into practice, and return to the COP with (new) insights based on the experience and the reflection thereof. The Lab triggers a so-called learning-loop: intercultural learning will become part of the organizational culture – 'this is how we do things around here'.

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2 The Intercultural Competence Learning Lab (ICLL)

The framework for The Intercultural Competence Learning Lab is based on the Process Model of Intercultural Competence designed by Deardorff (2009), and the Developmental Model of Intercultural Sensitivity – DMIS designed by Bennett (1993) (see figure 1). The ICLL framework structures our facilitation of the intercultural competence development: a total of 9 sessions of 4 hours each, spread over a period of 10 months.
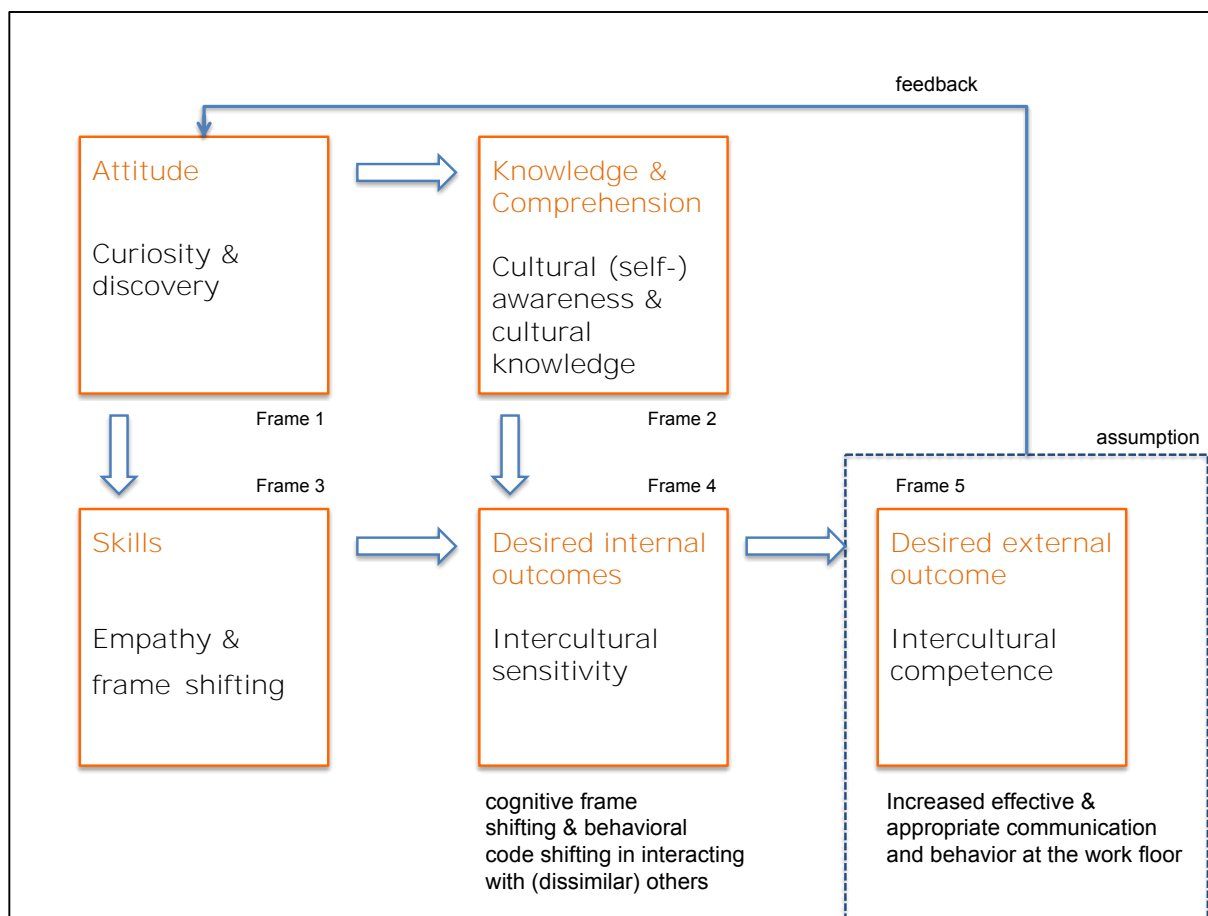
Fig. 1. The ICLL Framework.

The starting point for both the model as well as for The Lab activities (frame 1 in figure 1) is the general attitude toward intercultural relations. Participants are expected to be open, respectful and curious (Deardorff, 2009). We operationalize curiosity by asking for voluntary participation in The Lab. Respect and openness is manifest at the start of each Lab session when participants discuss personal IC experiences or critical IC incidents. This fixed opening of each Lab session is called your month (see figure 2). We jointly analyse to what extent cultural values, prejudices, stereotypical behaviour, etc. play a role in our experiences and work floor observations.

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We facilitate the process of cultural (self-) awareness (frame 2 in figure 1) by having all participants fill out the IDI[55] questionnaire at the start of the ICLL trajectory (pre-test). The participants receive both group- and individual feedback and articulate their personal IC learning outcomes based on the profiles. Participants fill out a second IDI questionnaire at the end of the ICLL trajectory (post-test), receive a second profile, and reflect on the outcomes. We interview all participants after the ICLL trajectory, finding out what participants report as insights and learning moments from the ICLL that enhanced their intercultural competence. All participants keep a logbook where they self-report critical incidents or key learning moments that relate to their self-selected IC exploration issues. These issues are called your intrigue and, as the name suggests, concern personal fascinations in the field of intercultural communication. Sharing the intrigues with the group is a fixed component of each Lab session (see figure 2).

For skills development (frame 3 in figure 1) we focus predominantly on empathy and perspective taking. Pettigrew (2008) proved that these elements are crucial in IC development; Deardorff (2009) showed that over 20 experts in the field of IC see empathy as the single fully agreed upon subcomponent of IC. We stimulate cultural empathy and perspective taking by doing multiple exercises + debriefing during each ICLL session (see figure 2; your work floor practices).

The other fixed components of each ICLL session are IC theory and models (aiming at expanding the participant's knowledge base; frame 2 and 3), your IC development (with the pre-test IDI profile as main reference point; frame 4), the client perspective (aiming at effective transfer of knowledge; frame 5), and management advice (aiming at leveraging the organization's intercultural learning context; frame 5) (see figure 2).

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[55] The IDI (Hammer, Bennett, & Wiseman, 2003) stands for the Intercultural Development Inventory: a 50-item validated questionnaire for measuring one's perception of dealing with cultural differences. The IDI is based on the Developmental Model of Intercultural Sensitivity – DMIS (Bennett, 1986, 1993). The DMIS is a staged model of how people experience cultural difference; individuals can progress from ethnocentrism where they experience events from a mono-cultural worldview to ethno-relativism where they experience events from a multicultural worldview. The personal IDI profile will assist individuals in assessing how to move from one worldview to another.

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Read Threads:	Session 1	Session 2	Session ..	Intended learning outcomes (each session):	ICLL framework references:
Your month				To share, listen to, and discuss intercultural (work floor) events and incidents as experiences of cultural differences	Frame 1; respect and openness
Your intrigue				To explore and understand, plus share and discuss a specific ICC related issue, based on personal interest	Frame 1; curiosity
ICC theory & models				To compare, analyze and understand various models and concepts of ICC, and discuss suitability and usefulness for (enhancing) ICC development	Frame 2; knowledge and comprehension
Work floor practices				To observe, experience, and evaluate ICC related exercises; to interpret, practice and reflect on ICC related behaviours	Frame 3; skills and reflection
Individual ICC development				To recognize, comprehend, and review personal intercultural sensitivity development; to construe, plan, and exhibit personal intercultural sensitivity developmental steps	Frame 4; informed frame of reference shift
The client as resource				To investigate and understand client perspectives and to contrast this with own skills and understanding	Frame 5; effective and appropriate services
Management advice				To assess, validate and consider organizational change for enhancing ICC conducive collaboration	Frame 5; leveraging intercultural context
Underlying framework (DMIS)				Each session: choice of topics, exercises, examples, etc. relate to a specific theme, i.e. a stage from the DMIS	

Fig. 2. The ICLL Matrix.

2.1 The ICLL assumption

By triangulation of the findings from the IDI pre- and post-test, the individual self-reports, logbooks and intrigues, and from the interviews, we aim at achieving a higher validity of our data related to the development of intercultural competence facilitated by the ICLL intervention. Our line of thinking is as follows: attitude, knowledge, comprehension and skills development lead to a desired internal outcome, namely an increased intercultural sensitivity. Intercultural sensitivity refers to an ability to construe cultural differences, or to discriminate more complex and sophisticated cultural experiences (Bennett, 2013). The improved intercultural sensitivity is assumed to lead to an external outcome, namely improved intercultural competence. We define intercultural competence as a set of abilities that support operating and communicating both effectively and appropriately in a variety of cultural contexts (J.M. Bennett, 2009). Since we operate in, or prepare for the international professional environment we specify this further as the ability to collaborate both internationally effective and internationally appropriate, made visible by respecting and using the variety of cultural contexts present at the multicultural work floor. In the case of this research, the multicultural classroom is a 'classical' international classroom with students from different cultural and linguistic backgrounds (Beelen, 2007); educators role model the critical reflection and the behaviour that we think is indispensible for intercultural competent graduates, or grooming global citizens (Lilley, 2014; see figure 3).

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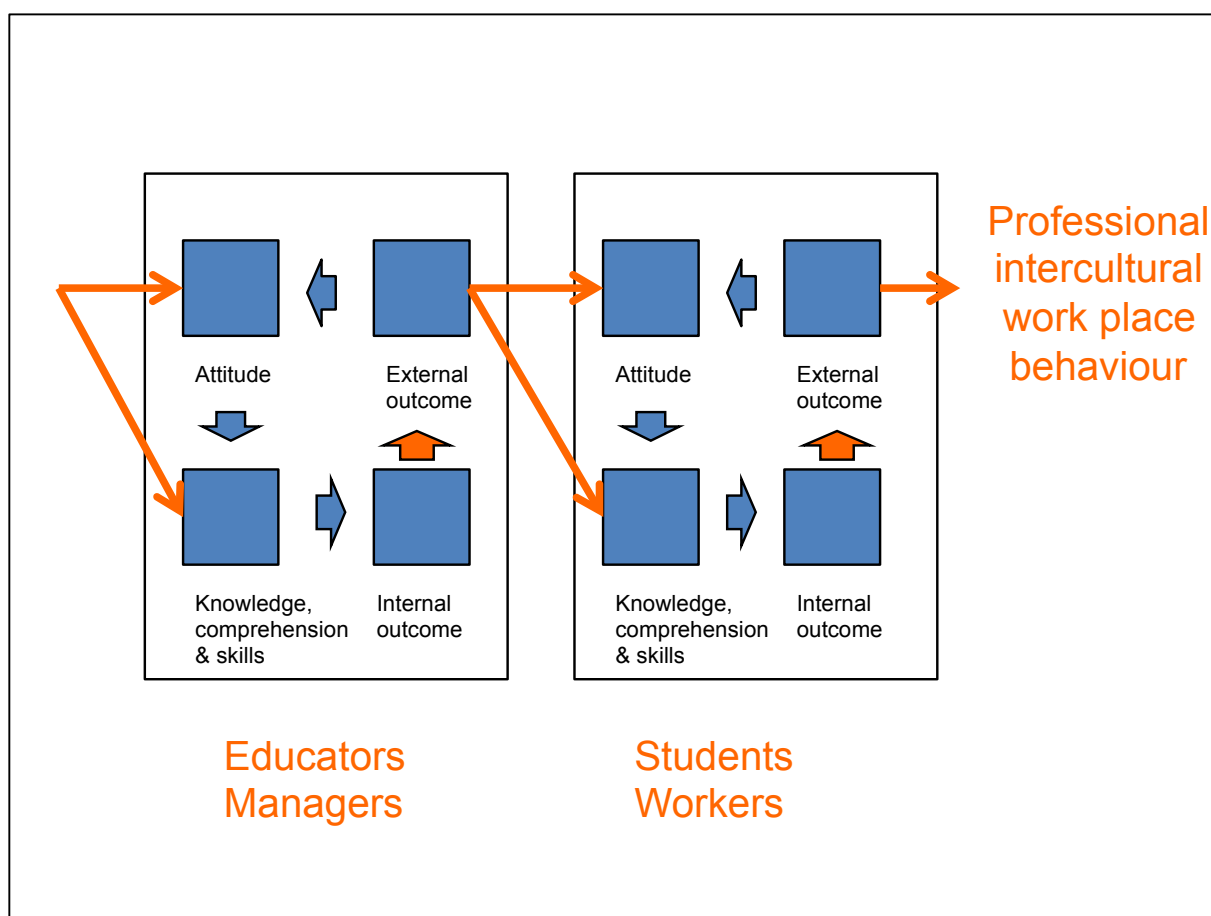
Fig. 3. The ICLL Assumption.

2.2 Findings

Results of the pre-test from the first ICLL group (2011; 10 participants) showed that the group takes commonalities among different people as leading in their interaction with others. The test labels this worldview as minimization. The post-test of this group showed a shift of 8 points on the IDI's 90-point scale toward a more developed worldview of acceptance. In comparison with other empirical research that made use of the IDI this gain can be seen as meaningful (Vande Berg et al., 2012).

The second ICLL group (2012; 13 participants) scored identical in pre- and post-test: as a group – on average - no development took place. At individual level however 6 participants scored between 12 to 25 points shifts (of which 3 positive, and 3 negative), and 7 participants scored between 0 to 7 points shifts (of which 2 negative). It showed that the intervention did have an effect, yet not only in the direction of an increased multicultural worldview, but also in the direction of an increased mono-cultural worldview. The latter is not uncommon. Exposure to intercultural learning can have an effect on the learner's perception of own intercultural sensitivity; increased awareness may lead to a more modest assessment of own capabilities. An intercultural traumatic experience may also cause 'regression', as well as what Vande Berg (2012, September) calls "the load of the stuff"; intercultural learning may be experienced as overwhelming.

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A third ICCL group (2013; 11 participants) scored in pre-test comparable to the first ICLL group: a bit above mid-minimization. In the post-test this group scored early acceptance, a shift of just above 10 points (on the 90-point scale), hence the biggest average shift of all the three ICLL groups. At individual level however there were again meaningful differences: two participants shifted more than 20 points toward a more multicultural worldview, while another two participants shifted 9 and 10 points toward a more mono-cultural worldview (of 4 participants in total with a negative score). Apart from one, all participants made considerable shifts of 5.7 points or more.

For all three groups it is remarkable that most individual scores are relatively high scores (= many points). Changes of just a few points would not hint toward a change in worldview; high scores do. The higher the score, the more happened to the individual's cognitive understanding and behavioural practice – it signals meaningful development (Lou & Bosley, 2012). Yet, not all scores were positive; how must this be interpreted?

For the positive (individual) IDI scores, we go by the assumption articulated above: shifts toward a more multicultural worldview can have a positive effect on (the quality of) professional intercultural behaviour. Various scholars underpin our assumption; Deardorff (2009) posits that "the shifts of internal frames predict appropriate and effective outcomes" (p. 32). Other scholars wrote that increasing levels of intercultural sensitivity make increasing degrees of proficiency in intercultural competence possible (Medina-López-Portillo, 2004; Bennett and Bennett, 2004; Hammer, 2007). Still, predicting and making possible is not yet mastery or proficiency; cognitive frame shifting may be a required but is therefore not yet a sufficient step. Educators and managers alike will need to make sure that concepts are turned into work floor practices (Lilley, 2014).

As for the negative (individual) IDI scores the above may still be true: a more modest assessment of own capabilities can have a positive effect on behaviour. Or as one participant had put it: "It feels as positive, but uncomfortable. The growing awareness made me insecure. I will need to move beyond this point." And in a similar vein, from yet another participant: "Typical, you don't know what you don't know, I thought I was culturally sensitive, but I am more culturally sensitive now." Yet, regression on the IDI scale may be hinting at a limited suitability for effective and appropriate intercultural collaboration, which is an equally valuable finding in the light of the objectives of The Lab: perhaps some professionals better concentrate on other talents.

3 Community of Practice

The above ICLL initiative can be placed in the tradition of Communities of Practice, or COPs. According to Wenger, McDermott, and Snyder (2002) COPs are "groups of people who share a concern, a set of problems, or a passion about a topic, and who deepen their knowledge and expertise in this area by interacting on an ongoing basis" (p. 4). Essential for the COP is that the ones generating (new) knowledge will take this into practice, and return to the COP with (new) insights based on the experience and the reflection thereof: a so-called learning-loop. The aim with the ICLL was to make educators behave as reflective practitioners, focusing on cultural differences and intercultural competence in the multicultural classroom, or in workplace practices. The typical expected impact of a COP can be categorized as both individual and communal, and both cognitive and emotional (Lankveld & Volman, 2011). Individually and cognitively one expects personal reflections on practices, and exchanges of best practices. Individual emotional outcomes concern recognition, being taken seriously, etc. Communal cognitive effects concern for instance arriving at agreed standards. Sense of community, or 'being in the same boat', would qualify as a communal emotional outcome. We have witnessed all four types of outcomes.

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From participant feedback we learn that the most unique features of the ICLL is that it offers a safe environment to educators for sharing intercultural experiences that often create uncertainty, anxiety, and self-doubt. What makes participants experience the ICLL as a good practice is having regular moments with peers for sincere attention to intercultural experiences and work floor incidents, being part of a platform for IC discussion, learning relevant IC theories and models, actively working on one's own intercultural competence, and generating management advices for improving the (IC) quality of the international work environment.

4 Conclusion

The conclusion after three series of ICLL sessions – with a total of 34 participants spread over 11 different nationalities - is that the intercultural competence of individuals – as measured by the IDI – can change substantially; participants confirm this in interviews. The second conclusion is that the changes are not always, and not necessarily, toward more multicultural worldviews; some participants moved toward more mono-cultural worldviews (9 out of 34). Interestingly, the latter is not necessarily being experienced as a negative outcome; some participants confirmed to have become more modest in their self-assessment of their intercultural competence and found this a positive development. A third conclusion is that intercultural competence development as part of an internationalization strategy can be successfully addressed through targeted training.

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The financial incentives for SMEs OSH activities in France

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Abstract

At the very beginning, of OSH in 1946, this approach was mainly based upon control of dangerous situations at work and financial sanctions in case of persistence of those perilous situations.

But the human resources of OSH Social Insurance Institutions are only able to check the safety in about 3% of enterprises, and peculiarly the greatest ones with a lot of employees.

So, it appeared necessary to find other ways of interventions towards SMEs. It implicates to offer technical tools as responses to technical or organizational levels on one side, and financial helps on the other side.

For being eligible for getting financial support, companies must fulfil conditions and propose programs within the frame of the principles of the National Convention of Objectives for the sector on which it depends.

This is a new philosophy which gets more and more success among SMEs, because it is rather easy procedure which replaces control by confidence.

Introduction

The approach of promoting prevention on occupational risks by financial incentives exists in the French system since 1946, and is more and more considered as a priority among the tools described in the Convention's aims and means signed between the Government and the National Health Found for Occupational Risks.

The contribution rate for occupational accidents and diseases is determined by risks faced by employees in ties with the activity. The incentives aim to advance companies in particular the least efficient of them on one side and get exemplary achievements, especially in the most successful companies on the other side.

Beyond those basic principles the regulation makes provision for stronger positive or negative financial incentives.

Among the positive ones we can quote:

- The refunds work related road and work for companies proving a peculiarly strong prevention effort, which implicates a reduction rate of contribution.
- The prevention contracts conceived for enterprises with fewer than 200 employees in the frame of professional branches having negotiated a National Convention of Objectives with the National Health Insurance Found. It implies a commitment of the profession to promote the prevention approach and helps for financing for innovative and exemplary achievements.

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- The simplified financial aids had been introduced for obtaining stranger action towards very small enterprises. By offering simplified procedures for enterprises, it will facilitate the deployment of prevention in very small enterprises. Those aids can be determined on either national or regional levels. They are destined for SMEs with staff lower than 50 employees and SMEs with less than 20 employees are prime targets. The aid can't exceed 25 000 euros.

Part 1: The place of SMEs and very small enterprises in economic organization in Parisian region for 2013

Number of employees of enterprises with collective compulsory contributions rating (less than 20 employees): **1 362 593** (29, 57%).

Number of employees of enterprises with mixed compulsory contributions rating (from 20 to 149 employees): **1 379 166** (29, 93%)

For a total of **2 741759** employees in SMEs and very small enterprises in Parisian region in 2013 (60%).

Number of enterprises with collective rating: **469 737** (93%)

Number of enterprises with mixed rating: **29 125** (6%)

For a total of **498 862** SMEs and very small enterprises in Parisian region in 2013.

➤ Loss for enterprises with less than 20 employees with collective rating:

Number of Occupational Accidents with sick leave: **28 768** (27%)

Number of Occupational Accidents with permanent partial disability: **2 431** (35%)

Number of Professional Diseases with sick leave: **1 848** (42%)

Number of Professional Diseases with permanent partial disability: **2088** (51%)

Number of daily compensations for Professional Diseases: **622 795** (46%)

➤ Loss for enterprises with less than 20 employees with collective rating:

Number of Occupational Accidents with sick leave: **43 060** (40%)

Number of Occupational Accidents with permanent partial disability: **2380** (35%)

Number of Professional Diseases with sick leave: **1 344** (31%)

Number of Professional Diseases with permanent partial disability: **1 050** (26%)

Number of daily compensations for Professional Diseases: **393 841** (29%)

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Part 2: Prevention contracts

As the professional organization representing a sector signed a national agreement on objectives with the National Health Insurance Fund, any company in the sector following the qualifying conditions may establish a prevention contract.

It allows benefiting, especially, from a financial aid for achieving various objectives of prevention.

The prevention contract intervenes between the Regional Health Insurance Fund and the company subscribing to a pre-existing national convention on objectives, setting a specific prevention program for the company's industry.

The prevention contract clearly defines the aims on which the company commits itself and aids, particularly financial, that the Regional Fund provides.

For a company to sign such a contract, it must:

• enter into the field of the national convention's application and adhere to it

• have a total workforce of less than 200 employees

• Be up to date on its social obligations.

If these conditions are met, the Insurance Fund and the company develop a prevention contract on the basis of a complete diagnosis of risks (initial risk situation, final purpose, program of measures to implement, investments to be made ...), which must have been the subject to consultation of the Committee of hygiene, safety and working conditions (CHSCT) or the staff representatives.

The final step represents the contract's signing between the company and the Regional Fund.

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Part 3: The simplified financial aids

The SFA implementation is declined in two distinct categories: SFA deployment and contracts for Very Small Enterprises (VSE).

The SFAs deployments are intended to enable small companies to access to prevention solutions expected to become standards. They should allow the development of a profession on a precise priority topic, triggering a leverage effect, beyond the direct interventions of prevention mangers in companies.

SFA deployment takes two forms:

- Payment of a subsidy after the completion of a measure appearing in a national or regional prevention program. No contract is required; or

- Payment of a subsidy conditioned by the joint signature of a convention defining targeted actions responding to a prevention program defined at regional level, and the implementation of these actions.

The request for a SFA deployment has to be initiated by the company. Administrative processing is performed by the Regional Fund.

The VSE contract is a financial aid to companies neither eligible to a prevention contract nor to a SFA deployment. Initiated by the branches of the Regional Fund, it takes the form of a subsidy payment subordinated to the joint signing of a contract. All the objectives of the convention have to be achieved.

An example of national aid deployment is "Aquabonus" for replacement of equipment for dry cleaners using perchlorethylene. This product is cancerogenic and will soon be forbidden in France. Aquabonus may help the enterprise to finance the replacement of old equipment by one or more water cleaning machines in order to remove the risks associated with the use of perchlorethylene and meet future regulatory requirements. This support allows the acquisition of 1 to 3 machine(s) for water washing and drying.

The subsidy amounts to **40 %** of the equipment's price.

This aid is limited to:

- **10 000 € for the purchase of 1 machine** for water washing and drying, and eventually for the cabin for stain removing,

- **20 000 € for the purchase of 2 machines** for water washing and drying, and eventually for the cabin for stain removing,

- **25 000 € for the purchase of 3 machines** for water washing and drying, and eventually for the cabin for stain removing.

Another Regional Aid helps in the Construction Industry obtaining scaffolding assembly and disassembly safety and transport trailer.

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The objective of this aid is to reduce the risk of falls from height for the employees of the construction industry.

The simplified financial aid "Scaffolding +" proposes to help companies to equip themselves for safe scaffolding assembly and dismantling in order to meet the standards, or the NF standard. It concerns the foot scaffolding and mobile scaffoldings.

Companies have also the possibility to benefit from aid for the purchase of a trailer with rack to transport scaffoldings.

In order to benefit of aid, the company must have trained, within the last 5 years, at least one employee by employment size class of 10 employees, to the use, the assembly and dismantling of scaffoldings. This training must have been provided by a training organization under agreement with the national or the Regional Insurance Fund.

This aid corresponds to a fixed rate of 40% of the investment, limited to € 6,000 for a foot scaffolding and € 3,000 for a mobile scaffolding with optional € 2,000 for a trailer with rack for scaffolding transport.

The National Found can also provide subsidies, awards and prices for advancing prevention in this activity sector by promoting the development of innovative measures.

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Simplified financial aids paid by CRAMIF in 2014 :

	Type	Target	Objective	Means financed	Number	Amount
Regional Simplified Financial Aids	**SECURED CASH REGISTER**	Local shops	Reduced risk of robbery	Secure cash register	119	1 040 261 €
	HOTEL BUSINESS	Hotel Business	Reduced risk of musculoskeletical disorders	Bed lift, motorized carriage, steam vacuum cleaner, training	2	16 671 €
	METALLURGY	National Technical Center A	Reduced risk of musculoskeletical disorders	Handling means	1	497 €
National Simplified Financial Aids	**AQUABONUS**	Dry cleanings	Reduced risk of carcinogenicity, mutagenicity and toxicity for reproduction	Aqua cleaning	35	374 420 €
	SCAFFOLDING+	National Technical Center B	Reduced risk of falls from heights	Scaffolding Musculoskeletical disorders	9	31 407 €
	Light commercial vehicle (Residual 2013)	All Technical Centers	Reduced road risk	Secure vehicle	4	9 955 €
	PRECISEO	Hairdressers	Reduced risk of musculoskeletical disorders	Height ajustable wash unit, lightweight hairdryer.	56	226 660 €
				TOTAL	**226**	**1 699 871 €**

Part 4: Negative financial incentives

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It consists of an increase of contribution for occupational accidents and diseases when finding exceptional risks resulting from a failure of prevention measures prescribed under the code of Social Security.

In case of non-realization of prevention measures, described in a letter of injunction, previously send to the employer, within the prescribed period, the file is presented to the social partners for applying an additional contribution (minimum 25% of the normal contribution for 3 months).

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Voluntary safety management system in SMEs - does OHSAS18001 certification help?

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Abstract. Occupational risk prevention can be managed in several ways. Voluntary safety management standard OHSAS 18001 is a tool which is considered to contribute to effective risk management in the manufacturing industry. This paper examines benefits of OHSAS 18001 based on the statistical analysis. The MISHA method is used for safety audit in 16 Estonian small and medium sized enterprises. The results provide the objectives why companies implement or wish to implement OHSAS 18001, identify differences in safety activities for three types of companies and determine correlations between different safety activity areas. This information is valuable for enterprises who wish to improve their safety activities via voluntary safety management system.

1 Introduction

The aim of safety management systems is to manage the planning and implementation of a company's safety policy. A safety management system usually includes the setting and prioritizing of safety goals and development of safety programmes. Different management tools can be used to fulfil legislation needs and company's demands in order to mitigate workplace risks effectively.
In literature on OHSMSs (Occupational Health and Safety Management Systems) often mandatory OHSMSs are distinguished from voluntary systems (Gallagher and Underhill, 2012; Robson et al., 2007; Frick and Wren, 2000; Robson and Bingelow, 2010; Hohnen and Hasle, 2011).

Mandatory OHSMS emerges from legislative requirements and sets core principles for the management of OHS (Occupational Health and Safety) to be implemented by the employers. The most well-known European mandatory OHSMS is the Framework Directive 89/391/EEC (Directive..., 1989), which defines employers' responsibilities in the management of OHS and requires insurance of safety and health of workers in every aspect related to their work. This directive sets general obligations: to conduct risk assessment at workplaces, to implement safety measures and to train and inform employees in OHS hazards.

Voluntary OHSMSs are not state-regulated. These systems were first encouraged by commercial organizations, corporations and associations (e.g. industry associations). Voluntary OHSMSs tend to be more complex than regulatory systems, and more formalized in terms of specifications. According to Frick and Wren (2000), a detailed specification of these systems helps to ensure good integration of OHS policy into the management processes of enterprises. Voluntary OHSMSs are generally in the form of standards or guidelines, providing requirements for certification or giving simple guidance on good management practices for OHS. These standards or guidelines are international (e.g. ILO-OSH 2001) (ILO, 2001), national (e.g. BS 8800:2004 or OSHAS 18001:2007) (BSI, 2004; OHSAS..., 2007; EVS..., 2007), and sectorial (e.g. MASE, DT 78) (Drais et al., 2002; INRS, 2004).

Organizations are increasingly concerned with achieving and demonstrating sound OHS performance by controlling their OHS risks, consistent with their OHS policy and objectives (Hale, 2009; Torp et al., 2000). In order to provide a recognizable OHSMS standard against which a company management system can be assessed and verified, OHSAS 18001 standard has been developed. The OHSAS standards covering OHS management are intended to provide organizations with the elements of an effective OHS management system that can be integrated with other management requirements and help organizations achieve OHS and economic objectives (OHSAS..., 2007; EVS..., 2007). An effective OHSAS 18001 management system may contribute to the following: (1) provide a

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structured approach for managing OHS; (2) establish and maintain a strong commitment to OHS; (3) promote organizational structures with clear and unequivocal roles and responsibilities, (d) ensure strong levels of trust and communication, (4) develop a continuously improving safety culture; (5) provide reduction in incident and accident levels with increased measures of performance (Chang and Chiu-Lan, 2009; Sanchez-Toledo et al., 2009; Fernandez-Muniz et al., 2012a; Fernandez-Muniz et al., 2012b). OHSAS 18001 is intended to be applied to all types and sizes of organizations and to accommodate diverse geographical, cultural and social conditions (OHSAS…, 2007; EVS…, 2007).

The benefits of OHSAS 18001 have been studied by several authors in recent years (Hale, 2009; Torp et al., 2000; Chang and Chiu-Lan, 2009; Sanchez-Toledo et al., 2009; Fernandez-Muniz et al., 2012a; Fernandez-Muniz et al., 2012b; Koivupalo et al., 2015; Fernandez-Muniz et al., 2007; Abad et al., 2013; Pearse, 2002; Kamp and Blanch, 2000; Nielsen, 2000; Granerud and Rocha, 2011; Rocha, 2010; Zwetsloot, 2000). Those studies demonstrate that OHSAS 18001 improves company's image and overall performance, integrates OHS into the company management system, reduces risk for accidents, improves the company's compliance with legal obligations, favours a learning process and helps to create a higher level of transparency. However, OHSAS 18001 certification has been criticized, especially towards a tendency of increased bureaucratization of health and safety issues and therefore discouraging genuine worker involvement. This may shift the focus from health and safety issues towards paperwork control, which may diminish the activities dealing with OHS problems (Kamp and Blanch, 2000; Nielsen, 2000; Granerud and Rocha, 2011; Rocha, 2010; Zwetsloot, 2000).

The objective of the current paper is to study how OHSAS 18001 certification influences safety activities and their improvement in Estonian manufacturing SMEs and to determine whether a non-certified company with a strong management support in safety is able to perform equally in OHS matters compared with OHSAS 18001-certified organizations.

2 Material and Methods

Based on the critical overview of the existing auditing methods, the MISHA method (Method for Industrial Safety and Health Activity Assessment) (Kuusisto, 2000), as the most innovative, was chosen for the current study. Technical Research Centre of Finland (VTT) developed this audit tool in 2000 (Kuusisto, 2000). The MISHA method is primarily designed for usein the middle and large-sized industrial companies in the manufacturing and process industry. The MISHA method considers the following areas of industrial activities: A. organization and administration (safety policy and safety activities in practice, personnel management); B. participation, communication, and training; C. work environment (physical work environment, psychological working conditions, hazard analysis procedures); D. follow-up (occupational accidents and illnesses, work ability of the employees, psychological work ability). Benefits of using the MISHA method are the relatively small amount of resources and time needed and inclusion of occupational health aspects related to ability to work (Peltonen, 2013). The audit process with the MISHA should have a leader who can be either internal or external to the organization subject to audit. Auditors should have prior experience in health and safety activities and should carefully examine the application of the method prior to audit (Kuusisto, 2000). To select industrial companies for our research, the database of Estonian Association for Quality (Estonian…, 2014) was scanned. By January 2014, 178 Estonian companies owned OHSAS 18001 certification. The scan showed that 32 % of the certified firms come from the manufacturing sector of which 62% were SMEs. The authors contacted each of these firms and explained briefly the purpose and the scope of the research. Finally, eight companies (representing main manufacturing areas in Estonia such as printing, textile, metal, food industry etc.) agreed to participate. In order to compare the results with non-certified organizations, eight companies with similar background were selected – four represented SMEs which belong to a larger corporation or concern but are not OHSAS 18001-certified and four were non-certified, locally established and owned companies. Altogether, 25

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interviews with employers, middle-level safety personnel and with safety responsible persons were conducted. During the interviews, 55 questions (validated MISHA method) were asked from each person interviewed by an experienced health and safety auditor. After necessary coding and transcription, the results were discussed with four experts on OHS to come to an agreement whether the results are interpreted correctly. Table 4 presents the characteristics of the examined enterprises in brief – the activity area and type.

The analyses were prepared using program IBM SPSS Statistics 22.0 and R 2.15.2. The following statistical methods were used: correlation, MANOVA, Factor Analysis Principal Component method, Independent T-test for hypothesis (Field, 2013).

3 Proposed conceptual benefits of OHSAS18001

OHSAS 18001 offers a number of benefits to companies as the standard should promote and increase the quality of management in OHS discussed in previous sections. Before conducting the research, OHSAS 18001 certified organizations were asked about the reasons for adopting the standard and later perceived benefits from the certification. Tables 1 and 2 show the results based on the five point Likert scale to measure the objectives to adopt OHSAS 18001 and perceived benefits from it. Companies are motivated to adopt OHSAS 18001 mainly to enhance company's social image and reputation, and also to ensure lead position in safety in the manufacturing industry. Companies also expect that the number of accidents and incidents in the company will decrease by the adoption of OHSAS 18001. Trade Union seems to have less influence regarding that matter and the close relationship between the standard and legislative regulations is overlooked.

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Table 1. Results of the objectives to apply for OHSAS certification

among Estonian manufacturing SMEs

Objective to adopt OHSAS 18001	Mean	Not at all important, %	Very important, %	Extremely important, %
Improvement of firm's image in society	4.50	0.0	25.0	62.5
Accident and incident prevention	4.50	0.0	25.0	62.5
Maintenance of sector leadership in safety	4.13	12.5	12.5	62.5
Integration of safety into corporate strategy	4.13	0.0	12.5	50.0
Maintenance of socially responsible behaviour	4.00	12.5	25.0	50.0
Satisfaction with customer demands	3.88	0.0	37.5	37.5
Improvement of employees' well-being	3.71	0.0	37.5	12.5
Pressure to follow competitors	3.50	25.0	12.5	50.0
Satisfaction with supplier/ subcontractors and/ or contractors demands	3.50	25.0	25.0	37.5
Reduction of operational costs	3.00	25.0	25.0	12.5
Improvement of employee motivation	3.00	12.5	50.0	0.0
Enhancement of relations with public authorities	2.88	12.5	37.5	0.0
Improvement of company's competitive advantage	2.50	50.0	25.0	12.5
Compliance with legislation	2.50	50.0	0.0	25.0
Labour union pressure avoidance	1.25	87.5	0.0	0.0
Other reason(s)				50.0*

*Other reasons mentioned: very good offer from certification body; to ease up relations with concern; decision on corporation level.

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Table 2 shows company's perceptions of OHSAS 18001 standard benefits. All the companies had functioned under OHSAS 18001 compliance from three to nine years. The most valuable aspect that the companies recognize is an improved safety documentation organization system. The second benefit is seen in improved company's image, which usually is one of the main motivations to implement OHSAS 18001. Even if it is not one of the most important reasons to adopt the standard, OHSAS 18001 makes it easier to comply with safety legislation, which later adds a value for the companies.

Table 2. Perceived benefits from OHSAS 18001 certification among Estonian manufacturing SMEs

Perceived benefits from OHSAS 18001	Mean	Not at all important, %	Very important, %	Extremely important, %
Improved organization & documentation systems	4.88	0.0	12.5	87.5
Improved firm's image	4.25	0.0	25.0	50.0
Improved firm's compliance with legal obligations	4.13	0.0	25.0	50.0
Improved working conditions	3.88	0.0	25.0	37.5
Improved customer satisfaction	3.75	12.5	25.0	37.5
Improved employee satisfaction	3.63	0.0	37.5	25.0
Improved relations with suppliers and contractors	3.38	25.0	37.5	25.0
Improved relations with public authorities	3.38	25.0	25.0	37.5
Improved production times	3.25	25.0	25.0	25.0
Improved employee motivation	3.13	12.5	50.0	0.0
Improved product quality	2.88	37.5	12.5	25.0
Reduced waste	2.38	37.5	12.5	12.5
Improved firm's profitability	2.75	37.5	0.0	25.0
Increased sales	2.13	37.5	0.0	0.0

The authors stated 11 hypotheses, which can be derived as benefits. It was possible to examine all of them statistically by the MISHA method.

The hypotheses are as follows:

Hypothesis H1. OHSAS 18001 helps to disseminate information on all levels of organization.

Hypothesis H2. Written safety policy plays an important role in OHS management.

Hypothesis H3. OHSAS 18001 helps to organize OHS activities in the company more effectively.

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Hypothesis H4. OHSAS 18001 promotes supervisors' and employees' interaction.

Hypothesis H5. The employees are better trained in OHS in OHSAS 18011-certified companies.

Hypothesis H6. OHSAS 18001 improves the development of the physical working conditions.

Hypothesis H7. There is a difference in psychosocial climate for OHSAS 18001-certified and non-certified organizations.

Hypothesis H8. Occupational health service activities are better organized in OHSAS 18001-certified organizations.

Hypothesis H9. OHSAS 18001 favours registration and investigation of accidents, illnesses and near misses.

Hypothesis H10. Physical workability is more appreciated in OHSAS 18001-certified organizations.

Hypothesis H11. Social work environment is regularly monitored in OHSAS 18001-certified organizations.

4 Results

The hypotheses were tested using Hotelling's T-square test statistics (Field, 2013). Sampling adequacy was controlled by the Kaiser–Meyer–Olkin (KMO) measure (Field, 2013). For these data, the KMO value is 0.83, which falls into the range of being great, so we should be confident that the sample size is adequate for the factor analysis.

As the results (Table 3) reveal, we can provide support for all hypotheses except H7 and H10 while comparing OHSAS 18001-certified (OHSAS) organizations with non-certified, locally established and owned (OHSASL) companies. The explanation behind H7 may be the fact that OHSAS 18001 does not emphasize psychosocial climate as one of its key elements.

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Table 3. Statistical analysis of the hypotheses

Hypothesis*		Hotelling's T-square test statistic	P-value	Confidence intervals	
				lower	upper
H1: OHSAS 18001 helps to disseminate the information on all levels of organization	OHSAS VS NOHSASL	11.128	0.008	14.825	51.152
	OHSAS VS NOHSASC	0.280	0.608	-25.029	18.092
H2: Written safety policy plays an important role in OHS management.	OHSAS VS NOHSASL	259.461	0.000	68.870	90.982
	OHSAS VS NOHSASC	0.621	0.449	-5.997	12.565
H3: OHSAS 18001 helps more effectively to organize OHS activities in the companies	OHSAS VS NOHSASL	8.944	0.014	7.701	52.714
	OHSAS VS NOHSASC	0.193	0.670	-18.963	12.713
H4: OHSAS 18001 promotes supervisors' and employees' interaction	OHSAS VS NOHSASL	5.132	0.047	0.456	55.099
	OHSAS VS NOHSASC	0.310	0.590	-34.747	20.857
H5: Employees are better trained in OHS in OHSAS 18011-cerfitied companies.	OHSAS VS NOHSASL	23.3383	0.001	19.644	53.278
	OHSAS VS NOHSASC	0.145	0.711	-7.136	5.053
H6: OHSAS 18001 improves the development of the physical working conditions.	OHSAS VS NOHSASL	15.167	0.003	9.046	33.237
	OHSAS VS NOHSASC	0.267	0.617	-9.854	6.146
H7: There is a difference in psychosocial climate for OHSAS 18001-certified and non-certified organizations.	OHSAS VS NOHSASL	2.076	0.180	-7.842	36.552
	OHSAS VS NOHSASC	2.593	0.138	-33.104	5.329
H8: Occupational health service activities are better organized in OHSAS 18001-certified organizations.	OHSAS VS NOHSASL	11.128	0.008	9.686	48.654
	OHSAS VS NOHSASC	0.280	0.608	-14.473	8.918
H9: OHSAS 18001 favours registration and investigation of accidents, illnesses and near misses.	OHSAS VS NOHSASL	25.783	0.000	30.919	79.271
	OHSAS VS NOHSASC	0.207	0.659	-24.558	16.229
	OHSAS VS NOHSASL	1.808	0.208	-29.522	7.302

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Hypothesis*		Hotelling's T-square test statistic	P-value	Confidence intervals	
				lower	upper
H10: Physical workability is more appreciated in OHSAS 18001-certified organizations.	OHSAS VS NOHSASC	0.044	0.839	-24.337	20.167
H11: Social work environment is regularly monitored in OHSAS 18001-certified organizations.	OHSAS VS NOHSASL	32.523	0.000	48.236	110.099
	OHSAS VS NOHSASC	0.968	0.348	-40.813	15.813

*F critical value = 4.964603; Abbreviations: OHSAS – OHSAS 18001-certified companies, NOHSASL – Non-certified, locally established and owned companies, NOHSASC – Organizations which belong to a larger corporation or concern but are not OHSAS 18001-certified

The study showed that most of the examined companies, irrespective of owning an OHSAS 18001 certificate, have low knowledge and conception of how to deal with psychosocial hazards. Hypothesis H10 is not supported, while the study revealed that physical workability, irrespective of the company type, is not assessed because of no general policy of how to measure and deal with employees' workability. Our comparison of OHSAS 18001-certified organizations and organizations which belong to a larger corporation or concern but are not OHSAS 18001-certified (OHSASC) revealed that none of the hypotheses were supported. This demonstrates that the level of OHS management in these companies is compatible with OHSAS 18001-certified companies, as their safety activities are regular, properly established, monitored, revised etc.

Table 4 presents the mean scores (0-3 scale) according to the activity area by the MISHA method. Each four-category framework element consists of three activity areas, which are examined by 55 specific items in the form of various interview questions/considerations. OHSAS 18001 requires preparation and implementation of a safety policy (A1). The results of our study showed that all OHSAS companies possessed their safety policy. Similarly, slightly lower results were gained by NOHSASC companies, which shows their awareness of the importance of engaging OHS activities in general organizational procedures. However, all the investigated NOHSASL companies strongly lacked activities in the area of safety policy.

With regard to safety activities in practice (A2), our research revealed no strong dependence on the company type – NOHSASC companies had equal or even higher scores, some local companies earned equally high points as well. In all types of companies, safety personnel and their responsibilities were usually designated. In smaller companies, no full-time safety manager was hired; often a production manager or personnel manager fulfils the duties during the working hours. All the companies had elected a working environment representative according to the OHS Act (Occupational…, 1999). Most of the companies had short-term plans about human resources; but no long-term views were generated. The reason the interviewees gave was that according to common practice, market needs are changing quickly (Paas et al., 2015). No changes were detected between OHSAS and NOHSASC, but NOHSASL gained considerably lower scores, as they deal with personnel management ad hoc.

OHSAS and NOHSASC companies actively engage supervisors to communicate with employees and encourage employee participation to improve working environment conditions (B1). Both company types gained high scores while NOHSASL companies stand at considerably lower scores. The same

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conclusion can be drawn for communication procedures (B2). OHSAS and NOHSASC companies demonstrated exceptionally high result in personnel safety training (B3), while NOHSASL companies gained lower points mainly because their employees participated more seldom in preparing work instructions. Differences between company types while dealing with physical work environment (C1) were not very pronounced, however OHSAS organization showed a very high level of assessment of chemical hazards and risk of major hazards. These factors were explored thoroughly because of the integrated system – all interviewed OHSAS 18001-certified organizations are certified also after ISO 14001 (ISO…, 2004), which pays special attention to chemicals used in the enterprise.

Table 4. The mean scores (0-3 scale) according to the activity area by the Misha method

Type	Industry, id. of the company	A1*	A2*	A3*	B1*	B2*	B3*	C1*	C2*	C3*	D1*	D2*	D3*
		Organization and administration			Training and motivation			Work environment			Follow up		
NOHSASL	Textile industry, K	0.36	1.63	1.50	1.67	1.50	2.00	2.22	1.33	1.00	1.33	1.50	1.00
	Printing industry, O	0.73	0.75	0.75	1.00	1.00	1.00	1.44	0.67	0.33	0.67	1.00	0.00
	Glass industry, Y	0.09	2.13	1.00	2.00	1.50	1.50	2.11	1.33	1.00	0.33	1.00	0.00
	Textile industry, Z	0.36	2.25	1.33	1.00	1.75	2.50	2.33	2.00	2.00	1.67	1.50	0.00

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OHSAS	Plastic industry, L	2.58	2.67	2.25	1.56	1.75	2.75	2.59	1.78	1.56	1.67	0.33	2.00
	Furniture industry, M	2.91	2.25	2.25	2.33	2.00	2.75	2.44	2.00	2.00	2.33	1.50	1.00
	Heat industry, N	3.00	3.00	2.50	2.67	2.25	3.00	2.67	2.33	1.67	2.33	1.00	3.00
	Elect-ronics industry, S	2.97	2.58	2.42	2.78	2.67	2.75	2.70	1.67	2.11	2.89	1.00	3.00
	Metal industry, T	2.82	2.88	2.00	2.67	2.25	3.00	2.67	1.33	2.00	3.00	1.50	3.00
	Food industry, U	2.64	2.50	2.25	1.33	2.75	2.75	2.44	1.00	2.33	3.00	0.50	3.00
	Wood processing industry, W	2.36	1.88	1.75	1.67	2.75	2.75	2.78	1.67	2.00	3.00	0.50	3.00
	Food industry, X	3.00	3.00	2.50	3.00	3.00	3.00	3.00	2.33	2.00	3.00	1.00	3.00
NOHSAS C	Metal industry, P	2.68	2.63	2.38	2.83	2.88	3.00	2.94	2.50	2.17	2.33	1.25	3.00
	Elect-ronics industry, Q	2.71	2.67	2.42	2.78	3.00	3.00	2.70	2.11	2.00	3.00	1.50	3.00
	Food industry, R	2.76	2.46	2.25	2.56	2.50	2.75	2.56	1.78	1.67	2.78	0.17	3.00
	Metal industry, V	2.55	3.00	2.50	1.67	1.75	2.75	2.67	2.33	2.33	3.00	1.00	3.00

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One of the hypotheses that was not statistically supported was H7, which concerns psychosocial hazards. The results in Table IV show that the scores for psychological working conditions were low and none of company types were distinguished. As mentioned before, knowledge about psychosocial hazards among managers in Estonia is still low. Hazard analysis procedures (C3) showed lower points for NOHSASL companies mainly due to lack of action plans after the risk assessment procedure and weak collaboration with OHS service providers. Almost all OHSAS companies actively collected and analyzed accidents statistics and investigated accidents and near-accidents (D1). The same trend could be followed among NOHSASC companies, as it is important for the corporation to compare different subdivisions and their safety activities. The lowest scores among all company types were gained for work ability of the employees (D2). None of the companies had a systematic view for the rehabilitation for persons whose work ability has decreased. There was generally no policy how to ensure elderly personnel's work ability. In several companies, the work satisfaction survey was conducted regularly (usually outsourced), but psychological hazards questionnaires were hardly used. Some companies stated that dealing with this issue depends strongly on the management attitudes and knowledge (35). All NOHSASC companies were distinguished with assessments of the social working environment through climate surveys. Most of OHSAS companies gained the same results. Almost none of the NOHSASL companies conducted social climate surveys and therefore gained considerably lower scores.

Tables 5, 6 and 7 present statistical results of the activity areas calculated by the MISHA method for OHSAS, NOHSASC and NOHSASL companies.

Table 5 shows that for OHSAS companies very strong correlations (above 0.85) are encountered between parameters A1-B1 and B2-D1; strong correlation coefficients (above 0.70) are encountered between parameters A1-A3, A2-A3, A2-B3, C3-D1 and B1-D2 ($p<0.05$). The very strong correlation between Safety Policy (A1) and Participation (B1) may be explained by the fact that a carefully prepared, comprehensively structured and well considered safety policy that embraces various necessary elements of OHSMS may contribute to higher employee participation in the work place design and better supervisor\ employee communication where feedback about the quality of work is regularly and explicitly given.

The very strong correlation between elements of Communication (B2) and Accidents and Illnesses (D1) is explained by the fact that SMEs do not prioritize recording, keeping and presenting regular statistics on occupational accidents and illnesses; they tend to organize less regular health and safety campaigns, or if they do, their focus is not on essential and emerging hazards in the company. Due to OHSAS 18001 requirements in OHS activities, OHSAS companies score generally higher points (often maximum) than other companies. Therefore, it is challenging to see all possible correlations between the elements due to the inconsiderable variability in scores between different OHSAS companies.

Table 6 indicates very strong positive correlation (above 0.85) for NOHSASC companies at a significance level 0.05 between variables B1-B2. Interestingly, NOHSASC companies gained slightly higher points in Participation (B1) than OHSAS companies. Presumably, NOHSASC companies, due to the pressure from headquarters, emphasize strong priority on safety issues, well regulated and effective communication procedures, information dissemination and up to date regular safety campaigns. Firm communication principles promote better employee and supervisor participation. Therefore, very strong correlation was found between Communication (B2) and Participation (B1).

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Table 5. The means, deviations and correlations between activity areas,

OHSAS-certified organizations

	Mean	Deviation	A1	A2	A3	B1	B2	B3	C1	C2	C3	D1	D2	D3
A1	92.80	7.83												
A2	86.46	12.96	.690**											
A3	74.65	8.59	.804*	.700**										
B1	75.00	21.30	.856**	.582	.492									
B2	80.90	14.35	.040	-.048	.028	.186								
B3	94.79	4.31	.547	.777*	.301	.684**	.140							
C1	88.73	6.03	.177	.299	.103	.546	.567	.530						
C2	58.80	15.39	.518	.321	.510	.581	-.079	.423	.499					
C3	65.28	8.15	-.020	-.301	-.155	-.071	.671**	-.235	-.125	-.584				
D1	88.43	16.50	.037	-.102	-.240	.241	.857*	.209	.367	-.341	.811*			
D2	30.56	14.85	.686**	.269	.147	.734*	-.129	.465	-.016	.225	.134	.210		
D3	87.50	24.80	-.034	.304	-.023	.159	.683**	.417	.536	-.202	.251	.630**	-.251	

Abbreviations: A1: Safety policy; A2: Safety activities in practice; A3: Personnel management; B1: Participation; B2: Communication; B3: Personnel safety training; C1 Physical work environment; C2: Psychological working conditions; C3: Hazard analysis procedures; D1: Occupational accidents and illnesses; D2: Work ability of the employees; D3: Social work environment.

* Correlation is significant at the 0.05 level.

** Correlation is significant at the 0.01 level.

*** Correlation is significant at the 0.1 level

Table 6. The means, deviations and correlations between activity areas,

NOHSASC organizations

	Mean	Deviation	A1	A2	A3	B1	B2	B3	C1	C2	C3	D1	D2	D3
A1	89.52	3.33												
A2	89.58	7.56	-.904*											
A3	79.51	3.47	-.752	.942*										
B1	81.94	18.04	.859***	-.813***	-.578									
B2	84.38	18.75	.828***	-.700	-.422	.979*								
B3	95.83	4.81	.394	-.212	.115	.741	.834**							
C1	90.59	5.46	-.130	.066	.260	.395	.421	.751						
C2	72.69	10.41	-.604	.572	.682	-.123	-.056	.462	.853**					
C3	68.06	9.49	-.835***	.878***	.917*	-.506	-.401	.169	.535	.894***				
D1	92.59	10.48	-.143	.433	.377	-.532	-.419	-.408	-.746	-.419	.000			
D2	32.64	19.30	-.144	.418	.696	.183	.355	.790	.650	.702	.653	.000		
D3	100.00	0.00	.[b]	.[b]	.[b]	.[b]	.[b]	.[b]	.[b]	.[b]	.[b]	.[b]	.[b]	

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Abbreviations: A1: Safety policy; A2: Safety activities in practice; A3: Personnel management; B1: Participation; B2: Communication; B3: Personnel safety training; C1 Physical work environment; C2: Psychological working conditions; C3: Hazard analysis procedures; D1: Occupational accidents and illnesses; D2: Work ability of the employees; D3: Social work environment.

* Correlation is significant at the 0.05 level.

*** Correlation is significant at the 0.1 level

At a significance level 0.01, there is a very strong downhill (negative) relationship between variables A1-A2. In NOHSASC companies, safety policy was often implemented in an unmodified form with minimal possibilities (the most common change was to eliminate legislative disagreements) to adjust with company's peculiarities. Therefore, it often lacked the practical connection and reflection of the company's real needs. While being unable to participate in the preparation process of the safety policy, those companies address their resources more towards safety activities in practice. This explains the very strong negative correlation between the elements Safety Policy (A1) and Safety Activities in Practice (A2).

NOHSASL companies represent a very strong positive linear relationship (above 0.85) at a significance level 0.05 between variables C3-C2, B2-C1, B2-C2, B3-C2, D1-D2 and A2-B2 (Table 7). Local companies with good Safety Activities in Practice (A2) tended to have good Communication (B2) skills and activities too: the management had effective information channels to communicate with employees, personnel was aware of the hazard reporting system and they were encouraged to make suggestions. Local companies who did not emphasize the need of workplace risk assessment as the basic preventive tool in OHS were not eager to deal with psychosocial risk factors either. This enables a correlation to be derived between Hazard Analysis Procedures (C3) and Psychological Working Conditions (C2). When local companies have established a good environment for communication where employees are encouraged to make suggestions and those are considered, it contributes to a better and satisfying physical and psychosocial work environment. This explains the very strong correlations between Communication (B2) and Physical Work Environment (C1); Communication (B2) and Psychological Working Conditions (C2).

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Table 7. The means, deviations and correlations between activity areas, NOHSASL organizations

	Mean	Deviation	A1	A2	A3	B1	B2	B3	C1	C2	C3	D1	D2	D3
A1	12.88	8.70												
A2	56.25	22.69	-.863											
A3	37.50	10.76	-.405	.521										
B1	47.22	16.67	-.793	.388	.258									
B2	47.92	10.49	-.715	.948**	.718	.221								
B3	58.33	21.52	-.405	.758	.800	-.086	.923**							
C1	67.59	13.31	-.751	.911**	.826	.356	.977*	.898**						
C2	44.44	18.14	-.569	.899**	.632	.000	.973*	.949**	.909**					
C3	36.11	22.91	-.464	.846	.564	-.135	.932**	.939**	.844	.990*				
D1	33.33	20.29	.127	.302	.707	-.487	.580	.849	.559	.671	.708			
D2	41.67	9.62	-.101	.424	.894**	-.192	.688	.894**	.723	.707	.700	.949**		
D3	8.33	16.67	-.058	-.061	.775	.333	.132	.258	.325	.000	-.081	.365	.577	

Abbreviations: A1: Safety policy; A2: Safety activities in practice; A3: Personnel management; B1: Participation; B2: Communication; B3: Personnel safety training; C1 Physical work environment; C2: Psychological working conditions; C3: Hazard analysis procedures; D1: Occupational accidents and illnesses; D2: Work ability of the employees; D3: Social work environment.

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*** Correlation is significant at the 0.1 level

Psychological Working Conditions (C2) are very strongly correlated also with Personnel Safety Training (B3). It is clear that the evaluation needs for training and insurance of adequate employees' safety knowledge reflect top management engagement. The management appreciation for employees favours better employee's psychological health. Local companies had very limited resources to deal with accidents statistics, accident investigation and absenteeism (D1). Those scores for all companies were considerably lower than OHSAS or NOHSASC companies. A significant number of investigated companies, irrespective of their type, did not handle the assessment of physical and psychological workability (D2). This leaves room for future improvements.

5 Discussion and conclusions

The globalization and constant competition in the world-wide market has encouraged companies to implement various standards to demonstrate engagement for quality, environment and OHS. The OHSAS 18001 (OHSAS…, 2007; EVS…, 2007) standard has gained highest acceptance in managing OHS in the manufacturing industry. Several authors have studied the impact of OHSAS 18001 (Chang and Chiu-Lan, 2009; Sanchez-Toledo et al., 2009; Fernandez-Muniz et al., 2012a; Fernandez-Muniz et al., 2012b; Koivupalo et al., 2015; Fernandez-Muniz et al., 2007; Abad et al., 2013; Pearse, 2002; Granerud and Rocha, 2011). In Estonia the manufacturing industry OHSAS 18001 certification has not gained too much attention yet. The investigated OHSAS companies stated that their motivation to acquire OHSAS 18001 certification is derived from managerial issues other than need to improve OHS. Those other aspects might be a pressure to maintain competitiveness in the market, to improve company's image in society and to integrate safety into the management strategy.

In our study, the investigated OHSAS companies perceived benefits from OHSAS 18001 certification as follows: (a) improved documentation management, (b) improved company's image and (c) better conformity of legal obligations. The same results were obtained by Fernandez-Muniz et al. (2012a, 2012b) in Spanish owned SMEs: that OHSAS 18001 helps companies to comply with their legal obligations, improve their organization and documentation system as well as enhance their corporate image. Another Spanish study (Abad et al., 2013) indicated that the adoption of OHSAS 18001 standard decreases the rate of work accident and that OHSAS 18001 can be used as a long-run strategic tool to achieve objectives that go beyond safety outcomes. They concluded that businesses who adopted OHSAS 18001 show significant improvements in safety performance and labour productivity.

 The current study supports different positive hypotheses about OHSAS 18001 benefits: it favours registration of accidents, illnesses and near misses; it supports regular monitoring of social work environment; contributes to more effective safety training etc. However, two of the postulated hypotheses were not confirmed: no difference in psychosocial climate between OHSAS and NOHSASL companies and higher appreciation on physical workability was observed. Hohnen and Hasle (2011) noticed the same shortcomings in their study, especially lack of concern about psychosocial work environment in an OHSAS company.

In our study, according to the results of audits, it can be concluded that in OHSAS companies OHS management functioned both on paper and in practice. However, in one or two cases doubts of window dressing and maintaining the system without practical value were perceived. A similar problem was encountered in a Danish study by Granerud and Rocha (2011). They demonstrated that five OHSAS 18001-certified manufacturing companies addressed health and safety issues in very different ways, including one manufacturer where the coupling took place and no legal requirements were compiled. The study raises the question of the impartiality of the certification agencies. In conclusion, Granerund and Rocha stated that OHSAS 18001 certification will not necessarily lead to

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higher levels of safety performance neither does it obstruct more advanced or innovative practices. OHSAS 18001 can strengthen structured initiatives, feedback possibilities, helps to create higher levels of transparency among companies and supports the consultation of blue-collar representatives in performance reporting and evaluation.

Our study also explored the differences between company types: OHSAS, NOHSASL and NOHSASC. The results showed that SMEs within a larger corporation were able to operate as efficiently as OHSAS companies since their OHS management system is strongly supported by corporate policy, standards, guidelines etc.

A study conducted in Finland (Koivupalo et al., 2015) to examine OHSMS in a global steel company revealed that local OHS practices and tools varied significantly between sites and no common practice or tool was found in use. In addition, the adopted corporate OHS standards varied relative to depth within subunits: some of them were exceeding the demands but some were below the standards. Corporate OHS management was based on OHS standards, vision and principles plan and targets. Management support of OHS effort was seen as the most important asset.

The results of our study presented correlations between safety activity areas according to different company types. This promotes better conception to understand how various safety activities are connected with each other and gives an explanation how employers emphasizing one specific safety element can smoothly influence positively other safety issues.

In conclusion, based on quantitative and qualitative data, the study shows that OHSAS 18001 contributes substantially to the establishment of company's written safety policy, development of physical work conditions, training needs of systematic training approach, better dissemination of information in all levels of organization, occupational health service activities, more effective supervisors and employees interaction, frequent accidents and illnesses registration and investigation, and regular monitoring of social work environment. Our results indicate that OHSAS 18001 provides no support for assessing psychosocial climate and physical work ability.

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Partnerships related to occupational risk prevention in SMEs

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Abstract

Considering the gap between the important needs aiming safety, on one hand, and the effective means of direct intervention hold by OSH Social Security Institutions on the other hand, it appeared absolutely necessary to complete public activities by a policy of cooperation with social partners.

Employee's involvement is considered to be a major challenge for controlling risks in a company; it was also decided to organize training courses being them dedicated. The actors of these trainings are either directly social partners or accredited training organizations.

The Regional Insurance Fund funds these trainings for prevention of occupational risks designated to trade unions and employer's organizations. It further commits to assist, advice and help the partner organization or the training organization.

As such, agreements have been signed with certain professional federations in order to reduce specific risks: CAPEB agreement on accompanied driving of apprentices in the construction industry, with UNPPD in order to promote the prevention of occupational risks in this activity sector...

In order to ameliorate the quality of this approach, the 13 Sections of the International Social Security Association have developed seminars with various programs.

This partnership with international dimension demonstrates a real willingness to reduce the claims in these companies and enables SMEs to have "good practices" having operated in countries which have experienced.

It's a rather important question, because there is a large part of employees who work in SMEs which have not strong safety and health structure as in major companies.

Introduction

The occupational risk prevention requires the involvement of all stakeholders to be effectively deployed within companies, in particular in Small and Medium Enterprises (SMEs). This category of companies is regularly identified as a prime target for prevention measures, not so much for its particular claims than for the difficulty that can be implementation of effective prevention measures in small structures, without any special department dedicated to the reduction of occupational risks.

It was therefore necessary to find partners who are able to disseminate prevention messages carried by the Assurance Maladie (Health Insurance Fund - Professional Risk) in these entities, as well as giving them the means to implement these messages.

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Part 1: The place of SMEs and very small enterprises in economic organization in Parisian region for 2013

Number of employees of enterprises with collective compulsory contributions rating (less than 20 employees): **1 362 593** (29, 57%).

Number of employees of enterprises with mixed compulsory contributions rating (from 20 to 149 employees): **1 379 166** (29, 93%)

For a total of **2 741 759** employees in SMEs and very small enterprises in Parisian region in 2013 (60%).

Number of enterprises with collective rating: **469 737** (93%)

Number of enterprises with mixed rating: **29 125** (6%)

For a total of **498 862** SMEs and very small enterprises in Parisian region in 2013.

➢ Loss for enterprises with less than 20 employees with collective rating:

Number of Occupational Accidents with sick leave: **28 768** (27%)
Number of Occupational Accidents with permanent partial disability: **2 431** (35%)
Number of Professional Diseases with sick leave: **1 848** (42%)
Number of Professional Diseases with permanent partial disability: **2088** (51%)
Number of daily compensations for Professional Diseases: **622 795** (46%)

➢ Loss for enterprises with less than 20 employees with collective rating:

Number of Occupational Accidents with sick leave: **43 060** (40%)
Number of Occupational Accidents with permanent partial disability: **2380** (35%)
Number of Professional Diseases with sick leave: **1 344** (31%)
Number of Professional Diseases with permanent partial disability: **1 050** (26%)
Number of daily compensations for Professional Diseases: **393 841** (29%)

Part 2: The involvement of social partners in the prevention of occupational hazards for workers

The Social Security Code, article R 421-6 specifies that the prevention fund permits the use of all appropriate publicity and propaganda methods to make known methods of prevention to workers and Committees for Work, Hygiene and Safety Conditions.

This article, supplemented by circular 113/65 of 26 January 1965, regulates the possibilities of signing subsidy agreements between the Regional Health Insurance Fund (CRAM) and Pension and Prevention Fund (CARSAT) and employee and employer unions in order to organize conferences and study sessions for Health and Safety at work.

The first of such agreement was signed between the Regional Health Insurance Fund of the Ile-de-France (CRAMIF) and these unions in 1993, after approval of the Board of the Fund.

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This agreement lays down the terms and conditions of CRAMIF's participation to the realization of training courses on prevention by the trade unions and determines the payment allocated to them.

This possibility of training sessions funding reveals the importance of today's training of workers in the frame of prevention policy of occupational accidents, occupational diseases and health at work.

It is now imperative to develop, through training activities, the ability of the actors to be involved in risk control in the field of safety and health at work.

Regarding the modalities of payment of the subsidies, upon receiving of the provisional training schedule at the beginning of the year, CRAMIF disburse 50% of the planned amount. The rest is then released gradually as trainings are accepted; knowing that the final balance can only be adjusted when unions send the training assessment of the past year to the Regional Fund.

CRAMIF does not only subsidize the unions. They may also request the assistance of an engineer, controller or trainer, employee of the Regional Fund. This person may intervene during the training course depending on the needs and objectives to be achieved in prevention.

The distribution of allocated funds is directly decided by the unions, amounting in 2014 to 67% for employees' unions, and to 33% for employers' organizations.

CRAMIF always has a clear view on the quality of the deployed training, firstly because it is possible that the Fund participated in its creation if social partners had developed the training.

On the other hand, if this is not the case, a union will have recourse to a training organization in order to realize training sessions. This body had to be approved before by the CRAMIF after opinion from the INRS.

As for the content of the training, it may concern:

• Basic acquisition training on occupational risk prevention for actions of the Committees for Work, Hygiene and Safety Conditions (CHSCT).
• Analytical methods, examinations of work lines, nuisance studies and prevention measures
• Training courses for the development of necessary relays to training on construction sites.

In addition, due to the signing of an agreement by the CNAMTS with employees' and employers' representative unions in 2009, it is mandatory to inform the Regional Fund of holding of training sessions so that its representatives are able to attend, if necessary. Trainers of CRAMIF regularly attend these sessions, their visit reports are systematically sent to the National Fund.

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The distribution of the subsidy for 2014 was as follows:

	SUBSIDY : 900 000 €
	67% = 603.000 €
C.G.T.	25 % 150.750
C.G.T. FO	25 % 150.750
C.F.D.T.	25 % 150.750
C.F.E.- C.G.C.	12,5 % 75.375
C.F.T.C.	12,5 % 75.375

	33% = 297.000 €
U.P.A.	25 % 74.250
CGPME	25 % 74.250
MEDEF	50 % 148.500

The Fund provides financing on a scale applied on 1 January of the current year, i.e. for 2014:
Session = 1 day: 260 €
Session > 1 day: 212 €

Part 2: The involvement of professional associations in the prevention of occupational risks

Training sessions for workers' unions are an important tool for occupational risk prevention through the appropriation of a culture on prevention by the workers themselves, also as this experience was extended to other regular partners of the CRAMIF, namely professional federations.

Indeed, these actors on the professional scene are significant allies for the Health Insurance Network - Professional Risk. They are particularly informed about issues that companies face in the sector, particularly in terms of claims.

They are indispensable partners of CRAMIF in order to reduce occupational risks in SMEs. On one hand, they can represent a significant proportion of workers of a professional sector and so therefore

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allow diffusion of the message to be delivered to the greatest number of people. On the other hand, they can coordinate preventive actions taken by companies they represent, which allow the regional Fund to have only one contact person, but to know that his message will be sent to its target audience.

Working with professional associations also can allow selecting prevention messages designate to a target population regarding a particular risk (musculoskeletal disorders, chemical risks and falls from heights ...). Some of these federations were invited to enter into a partnership with CRAMIF in order to reduce certain types of risks identified as particularly impacting the industry concerned.

The regional Fund has concluded an agreement with the Confederation of Crafts and Small Construction Enterprises (CAPEB) representing companies of certain departments within Parisian region, which provides mutual interventions on the very particular theme of road risk representing the increasingly very important number of accidents known by the construction sector. This risk concerns especially the particular public of apprentices. This agreement provides that the regional Fund intervene to educate mentors responsible for apprentices in this sector so that they learn through the person who manages them to control occupational road risk.

In addition, the CRAMIF provides the enterprises concerned with its documentary database, so that they can dispose of all documents allowing them to begin the process of prevention of occupational risks incurred by their employees.

Finally, the regional Fund may provide technical or financial assistance in the frame of Simplified Financial Aid to participate in the equipment of light commercial vehicles. The Simplified Financial Aid (SFA) represents a device in order to develop occupational risk prevention in small companies (under 50 employees). It is granted in the frame of national and regional prevention programs defined by the Health and Occupational risk Insurance and approved by the social partners (unions). It covers certain preventive measures identified, especially important for the control of specific risks.

Under the agreement signed with CAPEB, it is stipulated that the SFA will be used by the company in order to renovate or acquire a light commercial vehicle, safer and respecting national recommendations on road risk prevention. CAPEB is responsible for disseminating the offer of subsidy proposed by the CRAMIF and guide anyone desiring information on this matter provided by the regional Fund.

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Part 3: The recommendation of good practices by the International Social Security Association (ISSA) for enterprises.

Among the main groups affected by the solutions proposed by the ISSA related to Health and Safety at work, it can be mentioned especially small and medium enterprises, which generally employ the largest number of workers in all countries. The fact that they are, by their structure itself, reluctant to turn to Health and Safety professionals, poses a difficulty that must be overcome.

It is for this reason that the ISSA and its Special Commission on Prevention, itself composed of 13 Prevention Sections dedicated to various sectors, composed a working group dedicated to SMEs and the particular approach of which they were subject in the field of prevention.

It is through such working groups that ISSA could develop guidelines incorporating good practices already found in the world integrating them in the Centre of Excellence proposed to all countries in order to create a global social protection base.

One result of this work is the realization in 2009 of a website dedicated to SMEs, namely http://safety-work.org, which is a documentary database allowing companies who wish to have information accurate on different items.

Thus data are available by business sectors, themes or public concerned, in different languages, representing studies in countries of ISSA members who have been identified as constituting good practices applied by companies.

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Employees and (in)formal Corporate Social Responsibility (CSR) in Small and Medium sized Enterprises (SMEs)

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Abstract: This paper studies employees' reactions to CSR formalization in SMEs. Internal relationships within SMEs remain mostly informal. This informality generates reciprocal processes of trust and gives employees a particular role regarding the implementation of responsible practices internally. As a result, most of SMEs are used to experiencing "CSR" as a set of implicit and informal responsible practices with unspecified obligations. Over the last years, SMEs have been facing rising pressures around the formalization of CSR. Introducing formal policies or practices to govern what was previously accomplished through informality challenges prevailing norms and relationships causing disruption and uncertainty within employees. With the perspective of paradox theory, the purpose of this paper is to explore how employees experience the transition towards greater formalization and to identify the place of informality in newly formalized social responsibility. Through a single case study, we interviewed 17 members (owner, managers and employees) of a SME that has grown and formalized its processes during the last 15 years. This SME was characterized by strong, informal and historical social and environmental values and practices. We identified that the transition towards greater formalization have ambivalent effects on employees and that employees, managers and owner try to preserve proximity and informality threw a range of formal and informal actions. Regarding paradox theory, it appears that instead of a competing duality, formality and informality coexist within CSR and should be considered in relative degrees of a single formality-informality span.

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Introduction

Corporate social responsibility (CSR) in Small and medium-sized enterprises (SMEs) has given rise to a growing number of research over the last years, since SMEs have huge economic impacts worldwide (Jenkins 2006). Following large firms, SMEs have come under increasing pressure to engage in activities matching with what is described as CSR (Jenkins 2004).

SMEs are used to experiencing « CSR » as a set of implicit responsible practices with unspecified obligations (Slack, Corlett, and Morris 2015). In most SMEs, CSR is often implemented intuitively and informally (Jenkins 2006). But it seems that constructing a simplistic dichotomy between informality/formality and small/large firms respectively should be avoided (Marlow, Patton, and Ram 2004). Informality and formality are dynamic constructs which coexist in differentiated forms in time and space (Ram and al. 2001). According to paradox theory, if we consider formality and informality as paradoxical, they should be addressed simultaneously, since this would lead to long term organizational success and sustainability (Smith, Gonin, and Besharov 2013). Instead of a competing duality, the coexistence of both can be considered in relative degrees of a formality-informality span. In particular, we tend to identify formal practice with public, instrumental, macro and control, while we reserve informal practices for quite different functions – the affective, micro, private, social and integrative (Misztal 2002). According to Misztal, if we start from the understanding that formality and informality are part of a single span, however, then they may be seen as resources to be mobilized, rather than predictable or fixed in their constitution and effects. This challenges the notion that small firms must, should or inevitably do move from informality to formality (Marlow, Taylor, and Thompson 2010) and makes the task of understanding CSR formality-informality tension more significant. With regards to CSR, the social responsibility of a company is composed by both formal and informal approaches. It is not simply implemented through a formalized strategy. Mission statements and codes of ethics are not sufficient but CSR has to be « *embedded in the cultural fabric of the business as well as in the hearts and minds of its members* » (Collier and Esteban 2007).

The introduction of formality therefore challenges prevailing norms and relationships causing disruption and uncertainty. Research is needed to further explore how employees experience the transition towards greater formalization and how the compounding of certain tensions associated with formalization might be avoided (Mallett and Wapshott 2014). The purpose of this paper is therefore to explore the place of informality in newly formalized social responsibility and how employees experience the transition towards greater formalization. We analyze the manner in which, as SMEs adopt greater formality, socially responsible practices and values are therefore appropriated and reordered within the company.

Through a single case study, we interviewed 17 members (owner, managers and employees) of a SME that has grown and formalized its processes during the last 15 years. This SME was characterized by strong, informal and historical social and environmental values and practices. We identified that the transition towards greater formalization have ambivalent effects on employees' appropriation of responsible practices and values and that employees, managers and owner try to preserve proximity and informality threw a range of formal and informal actions. Results highlight the need for a comprehensive approach to social responsibility, balancing formal and informal processes. Regarding paradox theory, it appears that instead of a competing duality, formality and informality coexist within CSR and should be considered in relative degrees of a single formality-informality span.

This paper proceeds as follows: first, we present a review of the literature about CSR informality-formality span in SMEs and highlight the need for further research about employees in this tension. Then we outline the theoretical framework, the research design and present the results of the exploratory study. In the final section, we conclude by highlighting the contributions of the study and focus for future research.

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Literature review
SMEs' informal CSR and employees
SMEs are often characterized by informal and intuitive processes, such as direct and regular internal contacts, overlapped functions, low hierarchy, simple oral communication systems, good circulation of information and more leadership because of closeness (Torrès 1999). Empirical evidence suggests a notable tendency for informality in managerial action, resulting from spatial and social proximity between owners, managers and employees (Marlow, Patton, and Ram 2004). Indeed, internal proximity encourages low formalization of processes and relationships (Spence 2007), the latter are more flexible, based on intuition rather than on planning, on oral rather than written interactions (Torrès 1999). The information and coordination systems are simple and informal. The frequency of personal interactions between the managing director (or owner manager), managers and other employees fosters a direct circulation of information (Baumann-Pauly and al. 2013). These simple structures are then characterized by less linear and more improvised relationships (Mallett and Wapshott 2014). In essence, contractually specified models or models of best practice are not followed; informal managerial practices dominate (Marlow, Taylor, and Thompson 2010). The context of social and spatial proximity create a fertile environment for the persistence and dominance of informal processes.

That would explain why CSR is often implemented intuitively and informally in SMEs (Jenkins 2006) and why SMEs are used to experiencing « CSR » as a set of implicit responsible practices with unspecified obligations (Slack, Corlett, and Morris 2015). From Bertels, Papania and Papania (2010, p.13), CSR informal approaches may be defined as discussions, experiences and behaviors that « *aim to establish and reinforce shared values and shared ways of doing things that align the organization with its journey to sustainability* ». The term of « CSR » as such is not often being used (Fassin 2008) and SMEs would have been engaged in CSR a long time before it has been formalized in large firms (Murillo and Lozano 2006). Several authors maintain that informal social responsibility in SMEs allows CSR to be better integrated in SMEs' activities than in large firms' one (Baumann-Pauly and al. 2013) since SMEs are disposed to conceptualize it through daily practices (Murillo and Lozano 2006). It appears as a way of doing thing, a mix of intuition and opportunity rather than a CSR guidelines compliance upgrade. Fassin argues that, in SMEs, « *the essence of CSR lies in the implementation of responsible business practices at all levels of the corporation; it lies in the corporate culture, not in formalization.* » (Fassin 2008, p.375).

These informal practices give employees a special consideration (Mankelow 2008) and unwritten responsibilities. SMEs are characterized by mutual trust between the members of the organization, involvement in the business and facilitated integration of individual goals within the organization (Jenkins 2006; Torrès 1999), that affect the implementation of CSR. These reciprocal processes of trust and cooperation encourage the taking of social responsibility by employees within the SME (Murillo and Lozano 2006; Perrini 2006). For instance, it coult engender employee commitment, enable swift decision making, facilitate mutual problem solving and so add to competitive advantage (Tsai, Sengupta, and Edwards 2007). Then, employees potentially play an important role in the implementation of socially responsible practices in SMEs (Spence 2007, Preuss and Perschke 2010, Jenkins 2006; Vivier 2013; Lepoutre and Heene 2006).

However, despite the importance of employees as a stakeholder group (Collier and Esteban 2007) and despite their influence on CSR construction in SMEs (Spence 2007), relatively little attention has been given to them in the literature (Aguilera and al. 2007, Spence 2007). Aguinis and Glavas (2012) highlighted a huge lack of research about CSR at micro levels of analysis (ie individuals and teams). They advocate the development of an understanding of underlying mechanisms and microfoundations of CSR (ie foundations based on individual action and interactions). Most of the literature on employees and CSR measure employees' reaction to CSR through quantitative methods (Vlachos, Panagopoulos, and Rapp 2013; Shen and Benson 2014; Jones 2010; Farooq and al. 2014). Thus, employees are also mostly considered more as recipients of top-down CSR strategies rather than potential drivers of CSR (Davies and Crane 2010). The literature about CSR in SMEs tends to ignore the role of SMEs' employees in CSR construction (Spence 2007), despite employees are said to play a central role in it. They are rarely interviewed by the researchers, even when their work focuses on the employees themselves: in general, researchers give voice to the managing director (or owner manager), to the CSR manager when there is one (Nicolas 2004) or to external stakeholders.

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More precisely, the literature on CSR in SMEs almost exclusively focuses on elements related to the managing director (or owner manager) (his/her motivations, personality, origins, community and network, commitment or his/her point of view), (Murillo and Lozano 2006; Thornton and Byrd 2013). This bias may promote a normative vision of CSR and internal relations and thus making CSR necessarily desirable, acceptable and positive.

Rising pressures for CSR formalization and consequences on employees

Over the last years, SMEs face rising tensions around the formalization of CSR (Fassin 2008). CSR formal approaches « *involve trying to guide behaviour through the rules, systems, and procedures. The idea is to codify and organize values and behaviours that have developed informally. This is often accomplished by generating documents and texts such as codes of conduct, procedures, systems, and training materials and by implementing programs.* » (Bertels, Papania and Papania 2010, p.13). The discretionary nature of CSR engagement is shifted to become a more formal, explicit engagement (Slack, Corlett, and Morris 2015). Most research therefore focus on how SMEs could replicate large firms CSR strategies and on the rising pressure for CSR formalization (Fassin 2008). Formalization of CSR appears as a key step for CSR strategy success. As formalization is a way to legitimize the organization and its strategies (Meyer and Rowan 1977), external stakeholders especially push SMEs into following large firms' approach of CSR, focusing on the strategic dimension of CSR, which implies the development of reporting, standards, certifications, formalization, specific terminology, communication strategy and strategic partnerships (Fassin 2008). Formalizing CSR appears as a way to prove its responsible practices. It is described as a necessary step for CSR strategy. But SMEs have difficulties to follow these prescriptions compared to large firms (Jenkins 2009). Many studies show that SMEs face difficulties in formalizing their social responsibilities because of a lack of skills, time, money or method (Russo and Tencati 2008, Baden and Harwood 2012). Because of the weak formalization in SMEs, some tend to conclude that SMEs face difficulties to develop social responsibility practices.

Some authors have however questioned the relevance of this formalized strategic approach to CSR in SMEs. This approach has been built and defined by and for large companies and may be irrelevant in the SME context, in which CSR would be more informal, grounded and altruistic (Jenkins 2009; Baden and Harwood 2012). Internally, it is more feasible for small businesses to operate within a less structured context that consists of trust and informality (Russo and Tencati 2008). Indeed, some organizations, as SMEs do, depend more on « *managing the demands of internal and boundary-spanning relations* » whereas other ones, as large firms do, depend more on « *the ceremonial demands of highly institutionalized environments* » (Meyer and Rowan 1977). With regards to CSR, large firms appear to be characterized by totally different processes and strategies particularly because of the priority they give to reporting functions, reputation and external communication (Spence 2007; Baumann-Pauly and al. 2013; Torrès 1999). Implicitly or explicitly, a doubt is expressed in the literature on the adequacy for SMEs of the dominant approach to CSR, which would not guarantee a reliable responsible engagement. SMEs' specificities would lead to different forms of CSR culture that possibly cannot fit with a formalized strategy (Torrès 1999). Rather than SMEs failure to adopt a CSR strategy, should be highlighted CSR debate failure to include SMEs with their specific ways of functioning (Jenkins 2004).

Regarding employees, CSR formalization trend may call into question the very nature of social responsibility in SMEs because of its apparent subservience to more formalized economic considerations (Slack, Corlett, and Morris 2015). It encourages into considering employees as recipient rather than drivers of CSR. The organizational formalization of CSR may lead to employees viewing CSR as a separate, bolt-on business activity not motivated by a genuine social consideration but rather by more economic business interests of building social reputation (Slack, Corlett, and Morris 2015). Attempts to embed greater degrees of formality are complex processes that may raise tensions and reduce mutually developed forms of understanding and trust (Mallett and Wapshott 2014; Misztal 2002). Slack and al. highlighted rising tensions around the formalization of CSR by showing that formal CSR programs may lead some employees to distance themselves from CSR, since employees seemed to view CSR as an implicit activity with unspecified obligations (Slack, Corlett, and Morris 2015). At the employee level, a more strategic and economic engagement with CSR could lead to the aim of CSR becoming for the individual to be seen to undertake such activities, regardless of any serious sense of social responsibility, to achieve personal economic

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goals. In contrast, some employees may be advocating more strategic links between organizational and individual objectives through a closer alignment of CSR to personal development plans to more fully orientate employee social commitment within the company.

However, there are also tensions regarding the informal part of CSR. Regarding internal relationships and roles, proximity and low formalization are also source of complexity and heterogeneity (Ram and Edwards 2010) that may lead to potentially important conflicts within the organization (Goss 1992). The literature on SMEs highlights a turbulent and ambivalent internal reality, albeit potentially characterized by more satisfaction (Tsai, Sengupta, and Edwards 2007) and commitment (Jenkins 2006) but generating also intensified relationships, high turnover and kinds of emotional exploitation of employees (Goss 1992). Informality also generates ambiguity about the responsibilities of each individual in the organization (Mallett and Wapshott 2014), which certainly has an impact on how corporate responsibility is perceived and experienced inside the company (Cornelius and al. 2008).

Internal reality in SMEs may actually be much tougher than the idealistic « beautiful » perspective it implies, but equally less bad than the deterministic 'bleak' perspective. The bleak/beautiful typology therefore lacks explanatory power and should give place to a more nuanced and contingent view (Saridakis, Muñoz Torres, and Johnstone 2013). SMEs seem to face a conflict between their need to develop their own methods of integrating social responsibility into their corporate strategy and the opportunity and their willingness to merely replicate large firms' formal responsible strategy (Russo and Tencati 2008). Yet, SMEs rarely use the language of CSR to describe their activities, but informal CSR strategies play a large part in them (Russo and Tencati 2008). As a result, in SMEs, there is a tension between formal and informal processes linked to CSR that needs to be addressed and balanced.

Paradox theory
CSR formalization is best grasped through a reflexive and critical approach since considering formalization as a kind of panacea may lead to neglect the social and informal dimension of CSR (Gond 2011). CSR is not only strategic, but it is also a changing result of implicit reciprocal relationships and interactions of individual and collective values in the organization (Gond 2011; Mirvis 2012). It seems that constructing a simplistic dichotomy between informality/formality and small/large firms respectively should be avoided (Marlow, Patton, and Ram 2004) since « *all firms combine formality and informality just as they combine control and consent . . . the balance differs as conditions vary* » (Ram and al. 2001, p.859). Informality and formality are dynamic constructs which coexist in differentiated forms in time and space (Ram and al. 2001). It seems that insights into the realities, processes and experiences of both formal and informal processes in SMEs are likely to require further detailed qualitative investigation (Mallett and Wapshott 2014). There is an assumption that « formal » equates to rule based and « informal » to social negotiation: there is a need to explore the interaction of formality and informality in a more nuanced manner, and so contributes to conceptual understanding of how both approaches coexist within managerial practices. Since degrees of informality and formality coexist within all organizations, analysis should be oriented towards understanding this interplay (Marlow, Taylor, and Thompson 2010).

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According to paradox theory, paradoxes refer to « contradictory yet interrelated elements—elements that seem logical in isolation but absurd and irrational when appearing simultaneously » (Lewis 2000, p.760), like formality and informality. Indeed, in every organizations, managers must navigate a path between rationality and intuition, formality and informality, professional norms and personal preference or idiosyncrasy (Marlow, Taylor, and Thompson 2010). In particular, we tend to identify formal practice with public, instrumental, macro and control, while we reserve informal practices for quite different functions – the affective, micro, private, social and integrative (Misztal 2002). According to Misztal, if we start from the understanding that formality and informality are part of a single span, however, then they may be seen as resources to be mobilized, rather than predictable or fixed in their constitution and effects. Resulting from contradictory demands from divergent internal and external groups, this paradox between formality and informality generates tensions (Smith and Lewis 2011). This makes the task of understanding CSR formality-informality tension more significant. Paradox theory suggests to address formality and informality tensions simultaneously and assesses that it will lead to long term organizational success and sustainability (Smith, Gonin, and Besharov 2013).

The introduction of formality in CSR in SMEs challenges prevailing norms and relationships causing disruption and uncertainty within the organization. Research is needed to further explore how employees experience the transition towards greater formalization and how the compounding of certain tensions associated with formalization might be adressed (Mallett and Wapshott 2014). Introducing CSR formal policies or practices to govern what was previously accomplished through informal, interpersonal means particularly impact employees. The purpose of this paper is therefore to explore the place of informality in newly formalized social responsibility and how employees experience the transition towards greater formalization. We analyze the manner in which, as SMEs adopt greater formality, socially responsible practices are therefore renegotiated and reordered within the company across the informality-formality span. We draw on the experiences and observations of employers, managers and employees.

Methods
This paper presents an exploratory case study that was conducted from October to December 2014 in a French SME in a process of CSR formalization. More qualitative studies are needed to improve our understanding of the underlying mechanisms of CSR and especially its microfoundations (ie foundations based on individual action and interactions) (Aguinis and Glavas 2012). In particular, case studies are recommended in situations where a recent phenomenon is still insufficiently understood (Ghauri 2004). It allows a thick description that leads to an « *understanding of what is important about that case within its own world* » (Stake 2000). Finally, SMEs are said to be a popular empirical site for researchers to explore formality and informality in managerial practice (De Kok, Uhlaner, and Thurik 2006).

A qualitative approach to data collection was deemed essential to uncovering and exploring perceptions and experiences of the employer, managers and employees. We are working on the assumption that all involved in social responsibility actively construct and reconstruct it formally and informally (Marlow, Taylor, and Thompson 2010). The exploratory study was based on 17 one-hour interviews with the employer, managers and employees of different services and secondary data. As suggested by Corbin and Strauss (2008), our interview questions were open-ended and exploratory. The data was analyzed using open coding techniques (Corbin and Strauss 2008) with NVivo codes (codes based on a word or phrase in the data).

The case study
Sampling of case studies is crucial, as the choice of sample influences the results of a study (Miles and Huberman 1994). The exploratory case-study company was selected to meet following specific criteria : being an SME (according to the Article 51 of the regulatory decree (No. 2008-1354) of the French Law called Loi de Modernisation de l'Economie (LME)), having strong social and environmental values and engagements, being in a process of CSR formalization.
The selected SME is located in Nantes (West of France) and employs 130 persons. It has grown tremendously since fifteen years. At the time the interviews were conducted, the company was in a process of formalizing the social and environmental practices and values it had implemented internally since its inception. This formalization went hand in hand with a more general structuration

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of the company. According to respondents, several factors have contributed to the structuring and increasing formalization of business processes. First, the company growing: its staff has greatly increased in parallel with the production, the workload, the pace of work and activity that has diversified. Meanwhile, the institutional context, especially related to CSR, caused a proliferation of regulations and standards as well as requests for customer audits. Finally, the owner will to be competitive and to highlight its activities and CSR engagement. The latter is involved in several local networks linked to CSR and is therefore committed to enhancing and structuring CSR practices so far introduced spontaneously. The objectives were to be more easily accountable for its clients and to enhance more systematically its many responsible practices and values, and thus, to build a comprehensive CSR strategy.

The original activity of the company is organic and biodynamic arboriculture (AB and Demeter labels). Then it expanded by developing processing and marketing of a wider range of certified products. Its CSR culture was much formalized for the environmental part with the AB and Demeter labels. From the social point of view, employees had a number of benefits that had been implemented throughout years. However, there was no formal documents or procedures relating to 'CSR' or that could bring these initiatives under an overall strategy.

CSR culture seemed to be rather informal and historically lived through very strong values. First of all, threw its organic and biodynamic tree growing, the company is strongly attached to the land and respectful of nature's cycles.
« *The commitment to nature has a symbolic impact on employees in the sense that we show that is extremely important to preserve nature, take care of it, to follow all its seasonal steps etc.* » a manager

In addition to the earth, human appears as another foundation, the company is qualified by those interviewed as a « *family* » and very humane. The owner and managers are very attentive to the staff and the latter has a large freedom of speech.
« *What surprised me at first, is confidence perhaps, confidence, letting us ... letting us get by. In our job, they consider us ... not as a novice who just arrived. I think that plays a lot.* » an employee

These values of listening and speaking promote trust and a strong solidarity between employees, managers and the owner. So, many of the employees of the company do not work here by chance and know that if they face personal and private problems, the company can listen to them and can be a support.
« *The individual must be considered individually, it's not just the group, it is not just a team so that's why I also know how to stand alongside and exchange with them individually.* » a manager

Finally, the mission of the company is not only an economic one but the company carries a project and a vision. This project gives meaning to the activity. The owner plays an important role in the embodiment of this vision.
« *In other companies ... we're going to work, it is to do eight hours and that's all... While here, we try anyway ... we try to move the project forward. To advance the business.* » an employee

These values appear to be firmly anchored in the company since its inception and to be closely linked to CSR principles. Indeed, the company's founders already had a strong desire to work closely with nature and earth and to promote at same time the values of solidarity towards individuals within the company and outside the company. These values are still essential today for the owner and are anchored 'naturally' in the methods and relationships.
« *We have a boss who is very human. With respect to others, other companies, it's pretty family-like* » an employee
Since a few years, the company was divided in different geographical areas, including one in the city. Within 3 years, all the services were expected to be gathered together in one site in the countryside. This new place led to the emergence of an important new project around educational farming, beside the core activities, in which employees could get involved voluntarily.

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Interviews

The one-to-one interviews were held in private meeting rooms. They lasted approximately 1 hour and were audio-recorded. Transcription of the interviews enabled the researcher to gain an in-depth familiarity with the responses (Bailey 2008). To provide a basis of objectivity in the interviews, and to enable the employees to speak freely about their views and engagement with socially responsible practices, all participants were assured of their anonymity. The exploratory nature of the research was explained to encourage employees to speak as widely as they wished on their engagement inside and outside the company (Slack, Corlett, and Morris 2015).

Using open-ended questions, the interviews explored the different views and considered the tensions and contradictions which arise during formalization and how they are managed by the actors involved. The introduction of formality challenges prevailing norms and relationships causing disruption and uncertainty, it is this process and related tensions which are of interest here. Accordingly, our data analysis is centered upon oscillations along the informality-formality span by examining the continuous negotiation and contestation of formalized processes as described by all three categories of respondent (Marlow, Taylor, and Thompson 2010). The dynamics and challenges associated with this shift were discussed readily by all respondents.

In order to identify informal responsible practices and to get what composes the culture of responsibility within the company, the expression "CSR" was avoided during most of the interview. Instead, we referred to "responsible practices / engagement", "social or environmental practices / engagement", "values" etc. At the end of the interviews, we finally asked the interviewees about their knowledge and attitudes with regards to "CSR" and its formalization.

Findings

In the following, first, we briefly present how the company shifted from mostly informal processes and relationships to more structured and formalized ones. Then we analyze how this was lived as an overall distance process and which tensions it generated. Last but not least, we finally highlight actions implemented by employees and managers to preserve internal proximity and informal processes.

The company development

Before the structuring and business development stage, the company was characterized by a craft activity, polyvalent tasks and by friendly and informal relationships. The activity was mainly based on informal processes supported by strong social and environmental values in the company. Due to the increased competition context, regulatory changes (the *35 heures* French law, standards proliferation) and the arrival of a new director with strong development ambitions in 1998, the company grew tremendously in the last fifteen years. Production increased and the number of employees moved from 15 to 130. The activity, previously focused on the tree crop production, has diversified, with the development of industrial and processing activities, marketing activities and international marketing. The growing of the company lead to company structuring: specialization of labor, materials and teams and structured and staggered working hours. Physical constraints have led the company to split over several sites. The company has also gained equipment. Its environmental commitment has gradually been recognized by the AB and Demeter labels.

Generated tensions

Distance and proximity in a growing company

Based on the analysis of the interviews, the company growth and the external institutional context lead to a useful structuration of the company and created a distance they deplore. First, geographical distance: the company split into multiple sites to expand its activities and accommodate the entire growing staff. On the other hand a functional distance: tasks are specialized to deal with the diversification and amplification of the activity but also to comply with external requirements. The distance is also perceived in the relationship between the « *graduates* » and people working down the chain. Moreover, a distance from the land: one of the sites (MIN site), acquired in recent years, is in town, « *in bitumen* », which was very hard to accept by some as « *it does not correspond to the company's philosophy* ». This distance comes also from the profusion of standards, not adapted to the reality of the activity and from the functional distance, which implies that managers are not always practitioners, but are sometimes « *too much in their office* ». The relationship to the land is

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also lost with the development of fruit transformation, which results in a tendency for industrialization of the company.

These different kinds of distances are self-feeding and especially cause a relational distance, deplored by employees: the ties in the company are less « *family-like* » than before and it is almost impossible that everyone knows each other because of the number, geographical remoteness and specialization of tasks. While most employees have values close to the company, some « *urban* » people first see the company as an employer like any other, although highlighting the human approach of the owner. The proximity that characterized the company (relational proximity, geographical proximity, functional proximity, land proximity, values proximity) was somewhat disintegrated and individuals express a fear of losing a little more this close thereafter. Social and environmental values are also perceived as being more fragile and less entrenched than before.
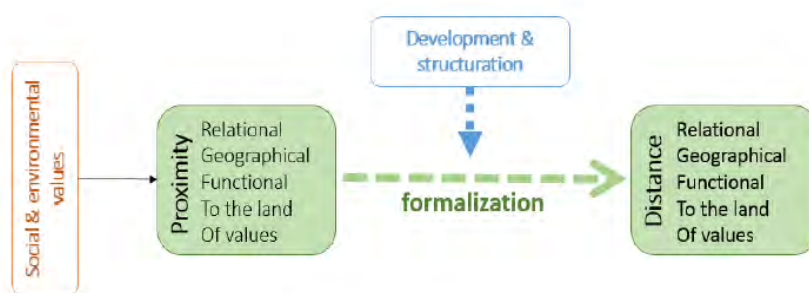

Fig. 1 From proximity to distance

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« *Over time ... we know each other less and less, we meet less and less ... It's a shame. But this is no longer the same structure, it is almost impossible that everyone know each other. And it has become more structured, each one has a specific task, whereas when I arrived, it was much more varied, we could do a little of everything.* » a manager

Most tensions in favor of informal processes
The respondents generally appeared suspicious about formalization. According to the respondents, structuring the company has a strong relational impact. People know each other less and less. This sentiment was common to all owner, managers and employees, lamenting the intrusion of formality into what they presented as previously amiable social relations. The activity is less flexible. The products become standardized. The relationship to the nature is less strong. People fear that the strong values of the company disintegrate. They are trying to preserve them but fear the industrialization of their company.

« *Here* (MIN site in the city) *we are in a world that is in the city, industrial, more automated, perhaps more controlled too. There* (Vertou site in the countryside)*, they are much closer to the orchard, nature, much closer to traditional methods, much closer to the ground, people have different behaviors, they are also a bit different and that's it. I also see guys from orchards. It is very little the case for the people who work here* (MIN site in the city)*. And perhaps people here tend to forget sometimes that we are tree farmers at first. Guys in orchards are in the field, they wear boots every day, they are outside, come rain or shine, even if it is snowing or 30°c. They face huge difficulties, this is not only an applesauce sale. So that's important. We often say: "Come with us, come to the other side, and soak you up, because all that it's our business." It is a vertical business, this is a little unusual, but it is also a great strength for us.* » a manager « *Over time... we know each other less and less, we meet more than we know each other... it's a shame. But it's not the same corporate structure, it is almost impossible that everyone knows each other. And it became structured, each with specific tasks while when I came in, it was much more diverse, we could do a little of everything.* » a manager

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Regarding communication, formalized internal communication is not always sufficient, newsletters are not necessarily read. "Word of mouth" communication also remains critical to employee involvement in projects. Employees and managers fear external communication takes precedence over the implementation of concrete actions.

As regards the proliferation of standards, many of the standards appear unnecessary to field employees and managers and are often inconsistent with the reality of the work. They are seen as constructed and imposed by people working with simple technical data but who do not know the reality and did not bother to test their standards. The standards are not thoughts from a global point of view, but just treat isolated problems. Standards look inconsistent or incompatible.

« *Some standards are good, they are useful. Except that sometimes they are completely off the mark, I think that certain standards are made by people who just have the technical data sheets, they have never practiced. And despite their great technical training, if they came on the field, I think sometimes they would realize that they impose is not necessarily feasible.* » a manager

The proliferation of standards, controls and audits would require a full time employee to organize it. This is seen as a waste of time and money. Managers are suspicious toward auditing clients, which certainly do not apply the rules to themselves. They see it as an unfair imbalance.

« *Maybe I deliberately block a little because I do not want to go into a straitjacket. That's it. I think with everything we just said, CSR is done every day. That's it. It is not without knowing it, but it is by our own methods. That's it. [...] As soon as someone goes in boxes, he must not get out. I have a quality assurance training, this is what made me a bit stuck. Because for the ISO, going into procedures etc., going into boxes all the time in the boxes, and then if you come out of the box, it's not good, this is not in conformity etc. ffff here we make purees which have different colors and different tastes every day.* » a manager

Alongside, employees and managers have the will to preserve informal relationships and processes. Indeed, informal processes are viewed positively because they allow individuals to get closer and to know each other. They allow managers to anticipate and manage conflicts and difficulties intuitively. These informal and close relationships promote exchanges and trust. Ideas are expressed more easily.

« *This is respect, this is the consideration of the human, this is the consideration of the matter, this is the consideration of the environment, the consideration of the work environment, of daily difficulties. I try not to manage from an office, where we pass the instructions. With the resources we have today, computers and so on, we can do what we want without any problem. But it does not have any interest for me. You have to take care of the human. The human is the most important.* » a manager

« *I try to see a little bit if it went well in the job. But also I feel if people are in a phase where things are alright, where one is happy and everything is going well or if people are in trouble, if they have difficulties. I try to feel conflict emerging. So, it allows me to share so much with them, here it's easy, it's pure everyday life, I am here. So, I always come to see them individually, it can be a simple "hello", it's not much, and then from time to time when I see that there's one who is a little solo, well, I ask how it goes. I go a little further to see if everything is going well. It allows for mutual trust, it also allows to have a manager who is close to the teams.* » a manager

These results suggest that informal processes help make room for trust, reciprocity and proximity. They promote a family atmosphere at work and solidarity beyond working conditions. For instance, several employees engage voluntarily in extra-projects for the company, such as the educational farming project, because they feel consistent with it. This confirms the results of previous research suggesting that informal processes can generate more commitment (Jenkins 2006).

« *And in the company you always have two or three people who want to invest in a commission in order to support and demonstrate their knowledge of what they already know.* » the owner

« *I am very aware of these questions. So for example, on the eco-village project (educational farming project), there is UNAPLA that is involved, it is the National Union of beekeepers in Loire-Atlantique, beehives were settled three years ago at la Caffinière (future site that will gather the whole enterprise), on the orchard. So, Robert (co-director) was looking for hives... I established the link between the company and UNAPLA and it was done. And for me it is important yes. To make a connection*

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between ... between men and land. It seems to me, that this is the future. If we don't do this now, well ... we will surely regret it. » an employee

However, informality is not always beautiful
The results suggest that informal relationships and intuitive management are also source of complexity and heterogeneous relationships (Ram and Edwards 2010) that may lead to potentially important conflicts within the organization (Goss 1992). They also generate ambiguity about the responsibilities of each individual in the organization (Mallett and Wapshott 2014). Internal dialogue is not always spontaneous: formalizing regular and organized exchanges may facilitate a clear management, compatible with employees' needs. Some employees highlight a lack of communication because the latter is little systematic in the daily management. « Intuitive » identification of conflicts is not always effective and sometimes managers seem to be passive in the conflict resolution. The direction is not always sufficiently attentive to staff, which would cause an unsuitability of the material to the needs of the employees for instance. More regular and structured meetings would allow better exchanges.
« *And then there is not much dialogue between management and the staff. What I mean by this is that the communication has to be reviewed.* » an employee
« *There is a communication problem... for example... they install a new engine, anything, without asking how it goes from the perspective of the worker. It is the worker who is on the job... so you have to ask... you have to ask before...* » an employee
« *I think we need that each sector makes a meeting, I don't know if they do that, one meeting per week. So that they say "this week there will be this, that, and that" and then we will agree... and then we should write down what is going to happen.* » an employee

Alongside, the interviewees highlighted several benefits from the formalization. The company's structuring elements allow a smooth running of the company and its economic development, thus they contribute to preserve jobs. Formalized internal communications and internal meetings appear as an essential tool to keep employees informed of the company's projects and to raise awareness of the issues and corporate values. Formalized external communication allows the company promotion and can foster a ripple effect on other businesses. The proliferation of standards and audits forced the company to pay attention and stay compliant. This also helps to raise issues it would not have identified itself.
« *We have a committee of managers with those of each service, several times a year, once every three months, just to talk about the project of the company, balance sheet and all. Managers and the owner. To mention a whole lot of projects...* » a manager
« *The project to gather all services together in a few years* (Company gathering at la Caffinière)*, they talk about it on the Christmas drink for example, in the newsletter they have already written about it also... I know that...*» an employee

Formal processes appear necessary to structure a growing company, to communicate properly inside and outside the company about its values and social responsibility and to insure conformity with external rules. The formalization appears as internally useful to facilitate internal communication in a developing structure, with diversified sectors. A lack of structuration may be detrimental to mutual trust and reciprocity within the company. Formalization is not incompatible with values of proximity and trust. On the contrary, by preserving a good communication in a changing structure, it can preserve the potential for voluntary involvement. That is why, the *informal is beautiful* tendency belief in SMEs should be avoided. Slack, Corlett and Morris showed that poor internal communication can cause disengagement. Moreover, employees do not constitute a uniform group and some employees may expect a more strategic and economic approach to CSR, in order to foster economic rewards to the business in terms of its reputation in the community (Slack, Corlett, and Morris 2015).

How are the tensions managed?
Employees, managers and the director are establishing both formal and informal actions that maintain the historic values and proximity in the company. These actions are conducted either consciously in order to preserve these values or are naturally in place (routines, habits, ...) or for other reasons (structuring, material constraints ...). This results in the preservation of the values and proximity despite the trend of distancing.

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Regarding informal actions, informal processes have been preserved and are mainly related to internal relationships. The close relationship is maintained through free daily attitudes, integrated in most of the company's members. Managers and employees want to keep and maintain direct relationships on a daily basis with all. The management is done directly by daily contacts without structured rules. The manager comes directly to see the employees and informally talks with them. Managers are particularly attentive to people and try to identify and anticipate potential conflicts or private issues. Relationships are then characterized by strong proximity. Little teams and family spirit make possible a weak formalization of management. Transmission and training are done by experience through the activity itself. Managers have the feeling of doing CSR without knowing it and that values support these behaviors spontaneously. Freedom of speech, listening and respect are clearly promoted values, which materialize in the attitude of people every day. The owner and managers are qualified as « *very accessible* ». Attention is paid to private problems and working time flexibility needs.

« *As we managed building confidence, employees trust and talk about themselves after a moment.* » a manager

« *We are free to speak. We are free to speak. As long as we are respectful ... no worries.* » an employee

Regarding formal actions, the company will be reunited within 3 years on the same site in the countryside. Emanating from external constraint and the will of the owner, employees are also keen to bring together the different services in one place and thus to have more unity and proximity. The proximity of the land and the attachment to the land remains important despite the development of the company. Most employees who had been forced into "exile in the city" see in the relocation project in the countryside as a return to the land and to the foundation of the company. The educational farm project is a way to develop and promote earth respect inside and outside the company. Several employees got involved voluntarily in this project. Functional distance, meanwhile, will stay effective in task specialization but the gathering of different businesses in one location is expected as vector and link between different functions.

« *The owner is the main driver in the sense that he launch the idea of this project* (educational farm)*. But where this is interesting is that employees are involved parties. If they want to be actors, they can be actors. If they want to give ideas, they give ideas. And that's what's interesting.* » a manager

Regarding communication, the company has a monthly internal newsletter, to keep employees informed of the company projects but also to give private information, such as birthdays, weddings and births and to promote private initiatives, such as private honey selling. Quartely, the company publish an external paper magazine, which is delivered in supermarkets. Finally, the company participates punctually to TV reports since it is locally recognized as a engaged company.

Although there are no regular meetings inside each service, the owner organizes two annual meetings with all the employees, before summer holydays and before Christmas, which appears to be a friendly and largely liked moment. Quartely, managers and the owner join for a meeting to discuss on the strategy of the company. Finally, the orchard service makes quartely meetings, before each key cycle of production.

Working time is organized to provide flexibility to employees and to foster the balance between work and private life. Thus, many employees are working on a 4-day week. Many other formal initiatives are designed to improve comfort and working conditions and contribute to a friendly and family atmosphere in the company.

Finally, the AB and Demeter certification is a strong example of formalization that strengthen environmental values of the company and its proximity to land.

To conclude, the values that characterized the company have weakened today due to the structuring and formalization, but they still remain nonetheless. Indeed, the ambivalence of the tensions generated by the formal and informal processes and the widespread desire to preserve proximity and values have resulted in the establishment of formal and informal actions. These actions allow to manage the tension between proximity and distance resulting from the structuring of the company.

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The overall distance resulting from this trend in the formalization of the company is mitigated by the strength of historically rooted values in the company.
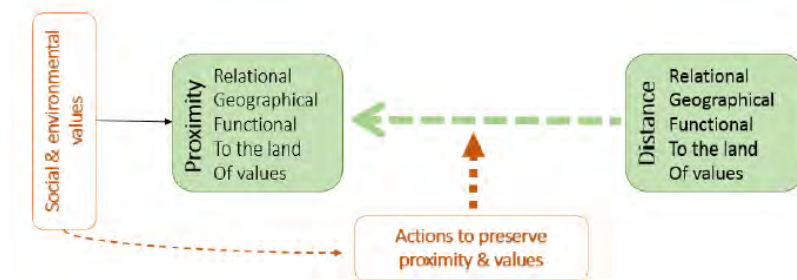

Fig. 2 From distance to proximity

Discussion

Formal/informal paradox

Formal and informal processes generate ambivalent tensions within the company. Increasing size and complexity in SMEs fosters greater CSR formality. Despite this formalization process is necessary, the results suggested that during the introduction and implementation of such changes, owners, managers and employees expressed a sense of regret and nostalgia for the loss of what they presented as benign fraternalism or 'friendly' social relations of production. There was recognition of, and some adherence to, formality but the desire in owner, managers and employees to retain informal relationships and interactions.

The results therefore suggest that formal processes may threaten internal relationships and efficiency as regards day-to-day activities. Social and environmental values are also perceived as being more fragile and less entrenched than before. Thus, formalization of social responsibility may be ineffective or even cause resistance and disengagement from employees because it is partly experienced as an implicit gift exchange. If the implicit nature of socially responsible involvement is shifted to become a more formal and explicit involvement, this may call into question the very nature of social responsibility because of its apparent enslavement to more formalized economic considerations (Slack, Corlett, and Morris 2015). This would result in employees' involvement weakening and may engender suspicion toward the company's interest to build social reputation, as it is sometimes the case in large firms.

Overall, we observed a tension between the formal processes, necessary and beneficial but causing a fear of industrialization and a distance between the individuals in the company, and informal processes fostering trust between individuals, to maintain a certain proximity but insufficient and potentially generating conflicts in a developing company.

This case illustrates the tensions occurring when moving from a small to a medium structure. In this context, values and identity of the company are in tension between two models, generating tensions between informal and formal, proximity and distance, polyvalence and specialization. Employees and managers, immersed in this ambivalence, oscillate between two visions they seek either to defend or to fight.

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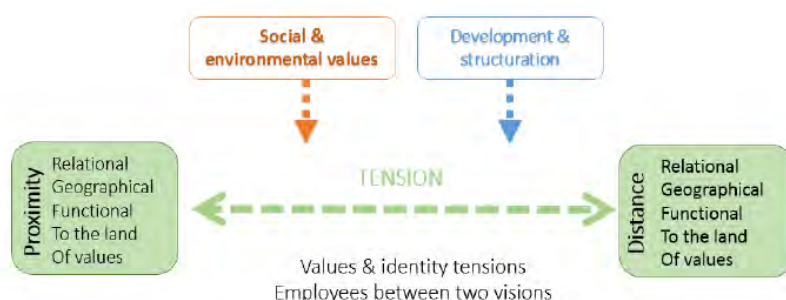The Netherlands | www.useconference.com

Fig. 3 Tension between proximity and distance

The conflict seems to be between SMEs' need to develop their own methods of integrating social responsibility into their corporate strategy as opposed to the opportunity and their willingness to merely replicate large firms' formal responsible strategies (Russo and Tencati 2008). Due to its development and external demands, the SME must meet the required formalization but the latter should be used also to support proximity, which can appear as a real strength for CSR implementation. It is in the (in)formal tension that CSR must find a way to deploy without one takes precedence over the other. CSR must take into account this necessary complementarity, especially in SMEs. Theory of paradoxes recommends to manage the formal / informal tension simultaneously. It is not a dilemma but a tension between the formal and informal coexisting in CSR. The formalization appears to be useful but is not a panacea, informal aspects are to be preserved.

Formalizing CSR
The formalization of responsible values and practices through a CSR strategy is widely criticized by respondents. If today, many practices are informal and spontaneous and then escape to this formalization, respondents are concerned that the formalization generalizes. Formalizing CSR represents a straitjacket for a commitment that was far « *natural* ». Costly and arduous processes encroach on the time to spend on essential issues such as internal relations. The formalization also gives rise to put a cost on actions rather than follow them. This could lead to crop on some commitments by the awareness of the costs they generate. The communicational goal that goes along with the formalization of CSR is also criticized as being able to take precedence over action monitoring. Some respondents also fear a mismatch between communication and reality. Finally, the term « CSR » is unclear for most respondents. In most employees' vision, it is related to a policy or a set of processes coming from management or « *graduates* ». Finally, CSR would not encompass what makes the strength of the company in terms of values and responsible practices. However, at a time when external demand and competition have a strong influence, formalization of CSR is seen as necessary and fostering the company's promotion. Internally, it facilitates action monitoring and improvement and facilitates a common vision. The formalization of CSR would be positive for an already committed company, but it should be implemented in a thoughtful and careful manner: from what is done and from internal values and not from « CSR », focusing on actions and values and not on the results, avoiding arduous and costly procedures.
« *We do not do a CSR policy to please an auditor.* » a manager

Conclusion
This paper presented an exploratory case study about the tensions experienced by employees between formal and informal processes in SMEs and how they respond to it in terms of social responsibility. From a brief review of the literature, we highlighted the need to examine the role of employees in CSR in SMEs and the tension between formal and informal processes linked to social responsibility. Paradox theory provides a relevant framework since social responsibility appears to be based on both formal and informal processes within the company and it generates tensions. Through a single case study, we identified that formal and informal processes generate ambivalent tensions within the company. Increasing size and complexity in SMEs fosters greater CSR formality. Despite this formalization process is necessary, the results suggested that during the introduction and implementation of such changes, owners, managers and employees expressed a sense of regret and nostalgia for the loss of what they presented as benign fraternalism or 'friendly' social relations of production. There was recognition of, and some adherence to, formality but the desire in owner,

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managers and employees to retain informal relationships and interactions. Results therefore highlight the need for a comprehensive approach to social responsibility, balancing formal and informal processes.

This research entails managerial and academic contributions. From a managerial point of view, this research project aims at facilitating decision making and management of formal and informal processes related to CSR finding the right balance between formal and informal processes is necessary to respond to the challenge of enabling and nurturing employee commitment to CSR (Collier and Esteban 2007). This research highlights how the compounding of certain tensions associated with formalization might be adressed. From an academic point of view, this research contributes to studies about CSR by shedding further light on the nature of its formality–informality span (Misztal 2002). Through Paradox Theory, it helps adopting a comprehensive approach to CSR

by characterizing the ambivalence of its strategic and formalized part and its necessarily spontaneous and informal part.

This study has several limitations, especially the fact that it is based on one case-study. This exploratory study is only a little part of a deeper analysis. From this, the research project will continue through a qualitative multiple case study approach (Yin 2013). Three SMEs at different levels of CSR formalization will be analyzed. Paradox Theory will allow analyzing deeply how formal and informal processes generate tensions within the organization and how they therefore influence social responsibility construction. Moreover, a distinction should be made between what is formalized or not regarding CSR. Indeed, in our case study, it seems that environmental practices are well structured, through AB and Demeter labelling and that this is largely accepted by the employees. On the contrary, the formalization of social relationships are much more ambiguous and not unanimous. During the interviews, people mostly focused on the social aspect of CSR, more precisely on internal relationships aspects, as if they were a fundamental base for any responsible behavior. Our analysis should be deepened making a more detailed distinction between the different CSR axes and their own functions. This understanding of CSR will therefore lead to future research in order to contribute to existing theory regarding the interface between and overlap of informal and formal managerial practices, with a current focus upon employment relations in medium-sized firms. Future researches could transpose this questioning in large companies' contexts.

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The "Italian" OiRA Project: the development of the tool according to the Occupational Health and Safety Italian Legislation

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Abstract. The effectiveness of OSH management remains a challenge for micro and SMEs. They still show lower levels of compliance with rules, therefore, there is a need to put in place simpler and more efficient solutions and to provide micro and small enterprises with tailored guidance and support to facilitate risk assessment.One of the most important aim of the "Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on a EU Strategic Framework on Health and Safety at Work 2014-2020" (June 6, 2014) is to implement actions at EU and at national level, including appropriate adaptation of tools, such as OiRA, in order to support micro and small enterprises.

Italy takes part of the OiRA project through the Memorandum of Understanding signed in August 30, 2013, by the Ministry of Labour and Social Affairs and the European Agency for safety and health at work (EU OSHA).In order to develop the Italian OiRA tools, according to the OiRA project guide, the Ministry of Labour has involved different stakeholders representing Public Institutions (such as the Ministry of Health, INAIL - Italian Workers' Compensation Authority and the Regions), trade Unions and sectoral experts. Most of these representatives are also members of the Italian Permanent Consultative Commission for the Prevention of Accidents at work and Occupational Health, a tripartite organism, chaired by the Ministry of Labour, established by the Article 6 of the Italian Legislation on Occupational Safety and Health (Legislative Decree 81/2008 and subsequent modifications and supplements).Since December 30, 2013, the OiRA Group has been chaired by the Central Director for Prevention of INAIL, Ester Rotoli; the main goal is to adapt the software to the Italian legislation on Occupational Health and Safety in order to allow the micro, small and medium enterprises to easily carry out the correct risk assessment and to facilitate them in preparing the mandatory Risk Assessment Document. The presentation shows the tools with practical examples and explanations, following all the mandatory requirements of the Italian Legislation, implemented through the activity of specific working groups, established within the OiRA project.

1 Introduction

The Communication from the Commission to the European Parliament "Improving quality and productivity at work: Community strategy 2007-2012 on health and safety at work", intends to respond to the specific needs of SMEs, particularly as regards risk assessment, and promotes the implementation of instruments to facilitate this process and guarantee a higher level of compliance with legislation.

The evaluation report of the mentioned Strategy has identified serious shortcomings in the implementation of OSH legislation, particularly in SMEs and the public sector. So better compliance with Community legislation will effectively contribute to reduce the number of accidents at work and occupational illnesses.

In order to facilitate compliance with OSH legislation , the EU policy framework 2014-2020, emphasized the need to point out "a financial and technical support for the implementation and deployment of OiRA (Online interactive Risk Assessment) and other tools based on ''Information Technology'' aimed in particular to SMEs.

The OiRA's software, developed by EU-OSHA in 2009 but effective from 2010, is based on a risk assessment tool known as Dutch RI & E, (Dutch Risk Assessment Instrument), largely widespread and efficacious.

The software OiRA was presented for the first time in October 2012 in Cyprus during the conference "Working together for the future of occupational safety and health in Europe", a European meeting of OSH experts.

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Oira is created in order to overcome the difficulties that all enterprises, policy makers, employers and employees meet in practice in the implementation of OSH legislation. The application is created to support, step by step, employers, especially in SMEs, to carry out their own risk assessment at workplace, with a simple and effective procedure, by providing the required resources and the know-how.

The use of the instrument, which is totally free, allows companies to better implement health and safety at work, including it in the quality management as well. At company level, it has got a positive impact in terms of performance and competitiveness and from an economic point of view, considering the benefits in the reduction of costs for occupational accidents and occupational diseases.

The above well meets the First challenge: Improving the implementation record of Member States, in particular by enhancing the capacity of micro and small enterprises to put in place effective and efficient risk prevention measures

The phases of the evaluation process of OiRA software run from identification of risk factors, to evaluation and identification of preventive and protective measures already taken or to be improved.

2 The Italian OiRA's tool

In order to formalize the participation to the project, Italy signed, through the Ministry of Labour and Social Policies, on Aug. 30th, 2013, with the European Agency in Bilbao (EU OSHA), the Memorandum of Understanding, in which the steps for the development of the project are also set out, as well as the use and the implementation of the instrument.

In order to develop the Italian tool, according to the rules established in the Memorandum, the Ministry of Labour has involved several participants representing public institutions (such as Ministry of Health, INAIL and Technical Coordination of Regions), representatives of the social partners and employers in order to ensure the tripartite working group, as well as experts.

The Italian group, chaired by Ester Rotoli, the director of the Inail's prevention department, could be used as a forum to discuss and collect all the tools and aids in a sort of repository, linked to the "decree of doing", to support enterprises in risk assessment.

In line with the objectives of the communication 2014-2020, it is still necessary to simplify OSH legislation and eliminate unnecessary administrative burden particularly for micro and small enterprises, while preserving a high level of protection for workers' health and safety.

In accordance with Law 9 August 2013, n. 98 and with Law 10 December 2014, 183 of the "Jobs Act" and in order to identify possible semplifications for the SME's, the article n. 29 of Legislative Decree n. 81/08, contains a clear reference to the instrument Oira, defining it as one of the computer-based instrument which can support the employer in risk assessment.

The main challenge regarding the Italian tool is the adaptation of the European software to the Italian OSH requirements.

Our country is pursuing the ambitious goal of adapting the European software with the Italian law on health and safety at workplace. The exercise is extremely complex and articulated aimed to develop a practical instrument of semplification which really helps employers to comply with requirements of the existing legislation on health and safety at workplace and therefore to cope with the difficulties encountered particularly by small and medium enterprises in carrying out these obligations.

The aim is indeed to enable micro, small and medium companies to deal with risk assessment in the most appropriate and simple way in order to protect workers occupationally exposed, as requested by the Italian OSH legislation (Art. 17 and art. 28 of Legislative Decree no. 81/08), with a positive impact in terms of costs, quality and time spent to carry out the risk assessment. .
The sector identified at national level to develop the OiRA sofware is "offices".
At the operational level, the working group, composed, as mentioned ,on a tripartite base, was divided into two subgroups, "workplace and production cycle" and "work organization". They work constantly together, in order to implement the contents of each tool, considering the competencies inside the two subgroups.

The tool is structured in modules and sub-modules dealing with all OSH risks and issues related to office sector. In setting the content of the instrument, it was decided to articulate the structure of the tool according to the structure of Legislative Decree n. 81/08.

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The first part of the tool regards organizational aspects and it is divided into 8 sub-modules:
- Company documents
- Prevention's actors
- Information and training
- Emergency management
- Health surveillance
- Management of contracts

Then the risks are analyzed in an analytical way:
- Workplaces
- Fire
- Equipment (which includes devices for temporary electrical connections, computer equipment and office equipment and ladders)
- Electrical system
- Equipment provided with video terminals
- Hazardous substances: chemical substances
- Biological risk
- Manual handling of loads
- Noise

The instrument leads the employer to the hazard identification and risk assessment according to all requirements of the current OSH legislation, identifying all the prevention and protection measures, already adopted or measures to be implemented to ensure the improvement of health and safety at work.

The tool provides at the moment 180 measures, both compulsory ones and improvement ones. The complexity of the tool is the result of the real effort provided in giving to the employer a complete list of risks and of all the measures needed to eliminate and manage them, as the legislative requirements. In fact employer using the tool will have a specific information about risks and will only select among the measures already precompiled.

Obviously, employers have the option, in relation to the specific work context, to customize their own risk assessment, by adding measures that have not been foreseen and possibly by modifying existing ones, especially with regard to improvement measures.

In order to give a real support to the risk assessment, particular attention is given to the textual descriptions in OiRA, especially in the identification phase, trying to provide exhaustive and detailed information about the specific risks, and about prevention and protection measures to be taken to avoid or minimize them.

Through an adaptation of the software it is also possible to insert, in a specific field, any additional information useful to define the way of the assessment carried out.

The document resulting at the end of the process has all the features required from the OSH law (Legislative Decree. N. 81/2008) and it represents the first important step to protect and prevent workers' health and safety.

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An Exploratory Study of Factors Affecting Sustainability Adoption in Small and Medium-Sized Enterprises

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Abstract. Primarily it is the owner/managers of Small and Medium-sized Enterprises (SMEs), supported by its employees, who are the internal groups effective in the adoption of sustainability in SMEs. Suppliers, government and customers are three external groups that can be effective in assisting the transformation of SMEs towards sustainable development. There are significant internal factors which impact on the ability of owner/managers to adopt sustainable practices, like perception of environmental and social impact, cost of sustainability implementation, level of sustainability knowledge of owner/managers and their attitudes and commitment to sustainable development. The significance of these factors becomes heightened in regional (non-metropolitan) areas which are geographically isolated from central nodes of sustainability knowledge. This paper examines key factors behind the adoption of sustainability in SMEs operating in a regional city of Australia. First, measurement scales for the affecting factors were developed and validated. Then the paper used survey data from 233 SMEs in the regional city of Ballarat which is located in Western Victoria, Australia. Findings reveal that the most effective factors appear to originate inside SMEs rather than outside. This paper contributes to the investigation of influencing factors on sustainable business development within SMEs, highlighting significant implications for both theory and practice in the context of a non-metropolitan urban setting.
Keywords: SMEs; Sustainability; Non-metropolitan Urban Setting; Sustainability Adoption Factors

1 Introduction

The purpose of every business is to improve its economic value in the market by meeting customer needs, wants and benefits. If the business wants to be successful, it should respond to the sustainability challenges because customers evaluate a firm based on its engagement with sustainable practices (Wells, 2011). In this regard, sustainability adoption has been accepted by many managers of large firms as a precondition for operating a business. Whereas small and medium sized enterprises (SMEs) have not paid enough attention to the sustainability issues in their management strategies (Revell et al., 2010). Besides, the majority of global pollution (up to 70%) is due to the SMEs' environmental impact (Hillary, 2004). So the role of SMEs in achieving sustainable development is very significant and owner/managers and employees of SMEs are no more exempt from environmental and social ethics than anyone else in the society.

   SMEs are significant regional development agents. In Australia, SMEs are playing an ever increasing role in the national and regional economy. According to the latest government statistics, Australian SMEs constitute over 97% of all private sector businesses in Australia and their contribution to the employment is 49% of the private sector workforce (Australian Bureau of Statistics, 2011). Also the strength of the Australia's national economy and welfare is significantly dependent upon the productivity and the economic contribution of regional (non-metropolitan) areas (Australian Government, 2014). Around two-thirds of Australia's export earnings come from regional industries such as agriculture, tourism, retail, services and manufacturing (Australian Government, 2014). It is apparent that SMEs contribute significantly to the economic development in Regional Australia; meanwhile, they undoubtedly have a significant impact on the environment and social community. Hence, further research needs to be considered on the factors (both as drivers and barriers) which affect the regional SMEs' orientation towards sustainability.

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In Regional Australian[56] context, there is a gap in the literature about the experiences of regional SMEs in dealing with sustainability. Also, there is no clear path for local communities and businesses to determine why, where, when, how and how much they should move forward to the sustainable development path in their overall business strategy (Goldsmith & Samson, 2006).

Given the absence of relevant studies on Regional Australian SMEs in existing literature, this paper takes a preliminary step towards an investigation of effective factors on the adoption of sustainability. For this purpose, positivist quantitative methodology was used and the following subsections present insight into the effect of different factors on the adoption of social and environmental practices in the light of the research findings and the extant literature.

2 Literature Review

In Australia, investing in regional community and infrastructure will boost local economies, increase productivity and improve local quality of life (Australian Government, 2014). Courvisanos (2009) believes in the significant role of innovation and learning for sustainable development in Regional Australia. SMEs in regional areas of Australia contribute the innovation and job growth and stability in the Australian economy (Evans & Sawyer, 2010).

SMEs act as the mainstay (Drew, 2003) and comprise a large number of businesses in many national economies, having a significant contribution to economic activities (Udayasankar, 2008). Tse and Soufani (2003) believe that SMEs play a significant role in future economies as relationships, networks, and information management are more dominant in new economies rather than size and physical matters in past economies. In this regard, SMEs could act as an engine to facilitate the transformation of economies into modern interconnected ones.

In modern economies, sustainability helps businesses to recognise and control economic, environmental and social risks in an integrated way. Long term commitment to sustainability enables businesses to capture new markets, resulting in improved competitiveness and reputation (Azapagic, 2003). Roxas and Chadee (2012) believe that the importance of SMEs in the sustainability research is associated with their significant contribution to the global economy. Given the much larger population of SMEs than large businesses, it is estimated that the total environmental impacts of SMEs outweighs the total environmental impacts of large businesses (Martin-Tapia et al., 2010). In addition, the focus of previous sustainability research has been predominantly on large businesses, with little attention given to the social and environmental friendly activities of SMEs; SMEs are often not researched because it is too expensive and time consuming to reach them (Rutherfoord et al., 2000). In other words, little information is available about how SMEs are oriented towards business sustainability issues (Perrini et al., 2007; Lee & Klassen, 2008; Dangelico & Pujari, 2010; Kuckertz & Wagner, 2010; Martin-Tapia et al., 2010) particularly in developing economies (Luken & Stares, 2005). Past studies about the status of sustainability in SMEs are usually conceptual or theoretical (Van Marrewijk & Werre, 2003; Kuckertz & Wagner, 2010; Linnenluecke & Griffiths, 2010). The absence of enough studies on SMEs orientation towards sustainable development may be due to the emergent nature of the sustainability and its relationship with large businesses and industries (Evans & Sawyer, 2010; Kuckertz & Wagner, 2010).

SME owners/managers face many business challenges including employee issues, product quality and pricing, environmental impact and government regulation problems (Evans & Sawyer, 2010). Increasingly, the owners/managers of SMEs are expected to operate in a socially and environmentally friendly manner. According to Simpson et al. (2004), SMEs engagement with sustainability could bring various benefits including waste reduction, cost savings, customer satisfaction, strong employee commitment, improved products, improved public relations and competitive advantage.

SMEs have responsibilities beyond the production of goods and services and making money; they should be involved in helping to solve the community problems (Frederick, 2006; Husted et al., 2008), support the community activities and programs (Pirsch et al., 2007; Shahin & Zairi, 2007) and be careful of their environmental impacts (Aragon-Correa et al., 2008). In this respect, there are some factors which oblige SMEs to adopt sustainability practices. For example, management attitudes and

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[56] Regional Australia is a term which refers to non-urban areas within Australia. It is more often defined in terms of its qualities like small economic scale, landscape diversity and disparate communities (Charters et al., 2011, p. 3).

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perceptions play a prominent role in the adoption of sustainability by SMEs (Salimzadeh et al., 2015).

Further, Roxas and Chadee (2012) believe that SMEs, being smaller and thus more flexible, are capable of adopting sustainability much easier than large businesses. So, in theory, SMEs have responsibility, capability and accessibility for the adoption of sustainable practices.

Despite the, in theory, potential commitment to sustainable practices, many studies clearly show SMEs do not adopt such practices. Cost, management time, and knowledge/skills are reported by Collins et al. (2010) as the three important limitations or barriers to the adoption of business sustainability. SME operators usually reject implementation of sustainability principles, as it is time-consuming and increases business costs (Tilley, 1999; Hillary, 1999; Biondi et al., 2000; Lepoutre & Heene, 2006; Roberts et al., 2006; Revell & Blackburn, 2007; Brouwers, 2010). In a survey study of UK SMEs by Simpson et al. (2004), they observe that 75% of owner/managers of SMEs consider environmental action as a business cost and 80% of them believe that there is no relationship between sustainability adoption and improved customer satisfaction. Luken and Stares (2005) conclude that small businesses are unable to pay the costs of addressing the social and environmental requirements of their stakeholders and natural environment. This is supported by Udayasankar (2008) who shows that lack of enough resources is the main reason for SMEs being unable to adopt sustainability. In general, owner/managers of SMEs have a negative attitude towards the financial returns from sustainability investments (Petts et al., 1998; Revell & Rutherfoord, 2003; Brouwers, 2010; Revell et al., 2010) and the lack of resources exacerbates this situation.

The owners/managers of SMEs are reported to have poor knowledge about various environmental regulations and standards (Groundwork, 1998; Gerrans & Hutchinson, 2000; Simpson et al., 2004), leading to the low level of the sustainability adoption within SMEs (Gadenne et al., 2009). Lack of knowledge and information about sustainability (Tilley, 1999; Del Brio & Junguera, 2003) is considered as one of the prevalent barriers to the adoption of sustainability by SMEs. Azapagic (2003) summarises the potential barriers to the adoption of sustainability in business context as: 1) lack of time and resources, 2) giving too much importance to financial priorities, 3) complications in explaining the advantages of sustainability in monetary manner, 4) long pay-back time, and 5) lack of knowledge about the sustainability issues and what can be done to have a sustainable business.

In some cases, the owners/managers of SMEs feel little responsibility towards the environment and society because they think that their businesses have insignificant individual effect on the environment (Yu & Bell, 2007). In other words, owners/managers of SMEs usually ignore the environmental impact of their enterprises due to what such SMEs perceive as little or negligible ecological impact that each individual SME contributes (Hillary, 1995; Hillary, 1999; Gerrans & Hutchinson, 2000; Ammenberg & Hjelm, 2003; Simpson et al., 2004; Gadenne et al., 2009; Revell et al., 2010). This supports Brouwers (2010) who has specified SMEs' perception of little individual impact on the environment as the primary barrier to SMEs' sustainability.

On the basis of negative attitudes and resource constraints, an affirmative strategy to the adoption of sustainable practices in SMEs is required urgently. Roxas and Chadee (2012) take a strong positive view that commitment towards business sustainability and the adoption of sustainable practices requires knowledge and experience about what kind of activities best fit the firm's needs, as well as appreciating the resources needed to implement such activities. Owners/managers' educational level contribute to enhance such knowledge and skill. This confirms the finding of Collins et al. (2010) in which management knowledge about sustainability is reported as an important motivator to the adoption of sustainable practices. Environmental knowledge at public, private and community level plays an important role in generating support and ideas which lead to the creation of sustainable business and an increase in the demand for environmental products and services (Drake et al., 2004; Hillary, 2004).

Individual concerns of the owners/managers are reflected in their beliefs and attitudes towards sustainability issues (Ajzen & Fishbein, 1980). So respecting the environment and community in which SMEs operate, is an ethical concern (Gadenne et al., 2009) and those owners/managers who perceive ecological management as an ethical issue, will be more likely to involve in a group of environmental friendly practices like recycling and waste reduction irrespective of engaging in any formal certification process (Hillary, 1999). For example, in UK, where SMEs constitute 99.8% of the businesses in private sector, a study about the environmental practices of 220 UK SMEs by Revell et al. (2010) reports that the large number of owner/managers of these firms are ready to pay the costs of the ecological regulations and taxation because they feel more responsibility towards the environment and their community. There are conflicting views about the attitudes of owners/managers towards sustainability

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issues. Some studies show that there is a relationship between the attitudes of the SMEs' owners/managers towards the environment and their willingness to adopt sustainable practices. For example, Naffziger and Montagno (2003) find that the owners/managers, who have more positive attitudes towards the environment, are more ready to spend the time and resources on the environmental friendly practices. In addition, Evans and Sawyer (2010) believe that SME owners/managers' attitudes towards the customer satisfaction and dealing with suppliers is significantly effective in the adoption of sustainable practices. In contrast, some studies find no correlation between positive attitudes towards the environment and environmental friendly actions. For instance, Tilley (1999) report a gap between the attitudes of SMEs' owners/managers towards the environment and their adopted environmental friendly practices. Also, Schaper (2002) and Prater and Ghosh (2005) argue that there is no relationship between positive attitudes towards the environment and local community and positive environmental and social performance in SMEs context. These conflicting views outlined above indicate the need, as Besser (1999) argues, that the level of education of SME owners/managers and their commitment towards the community are the bottom line for adoption of sustainable practices in SMEs.

Since preserving the environment is considered as an ethical issue, so some owner/managers adopt sustainability in their management processes due to their personal belief and commitment to their local community and environment, regardless of regulation pressure or financial benefits from sustainability adoption (Hillary, 1995; Naffziger & Montagno, 2003; Roberts et al., 2006; Lawrence et al., 2006; Gadenne et al., 2009). Potts (2010) believes that business sustainability originates from socially progressive influences on the traditional business base, but the points of distinction relate to the commitment to sustainable development. Long term commitment to business sustainability enables businesses to capture new markets resulting an improved competitiveness and reputation (Azapagic, 2003). It is consistent with the study by Lo and Sheu (2007) in which higher level of commitment to sustainability is strongly associated with higher market value. Furthermore in the "sustainability phase model" advocated by Dunphy et al. (2007), the last phase called "the sustaining corporation" which is the strong version of business sustainability, refers to a strong commitment towards the environment and society. Businesses in this phase provide safe working conditions and preserve the natural environment.

Suppliers, governments and customers are three external groups that can be effective in assisting the transformation of SMEs towards sustainable development (Salimzadeh et al., 2015). The pressure on SMEs to adopt environmental and social friendly practices can come from suppliers (by demanding ISO 14000 certificate), and customers (by observing the advantages obtained from other businesses' adoption of sustainability) (Gadenne et al., 2009). Evans and Sawyer (2010) find that customer satisfaction is increased by giving responsibility to SME employees and addressing the feedback from them. Employees (through the participation in sustainable business activities) influence the owners/managers of SMEs to adopt social and environmental friendly practices (Smith & Oakley, 1994; Biondi et al., 2000; Yusof & Aspinwall, 2000; Gerstenfeld & Roberts, 2000; Lepoutre & Heene, 2006; Deegan, 2007). Empowering employees by letting them share their views with owners/managers and by providing training and development opportunities are important factors for having a sustainable SME. Moreover, keeping a happy workplace, addressing employees needs and providing fair salaries and monetary remuneration have a positive effect on the employees' satisfaction leading to more sustainable businesses (Evans & Sawyer, 2010). Moreover, sustainable SMEs are able to attract and retain employees because they adopt the services and activities which are not detrimental to employees and community health (O'Laire & Welford, 1996; Revell et al., 2010).

3 Methodology

In this study, survey data was collected by means of a questionnaire. The questionnaire was designed in five sections and 68 questions. The first section consisted of questions related to the selected situational characteristics of the respondents such as gender, age, business category, business size etc. There were 24 questions in the questionnaire on social and environmental practices (second and third sections) adopted by SMEs.

The fourth and fifth sections of the questionnaire contained questions regarding the effective factors on the adoption of sustainability in SMEs. In section four, 23 questions were related to the internal factors which are originated from the inside businesses. Similarly, external factors scale was measured by asking 11 questions. These factors measure the outside influences on SMEs to adopt sustainability.

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The specific statements in each of the sections of the questionnaire were extracted from insights gleaned from the literature and questionnaires used in related studies (Lawrence et al., 2006; Yu & Bell, 2007; Gadenne et al., 2009; Lucas et al., 2009; Belz & Schmidt-Riediger, 2010; Brouwers, 2010; Evans & Sawyer, 2010; Collins et al., 2010; Revell et al., 2010; Chow & Chen, 2012; Roxas & Chadee, 2012; Schoenherr, 2012).

A header question was the hub of fourth and fifth sections of the questionnaire that read as follows: "Please indicate your level of agreement with each of the following statements". Below this header question, the items were presented as statements. Five-point Likert scale was used so that a respondent could choose one of the five points for each item. The scale points were labelled in order to assist a respondent to perceive to what extent respondents agree or disagree with each statement (Nayak, 2007). This scale was coded from 1 to 5 in the SPSS file, i.e. number 5 was assigned to "Strongly Agree", 4 was assigned to "Agree", 3 was assigned to "Neutral", 2 was assigned to "Disagree", and 1 was assigned to "Strongly Disagree".

Before conducting data analysis, the gathered data from some parts of the survey questionnaire were re-coded, because some statements in the two last sections (fourth and fifth sections) of the survey questionnaire were negative ones and some of them were positive ones. For example, the first statement in the "Internal Factors" section of the survey questionnaire was "My firm has low impact on the local community and environment" which is a negative statement so its coding should be inverted in order to homogenise its semantic direction with all other statements (Pallant, 2013). Therefore, for this statement and other negative ones, number 5 was assigned to "Strongly Disagree", 4 was assigned to "Disagree", 3 was assigned to "Neutral", 2 was assigned to "Agree", and 1 was assigned to "Strongly Agree".

The study area in this survey was the major regional city of Ballarat which is located in Western Victoria, Australia, with an estimated population of around 98,000 (City of Ballarat, 2013). Ballarat is the third largest city in the state of Victoria, and it is surrounded in its north, west and south by rural areas and small townships (City of Ballarat, 2013). The primary reason for selecting Ballarat as the study area is that it has a key strategic position at the centre of Regional Victoria's most important freight, tourist and commuter transport routes (City of Ballarat, 2013). As such, Ballarat is a good representative of a major regional city in Australia which has an economy with a large SME business population.

Due to the lack of statistical information and contact details on SMEs in the Ballarat region, all the SMEs registered on the "Manta" website[57] were identified and the questionnaire was sent out to them. The questionnaire was mailed out to all the accessible 1127 SMEs registered in Ballarat on this website. Because all SMEs in the database with a valid and current contact address were contacted, there is no sampling bias from the database itself. In other words, the census method on the Manta website was used for data collection and sampling methods were not applied in this study. The reason for applying the census method rather than sampling is that the response rate in past business studies was found to be low (Gadenne et al., 2009; Belz & Schmidt-Riediger, 2010; Revell et al., 2010). Thus, it was decided to include all the SMEs in Ballarat listed on the Manta to ensure that as large a number of responses as possible were collected. Ethics approval for the study was given by the University of Ballarat (former name of Federation University Australia) Human Research Ethics Committee (Project No. B13-146).

Before embarking on the main data collection, three academic staffs from the Research Services office and two PhD graduates in Federation University were asked to read and answer the questionnaire. Pre-test respondents checked the design, structure and clarity of the questionnaire to ensure that there were no ambiguous, unclear and misleading questions. A few minor changes were made in the questionnaire after the feedback from the pre-test. Based on the pre-test respondents' comments, the questionnaire was revised and prepared for a pilot study.

The pilot study was conducted before the main study in order to address any deficiencies in the questionnaire's design before time and resources are expended on large scale study (Meyers et al., 2013). The pilot survey was able to test the validity and reliability of the scales in the questionnaire (Sekaran, 2003). A telephone call was made to 60 SMEs which were randomly selected from the Manta website and asked about their willingness to participate in the pilot survey. A total of 53 agreed to participate so copies of the questionnaire were post mailed out to them. Participants were asked to complete the questionnaire and return it within a week. A total of 48 completed questionnaires were

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[57] Manta is the world's largest online community for promoting and connecting small businesses, with more than one million registered users and 87 million company profiles (About Manta Website, 2014).

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returned (a response rate of 90.57%). Cronbach's α (alpha) for reliability of internal consistency (Pedhazur & Schmelkin, 1991; Tabachnick & Fidell, 2007) for internal and external factors were 0.914 and 0.824 respectively. Nunnally (1978) recommends a minimum Cronbach's α of value 0.7. Caplan et al. (1984) state the value must be at least 0.5. Based on these two recommendations, it was concluded that reliability of two sections of the questionnaire was more than adequate.

The main data collection method in this study was a mail survey. For this purpose, the questionnaires were sent out to all 1127 businesses listed in the Manta website (this includes the 53 sent out previously in the pilot study). Within two weeks, 158 questionnaires were returned to sender due to wrong address or addresses for which businesses had left. A total of only 102 questionnaires were completed and returned by mail showing a disappointing response rate of 10.53%. In order to increase the response rate, it was decided to embark on sending a reminder letter to the businesses that had not participated. After sending a reminder letter, a further 48 questionnaires were returned to sender due to wrong address or addresses for which businesses had left. An extra 163 questionnaires were completed and returned by mail, now showing a response rate of 28.77%. According to Hart (1987), response rate in business surveys vary from 17% to 60%, with an average of 36%. Therefore, the response rate for this survey was found to be within the acceptable range of response rates.

4 Results and Discussion

Although answering all questions in the questionnaire was completely voluntary, the majority of respondents answered all the questions. Missing responses were limited to the question regarding the gender. Total number of respondents was 265, of which there were 16 franchisees and 12 branches of large national/international firms, respectively. After eliminating these 28 businesses, further analysis was conducted on the remaining 237 respondent businesses.

Based on the Australian Bureau of Statistics (ABS) definition, Australian small business is an actively trading business with 0-19 employees. Medium-sized businesses are actively trading firms with 20-199 employees. A large business is an actively trading firm with 200 or more employees (Australian Bureau of Statistics, 2011). The SME definition by ABS is the one adopted in this paper. Table 1 provides the distribution of the three class intervals of number of employees in respondents' business organisation. This table shows the majority of respondents' businesses in Ballarat (81.4%) were small businesses. Only four businesses were large and had more than 200 employees. Since this study is exclusively about SMEs, all businesses with more than 200 employees were eliminated from the database and further analysis was conducted on the remaining 233 SME respondent businesses.

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Table 1 Distribution of the Number of Employees

Number of Employees	Frequency	Percent
0-19 (Small Businesses)	193	81.4
20-199 (Medium Businesses)	40	16.9
More than 200 (Large Businesses)	4	1.7
Total	237	100

4.1 Factors Impacting the Adoption of Sustainability

There are significant internal and external factors which impact on the ability of owner/managers to adopt sustainable practices; notably customers, perception of environmental and social impact, suppliers, cost of sustainability implementation, government, level of sustainability knowledge of owner/managers and their attitudes and commitment to sustainable development (Salimzadeh et al., 2015). Figure 1 shows the average of agreement of respondents with each statement regarding the internal and external factors impacting adoption of sustainability in regional SMEs. In this study, influencing factors were measured through an aggregate response to the Likert scale questions relating to the impact and importance of each factor on the business. As seen in this figure, attitude, commitment and knowledge are three most effective factors on SMEs' engagement with sustainability. Also, cost and employees were recognised as the least effective factors. The following subsections discuss each factor in more details and present insights into each factor in the light of the extant literature.
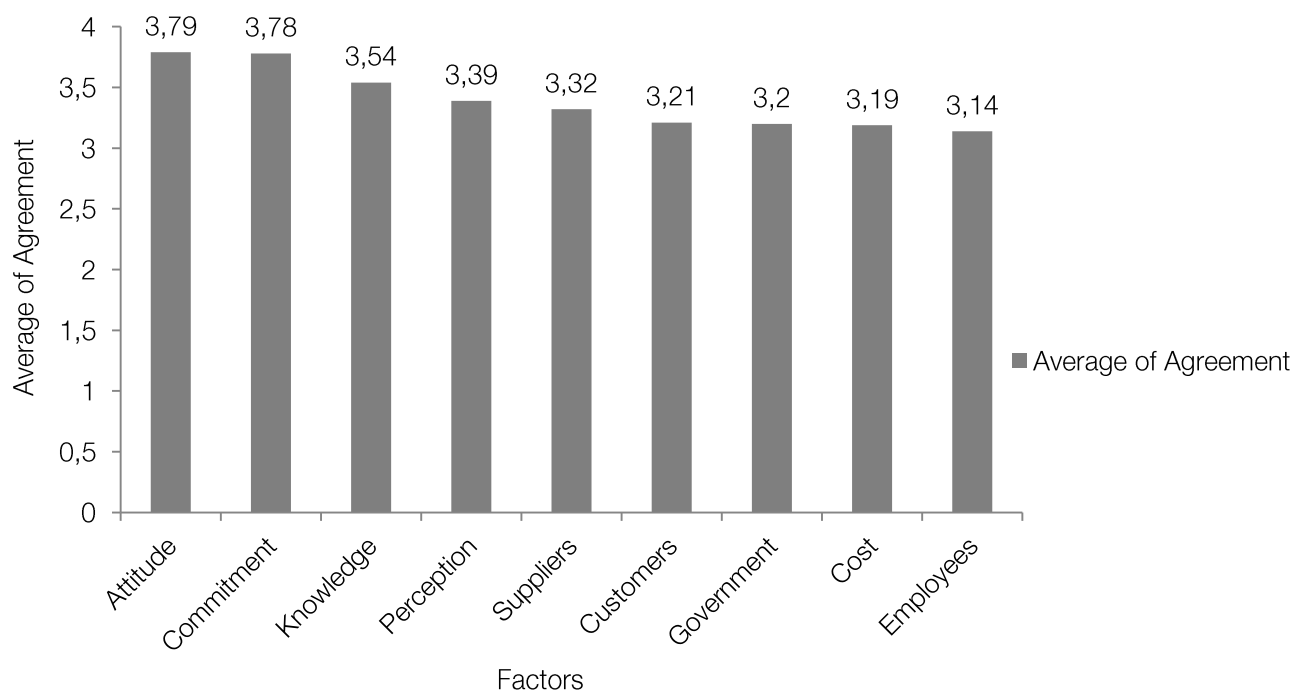

Fig. 1. Effective factors on the adoption of sustainability

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4.1.1 Internal factors impacting the adoption of sustainability

Worth noting in this paper are the internal factors impacting on SMEs' engagement with sustainable practices. These factors are perception of environmental and social impact, cost of sustainability implementation, level of sustainability knowledge of owner/managers, owners/managers' attitudes and commitment to sustainable development and their employees. As shown in Figure 1, owners/managers' attitude, commitment and knowledge about sustainability were found as the most effective internal factors. Also, the majority of respondents disagreed or were neutral about the effect of sustainability adoption's costs and employees role in the adoption of sustainable practices.

Perception

Table 2 provides a summary of the respondents' view on the role of owners/managers perception of environmental and social impact in the adoption of sustainability in regional SMEs. As shown in this table, 56.3% (1st row) of the respondents disagreed about their businesses' low impact on the local community and environment. This is inconsistent with the view that SMEs perceive little individual impact on the environment (Yu & Bell, 2007; Brouwers, 2010). However, 55.8% (2nd row) of the respondents believed that business owners/managers cannot be expected to help solve social problems. Also, 59.2% (4th row) of them agreed that their businesses do not make a difference to the local community. These findings show that despite of the emphasis on the significant environmental and social impacts of Ballarat area's SMEs, they do not feel a significant responsibility towards the community and socially related issues. Such a perception of little responsibility towards the community make owners/managers resistant to changing their attitudes towards the society and social issues, leading to less sustainable practices being adopted by SME owners/managers.

Table 2 Role of perception in the adoption of sustainability

Item Statements	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
My firm has low impact on the local community and environment	20.2%	36.1%	15.5%	21.5%	6.9%
Business owners cannot be expected to help solve social issues	4.3%	16.3%	23.6%	45.1%	10.7%
Environmental issues aren't relevant to my business	5.2%	11.2%	18.5%	48.1%	17.2%
I'm not in the right industry to make a difference to local community	4.3%	15.9%	20.6%	41.6%	17.6%

Table 2 shows that the majority of respondents agreed that environmental issues are not relevant to their businesses (65.3% in 3rd row) and they are not expected to solve social issues (55.8% in 2nd row). It contradicts the finding that these firms disagree with the view that their firm has a low impact on the local community and its environment, as felt by majority of respondents (56.3% in 1st row). The reason may be related to the misunderstanding of the statements or they may mean that despite of the environmental impacts of their businesses, they are not supposed to solve such problems and other bodies like environmental bodies or government are responsible for solving social and environmental issues. This requires further investigation.

Cost

In this study, 35.2% (1st row) of the respondents agreed that the adoption of sustainable practices increases their business cost (Table 3). It supports the view of Simpson et al. (2004) who observe that SME owner/managers consider environmental action as a business cost. Also, Luken and Stares (2005) in 22 SMEs in Asian countries identify cost as a major barrier in the adoption of sustainability practices. As Table 3 shows, more than half of the respondents (64.3% in 2nd row) agreed that their regional infrastructure limits support for sustainable activities. This is compatible with the view that limited resources of SMEs make them unable to implement sustainable activities (Udayasankar, 2008).

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Table 3 Role of cost in the adoption of sustainability

Item Statements	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Being environmentally and socially friendly increases my business costs	6.4%	33%	25.3%	26.2%	9.0%
My business has poor infrastructure to support some activities like recycling	3%	16.3%	16.3%	47.6%	16.7%
My business will not benefit financially from environment-friendly activities	9.4%	25.3%	22.7%	31.3%	11.2%
Business must spend some money and efforts for environmental protection and management	4.3%	13.3%	26.6%	46.4%	9.4%

In addition, Table 3 shows that 42.5% (3rd row) of the respondents agreed that there are no financial benefits from the adoption of sustainable practices. Also more than half of them (55.8% in 4th row) believed that the adoption of such practices needs some money and efforts to be spent by SMEs. These findings are consistent with the view that SME managers are suspicious about the financial returns from sustainability investments (Petts et al., 1998; Revell & Rutherfoord, 2003; Brouwers, 2010; Revell et al., 2010). Further, these findings also support the need for time to adopt sustainability practices and the cost of such adoption (Hillary, 1999; Tilley, 1999; Biondi et al., 2000; Lepoutre & Heene, 2006; Roberts et al., 2006), which makes owners/managers unwilling to alter their activities to environmentally friendly and socially responsible ones.

Knowledge

The owners/managers of SMEs are generally reported to have poor knowledge about the environment (Tilley, 1999) and various environmental regulations and standards (Groundwork, 1998; Gerrans & Hutchinson, 2000; Simpson et al., 2004). This is inconsistent with the findings of this study. According to Table 4, 67.8% (1st row) of the respondents know about the main source of electricity in their living areas. Also, the majority of them (57.1% in 2nd row) are aware of environmental protection programs organised by the government or external bodies.

Table 4 Role of knowledge in the adoption of sustainability

Item Statements	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
I realise that most of the electricity in Victoria is produced by burning highly polluting brown coal	0.9%	7.7%	23.6%	45.9%	21.9%
I am aware of environmental protection programs organised by the government or external organisations	0.9%	15.9%	26.2%	48.1%	9.0%
Socially and environmentally responsible businesses have the potential to break into new markets or promote existing markets	1.3%	13.3%	38.2%	40.3%	6.9%
Socially and environmentally responsible businesses achieve cost savings from energy or other resource efficiencies	2.6%	12.9%	32.2%	44.2%	8.2%
Transition to a low-carbon economy will bring opportunities for business growth	6.4%	18.0%	40.3%	25.8%	9.4%

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Moreover, 47.2% (3rd row) of the respondents agreed that sustainable businesses have the potential to break into new markets or promote existing markets. It confirms Gadenne et al. (2009) findings that owners/managers of SMEs generally know about the mandatory compliance and supplier impacts and also are aware of benefits resulting from the adoption of environmental friendly practices.

Attitude

In this study attitude of the owners/managers towards sustainability issues was recognised as the most effective factor on the adoption of sustainable practices by Ballarat area's SMEs (see Figure 1). Table 5 shows a summary of the respondents view on the role of owners/managers attitude towards sustainability issues in the adoption of sustainability in regional SMEs. As shown in this table, the vast majority of the respondents (77.3% in 1st row) agreed that engaging with sustainable practices give them personal pride and enjoyment. Also, 88.4% (2nd row) of them believed that preserving the environment and respecting local community is the right thing to do. These findings show that Ballarat area's SMEs have a positive attitude towards the environment and local community. It endorses the study by Revell et al. (2010) in which majority of SME owners/managers want to engage with sustainable practices due to their positive attitudes and responsibility towards the natural environment and local people.

Table 5 Role of attitude in the adoption of sustainability

Item Statements	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Contributing to protecting environment and supporting the local community gives me personal pride and enjoyment	1.3%	3.9%	17.6%	55.4%	21.9%
Preserving the environment and respecting local community is simply the right thing to do	0.9%	3.4%	7.3%	58.4%	30%

In contrast, some studies (e.g. Tilley, 1999; Schaper, 2002; Prater & Ghosh, 2005) show that owners/managers attitudes towards sustainability reflect that they feel it does not impact on their environmental and social friendly behaviour or practices. This finding of the current study corroborates the similar observations made in the study by Gadenne et al. (2009) in which a significant positive relationship was found between owners/managers attitude towards the environment and their adoption of environmental friendly activities.

Commitment

As Table 6 shows, the vast majority of the respondents (71.7% in 1st row) agreed that business should regulate itself to improve environmental practices. Moreover 92.3% (2nd row) and 73.4% (3rd row) of the respondents believed that SMEs should ensure the health and safety of its employees and community, respectively. Other scholars like Hillary (1995), Naffziger and Montagno (2003), Roberts et al. (2006), Lawrence et al. (2006), and Gadenne et al. (2009) confirm that personal beliefs of owners/mangers impact on their expending time and resources on sustainability.

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Table 6 Role of commitment in the adoption of sustainability

Item Statements	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Business should regulate itself to improve environmental practices	1.7%	7.3%	19.3%	53.2%	18.5%
Small firms should ensure the health and safety of its employees	0.0%	2.1%	5.6%	44.2%	48.1%
Small firms should ensure the health and safety of its community	0.4%	8.2%	18.0%	44.2%	29.2%
It is the responsibility of every business owner/manager to have policies that help improve society	2.6%	13.7%	20.2%	49.8%	13.7%

Furthermore, Table 6 shows that 63.5% (4th row) of the respondents agreed on the responsibility of owners/managers to have policies that help improve society. This finding is consistent with the last phase of "the sustainability phase model" advocated by Dunphy et al. (2007). In this phase which is a strong version of business sustainability, firms "internalise the ideology of working for a sustainable world" (p. 16) and have a strong commitment towards the ecosystem and community.

Employees

In this study employees were recognised as the least effective factor on the adoption of sustainable practices by Ballarat area's SMEs (see Figure 1). Table 7 provides a summary of the respondents view on the role of employees in the adoption of sustainability in regional SMEs. As shown in this table, 40.4% (1st row) of the respondents agreed on the ability of sustainable businesses to attract and retain staff. Such ability is due to providing non-detrimental services and goods (O'Laire & Welford, 1996; Revell et al., 2010).

Table 7 Role of employees in the adoption of sustainability

Item Statements	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Socially and environmentally responsible businesses are able to attract and retain staff	6.4%	10.3%	42.9%	31.8%	8.6%
Staff and employees should put pressure on businesses to be socially and environmentally friendly	10.7%	19.7%	35.6%	27.5%	6.4%

As seen in Table 7, only 33.9% (2nd row) of the respondents agreed that employees should put a pressure to engage with sustainability. Gadenne et al. (2009) believe that in order to have a sustainable business, employees can put pressure on SMEs by observing the advantages obtained from other businesses' adoption of sustainability. In addition, if owners/managers provide education and technical assistance about environmentally and socially friendly practices to their employees, then employees would devote more time and resources to the adoption of sustainability. Azapagic (2003) believes that the increased awareness of sustainability among employees will not only create practical innovations, but will also enhance the enjoyment of being part of a business that is committed to respect the community in a socially and environmentally responsible manner.

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4.1.2 External Factors Impacting the Adoption of Sustainability

There are three groups of suppliers, governments and customers who affect the adoption of sustainability in SMEs from outside of the business (Salimzadeh et al., 2015). In this study it was found that suppliers were the most effective external groups to adopt sustainable practices by regional SMEs. As Figure 1 shows respondents believe in the suppliers' role in the adoption of sustainability by SMEs. Government is not very effective in the adoption of sustainable practices as the average of agreement for the government role is 3.2 (close to neutral) (see Figure 1).

Suppliers

As shown in Figure 1, suppliers were recognised as the most effective external groups in sustainability adoption by Ballarat area's SMEs. Table 8 provides a summary of the respondents view on the role of suppliers in the adoption of sustainability in regional SMEs. As shown in this table, majority of respondents (57% in 1st row) agreed that socially and environmentally responsible businesses have the potential to minimise the risk of damage to their own reputation by dealing with socially responsible suppliers. Also, 42.1% (in 2nd row) of them agreed that suppliers and trade bodies could impose pressure on businesses to adopt sustainable practices. It supports the view of Rutherfoord et al. (2000) who believe that suppliers can set sustainability principles as important priorities for their own activities and in their relations to SMEs they deal with. Socially and environmentally responsible suppliers could encourage SMEs to adopt sustainable practices. Gadenne et al. (2009) show that owner/managers,

who know that suppliers' concerns affect their businesses, are more likely to learn the significant advantages and disadvantages associated with such concerns.

Table 8 Role of suppliers in the adoption of sustainability

Item Statements	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Socially and environmentally responsible businesses can minimise the risk of damage to their own reputation by dealing with socially responsible suppliers	3.4%	7.7%	31.8%	47.6%	9.4%
Suppliers and trade bodies should put pressure on businesses to be socially and environmentally friendly	8.6%	17.2%	32.2%	36.9%	5.2%

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Government

As Figure 1 shows, compared to suppliers, government is not a strong driver for the adoption of sustainability by regional SMEs. Table 9 shows the view of respondents regarding the role of government in the adoption of sustainability by regional SMEs. 78.9% (1st row) of the respondents believed that government should offer some form of recognition of businesses that have good environmental management practices. This finding is consistent with Udayasankar's view (2008) which believes SMEs are usually invisible to government and environmental bodies and stakeholders as they have limited and small-scale business operations.

Table 9 Role of government in the adoption of sustainability

Item Statements	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Government should offer some form of recognition of businesses that have good environmental management practices	0.00%	5.6%	15.5%	56.2%	22.7%
It is not the individual responsibility of business owner/managers to solve environmental problems	12.4%	27.9%	25.8%	30.9%	3.0%
National and local environmental laws and regulations should be strictly enforced in the business context	4.7%	12.0%	30.9%	42.5%	9.9%
Small businesses should leave the government to tackle environmental issues	5.6%	24.9%	27.5%	35.6%	6.4%
It's better that government enforces environmental taxes for businesses	13.7%	29.2%	37.3%	16.7%	3.0%

While 40.3% (2nd row) of the respondents agreed that solving environmental problems is the individual responsibility of owners/manager, 52.4% (3rd row) of them believed that national and local environmental regulations should be strictly enforced in the business context. Government regulation is one of the significant external factors affecting sustainability in regional SMEs, as such regulation controls current environmental behaviour, but also encourages owners/managers to look at ecologically-based innovations in the future (or "eco-innovations") as outlined in Courvisanos (2012). Drake et al. (2004) believe that customers could be motivated by the government to purchase environmental friendly products and services. In other words, government can promote public awareness about sustainability through education and support. This is compatible with the finding of the current study. In this study, 42% (4th row) of the respondents agreed that SMEs should leave the government to tackle environmental issues and 80.2% (5th row) of them disagreed or were neutral about enforcing the environmental taxes by the government in the business context.

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Customers

The impact of business on the environment is considered as a concerning issue not only among environmental bodies and legislators, but also among customers, local communities, suppliers and employees (Bubna-Litic & De Leeuw, 1999; Petts, et al., 1998; Deegan, 2007). As Table 10 shows, 46.3% (2nd row) of the respondents agreed that customers could put a pressure on businesses to preserve the natural environment. This confirms Wells (2011)'s view that if businesses want to be successful, they should respond to the sustainability challenges because customers evaluate a firm based on their sustainable practices. However, in a study of 210 Western Australian SMEs by Gerrans and Hutchinson (2000), they find that the majority of SMEs believe that the sustainability adoption is not important for customers.

Table 10 Role of customers in the adoption of sustainability

Item Statements	Strongly Disagree	Disagree	Neutral	Agree	Strongly Agree
Businesses with sound environmental management practices are well supported by customers	5.6%	16.7%	42.5%	31.8%	3.4%
Pressure from existing customers could force businesses to preserve the natural environment	6.4%	16.7%	30.5%	41.6%	4.7%
There is an increased public demand for ethical products and services	4.3%	10.7%	28.8%	48.1%	8.2%
Being socially and environmentally responsible attracts new customers	7.7%	17.6%	33.5%	33.5%	7.7%

Porter and Kramer (2006) believe that customers compel SMEs to adopt sustainable practices by either positively buying their products and services or negatively by rejecting them. This is consistent with the finding of the study in which 56.3% (3rd row) of the respondents agreed that there is an increased public demand for ethical products and services. This is also consistent with Hillary (2004)'s view which considers limited demand for sustainable goods from customers and the lack of customer pressure as significant reasons of non-adoption of sustainability by SMEs.

5 Conclusions

Given the international variation in defining SMEs, firms classified as SMEs in this study may be categorised differently in other countries. Hence the findings of this paper may not necessarily represent the sustainability orientation of firms that are categorised as SMEs in other countries. Also any generalisations that are made in the study are limited to the population of Ballarat's SMEs provided in the electronic database of Manta. Moreover, the findings in the study are limited by the extent to which the respondents were honest, careful, and without bias in responding to the survey instrument.

Being the mainstay of Regional Australia's development, SMEs are key players in achieving sustainability due to their significant contribution to the regional economy, environment and community. This paper has tried to look into the various factors affecting the adoption of sustainability in SMEs in a regional area of Australia. Findings reveal that the most effective factors appear to originate inside SMEs rather than outside. It was found that owners/managers of SMEs play a critical role in the adoption of sustainable practices. In other words, owners/managers attitude and commitment towards the sustainability issue and their knowledge about this issue were found as the most effective factors in SMEs engagement with sustainability in Ballarat.

The findings highlight the key area of education for Ballarat's SMEs' further improvements. As suggested by Gadenne et al. (2009), government campaigns and promotional advertising are two effective ways to enhance SME owners/managers' knowledge about benefits associated with environmental and social friendly practices leading to a positive attitude towards the sustainability issue. In other words, it is desirable that environmental education strategies and programs extend to

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cover local business communities and SMEs (Potts, 2010) in order to promote owners/managers' knowledge level about the sustainability.

The least important factor for engaging Ballarat area's SMEs in sustainable practices was the government. In other words this study found that government and legislation is not effective in the adoption of sustainability in Ballarat area. Hence, there is no need to enhance the enforcement of existing laws.

From the preceding discussion, a number of directions for future research are suggested. Many Australian business managers have been unsure of the strategic value of sustainability due to a lack of empirical studies, particularly in Regional Australia. Hence, similar studies can be conducted in other regional areas of Australia to further confirm these findings and conclusions. Second, some regression studies can be done to find the strength and direction of the relationships between effective factors and the adoption of various social and environmental practices.

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An Investigation Report of Potential Chinese Consumers on the Cognition of European Brands[58]

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Abstract:

Since the prevalent implementation of Chinese reform and opening policy and the development of Information Technology (IT), the younger generation of Chinese consumers have enormously changed their consumption attitude as well as the channels they are exposed to the media. These result in big changes on their cognition towards European brands as compared to the past. Through empirical survey and in-depth interview, this research focus on the investigation of the Chinese young consumers' cognition towards European product and brand image. The youth targeted in this research is the university students from 18 to 22 years old as they are the typical representation of potential consumers towards brand cognition. This report will study the comparison of consumers' cognition towards the brands from the United States of America, Japan, Korea and etc. Besides, a comparison based on the investigation which was conducted by our research team in the year 2000 entitled, "National image and brand association" is made, in order to examine the current potential Chinese consumers towards the changes in European brands' awareness and its factors.

Key words: European brand   Potential consumers   Brand cognition

Recently, China has become the world's fastest-growing market for goods consumption. According to the data released by Nielson in February 2015, the Chinese consumer confidence index remains

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[58]Remarks: Survey Description
This survey was conducted in January 2015 in Beijing by using both quantitative and qualitative research. Quantitative research is applied to 322 university students from 15public research universities in Beijing including Peking University, Tsinghua University, Renmin University of China and etc. The scope of survey includes 12 countries, namely Germany, the Netherlands, the United Kingdom, France, Sweden, Switzerland, Italy, Spain, the United States of America, Russian ,Japan and Korea. On the other hand, in-depth interviews were conducted with 8 representative university students who are highly informative and brand-oriented consumers.

The comparative data for this research is the same quantitative research that was conducted in Beijing in 2000. The survey respondents included university students of 15 public research universities in Beijing with 400 valid samples. The survey scope included 12 countries, namely the United States of America, Japan, Korea, Russia, Italy, France, Germany, the United Kingdom, the Netherlands, Brazil, Australia and Canada.

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high at 110 points in 2014, which is 13 points higher than the world's average[59]. There are more European enterprises which set China market as their key direction of market development. Besides attracting the high-end consumer, it is also important that the European brands which are relatively expensive, to grasp the group of customers with consumption power in the future and seize market opportunities.

With that, we have defined such groups as "potential consumer", whereby they have a big room of increment in terms of their consumption ability who will convert product demand into real consumption in the near future. They will definitely become the group with mainstream of consumption power. Being the group of university students with high education qualification who will be the future backbone of the Chinese society, they are undoubtedly the most potential consumers of European brands.

Dramatic transformations have occurred among university students who are grown up in the Internet environment, especially in terms of their consumption concept and the channels they are exposed to media. Their brand cognition towards European brands are totally different from the older generation. This phenomenon has resulted in great influence to the development of European enterprises in China market. Thus, our investigation team has selected the university students in Beijing area as our target. The reasons they are being selected are that they are living in China's economic, cultural and political hub. And generally, they have wider horizon and knowledge. The university students in Beijing also have more opportunities to access to the globalized information and they are undeniably the typical representation of Chinese new generation. Through the qualitative and quantitative research carried out on the respondents, the changes in European products and brands cognition among the potential Chinese consumers will be examined. The factors will also be found out in detailed.

1 The changes in environment which cause the transformation of potential Chinese Consumers towards European brands' cognition

Besides the open economic and trading cooperation, frequent cultural exchange and convenience in Internet access has helped the local Chinese especially teenagers from the first-tier cities in understanding the European culture, products, brands and other information rapidly and comprehensively. In addition, the increase of Chinese people traveling and studying in Europe has given them a better understanding about Europe. These are the factors that explain why university students have progressive transformations in terms of their cognition towards European brands.

1.1 Economic and cultural exchange boosted the consumption

After the Chinese Eleventh Communist Party of China (CPC) Central Committee Third Plenary Session, the Chinese government has adopted 'opening-up' policy as the national agenda which focused on developing mutual economic, technological, exchange and trading with foreign countries vigorously. China which has joined the World Trade Organization (WTO) in 2001 has removed the restrictions to foreign-invested enterprises and implemented "National Treatment" policy to encourage the foreign enterprises to invest in China market. Moreover, the release of "China's first policy paper on the European Union (EU)" by the Chinese government in October 2003, the China-EU comprehensive strategic partnership has made important head way.Now, the EU has become China's largest trading partner, the largest source of technology and the fourth largest source of

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[59] Pang Wuji, "Chinese consumer confidence index remains high at 110 points in 2014, which is 13 points higher than the world's average", **Error! Hyperlink reference not valid.** 2015

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foreign investment. China has also become the EU's second largest trading partner. China-EU trade volume has risen from 2.4 billion USD in 1975 to 615.14 billion USD in 2014[60].

Cultural exchanges and personnel exchanges between China and Europe have been expanding continuously. China has cooperated with France, Germany, the United Kingdom, Italy, Spain and other countries in co-organizing cultural festival and other mega cultural exchange activities. In 2013, China's outbound travel and tourism consumption were both ranked the first in the world. The outbound tourism consumption exceeded 70 billion USD, which is an increase of 20.7% compared with the same period in 2012. Eventually, Europe has become the most desirable tourism destination among the Chinese. Besides the popular destination for overseas study such as the United Kingdom, France, Germany, the Netherlands and the Nordic countries, other countries such as Italy, Spain, Russia and some of minority-language countries have also become the preference of Chinese students. Since 2006, EU countries have become the first choice of Chinese students for overseas study and the amount of students has surpassed the number of those who study in the United States of America.

In 2013, the President of the People's Republic of China, Xi JinPing had proposed the implementation of "The New Silk Road Economic Belt" and "the 21st Century Maritime Silk Road" in the effort to form an integrated Eurasia economic trend. Furthermore, in March 2014, President Xi JinPing visited the EU headquarters. Leaders of both parties have reached an important consensus to work together in establishing partnerships of four vital elements, which include peace, growth, innovation and civilization. In this context, the economic and trading cooperation between China and Europe will be strengthened. From the perspective of the potential Chinese consumers', either obtaining the information about Europe or visiting Europe has become easier. Growing up in such an open environment will cultivate an open-minded and tolerant attitude among the young consumers.

1.2 Internet has created a barrier-free consumption environment

The Internet, being an interactive platform for information spreading is a good alternative for mainstream media such as newspapers and television. Weibo, WeChat and other social networking sites allow the public to have more channels to voice out their thoughts. Development of social media does not only change the media landscape, but it also changes the consumption pattern among the Chinese. Chinese students who are living in overseas, teenagers who travel overseas or 'experts' who have strengths in certain areas can share the information and their lives in local and overseas, or even their travel experience to affect their surrounding people. Moreover, the Internet also allows the publishers and disseminators to provide customized and personalized information based on their targeted consumers. Thus, European enterprises shall set up We Chat public accounts or Weibo to communicate directly with the public as these channels are very useful in tightening the relationship between both parties.

E-commerce has overcome the limitation of the circulation of merchandises by enabling products from all parts of the world to be delivered to the doorstep of Chinese consumers. As of December 2014, the number of online shoppers in China has reached 361 million[61]. When purchasing European goods, most of the Chinese consumers can no longer be satisfied by the common purchasing channels such as brands' outlets or official stores. Instead, they prefer purchasing the overseas products when they study in overseas, or even getting help from their relatives who are having vacations in overseas. Besides that, they also prefer buying the overseas products through a

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[60] Ministry of Commerce of the people's Republic of China Department of European Affairs,*2014 China and European countries trade statistics*

[61] China Internet Network Information Center (CNNIC) ,"35th Statistical Report on Internet Development in China", February 2015

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specialized "overseas purchasing agent". Direct purchase from the official website whereby the goods are then be delivered by the logistic companies is also their favorite way of purchasing overseas product. In 2013, the trading volume of this "overseas purchasing agent" business has exceeded 70 billion yuan. The scale of overseas-purchasing business has reached 18 million people in 2013 and it is estimated the amount will hit 35.56 million people in 2018 with 1 trillion yuan[62].

1.3 Understanding of the world contributed to open-minded consumption habits

Understanding about other countries is inevitably vital in the formation of open-minded consumption mentality. This research has shown that potential Chinese consumers have deeper and diversified awareness towards the overall image of the European countries in these recent years.

Firstly, the university students' overall cognition towards the European countries has increased. Based on the research, the probability of answering for "Things associated with European Country" is 94.25% as shown in Table 1. This research shows that the respondents have a deeper understanding of European countries if compared to the past. For instance, during the research in 2000, upon hearing "The Netherlands" most students could only think of windmills and tulips. However, the same scenario has a different response these days. University students are now aware of the issues with legalization of homosexuality and they think that it is a country which offer a big room of freedom to the citizens.

Table 1.Rate of answering of the university students towards the country association

	Germany	Netherlands	UK	Spain	France	Switzerland	Italy	Sweden
Rate	99.38%	98.14%	98.14%	97.20%	99.69%	96.27%	96.58%	68.63%

Nowadays, the cognition of potential Chinese consumers towards the image of European countries are closely related to their lifestyle. In the past, university students usually include terms such as "dogma" and "aggressive" when referring to the German culture; whereas today, they focus on how the nations' "prudent" attitude (20.6%) brings out "higher-quality products". As for now, brand association of the university students towards Italy are related to Italian gourmet, clothing and attractions. Their negative mentality concerning Italian attitude and social problems have also reduced significantly.

Lastly, the cognizance of potential Chinese consumers' towards the whole world has become more diversified. Their preferred traveling destinations are no longer limited to one or two countries. For example, the United States of America is still the first choice for studying abroad but it is now only 28.8% , not as high as 63% in the research done in 2000. Coming in second and third place are the United Kingdom and Germany respectively (Figure 1). As for holidays, France is still the number one place to go, but again, the percentage difference is not as high compared to year 2000. Many respondents now desire to travel to the UK, USA, Germany and Japan (Figure 2)[63].

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[62] China Electronic Commerce Research Center," 2014 China e-commerce market monitoring report", April 2015
http://www.100ec.cn/zt/2014bndbg/
[63] Remarks ,The *2000 survey* did not involve Switzerland, Spain and Sweden

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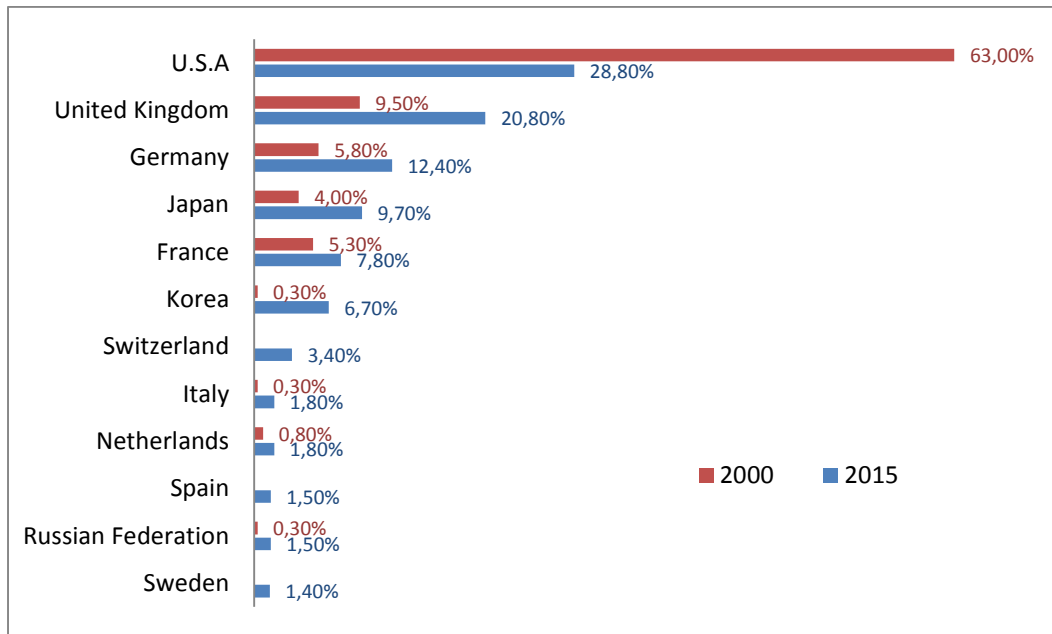The Netherlands | www.useconference.com

Figure 1. The most-wanted country for overseas study of the university students
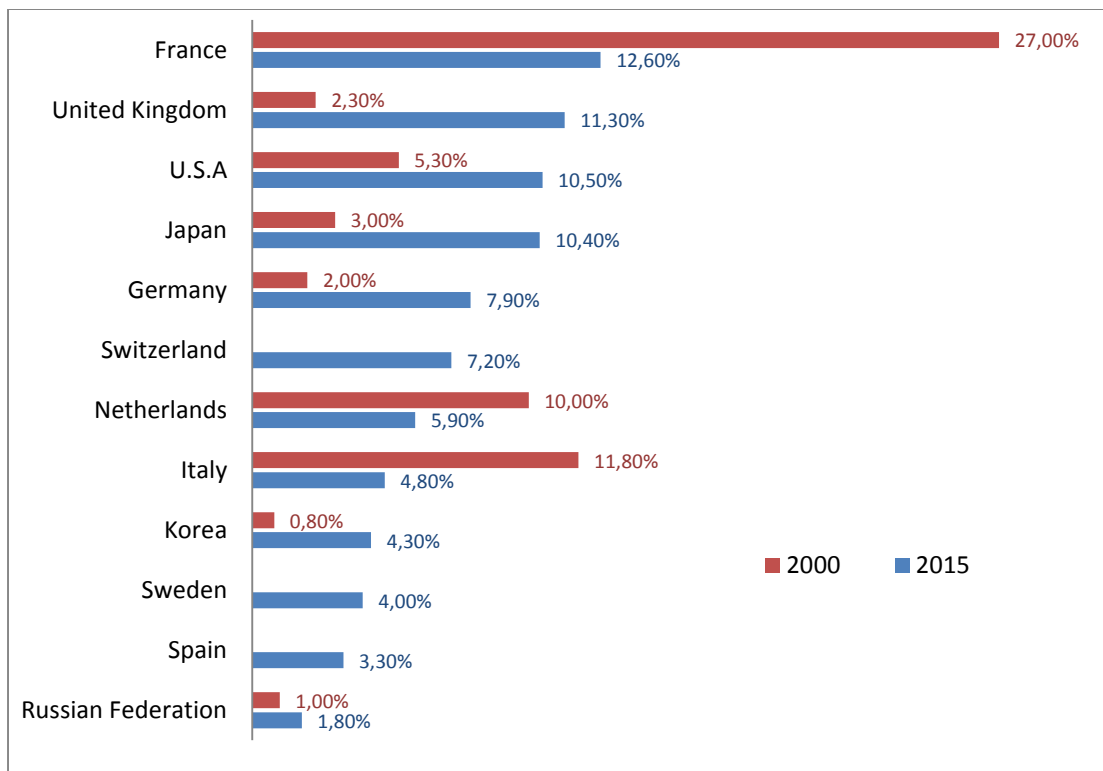
Figure 2, The most-wanted country for travelling of the university students

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2 Current cognition of potential Chinese consumer towards European brand

Brand cognition is the cognizance towards a brand which is gradually formed in consumers' mind as a result of long-term acceptance of the spreading of a brand as well as using the products and services of that brand for a long time. As a core element of the constitution of brand equity, it represents the level of understanding of consumers towards a brand and it is also closely related to the consumers' experience. Besides, brand cognition can be measured through brand awareness and brand image. Brand awareness is inclusive of brand recall and brand recognition. Generally, consumers' image towards a brand originate from product-related attribute which comprises of perceived quality, and non-product related attribute which includes brand association.

This research involved the brand recall, brand recognition and perceived quality of the cognition university students towards European brand. On this basis, a comparison of consumers' towards the brands from the United States of America, Japan and Korea is made. Besides that, a comparison based on the investigation which was conducted by in 2000 entitled, "National image and brand association" is also being carried out.

2.1 Abundance of Brand Recall

Recently, potential Chinese consumers have better understanding towards European product. The rate of answering of the university students towards German and French product has achieved more than 80%. Rate of answering of the university students for British product has increased significantly and it comprises of 307%. This is followed by the German product which has increased 147% (Table2). Moreover, their brand cognition towards European product has become more abundant. For instance, during the investigation in 2000, in the research of the brand cognition towards the United Kingdom, the brand cognition of university students towards the United Kingdom is only limited to "beef, dairy products, vintage cars, leather bag, leather shoes and clothing". But for the recent investigation, the potential Chinese consumer has mentioned about the British tourism, luxury goods, skincare products, red tea and etc.

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Table 2, The rate of answering of the university students towards the products associated with each country.

	2015	2000	Rate of increase
Germany	90.06%	36.50%	146.75%
Netherlands	65.22%	45.30%	43.97%
United Kingdom	67.08%	16.50%	306.55%
Spain	45.34%	--	--
France	84.16%	60.50%	39.11%
Switzerland	79.19%	--	--
Italy	65.84%	45.50%	44.70%
Sweden	30.75%	--	--
Russian Federation	68.63%	52.80%	29.99%
U.S.A	79.81%	40.50%	97.07%
Japan	85.71%	52.00%	64.84%
Korea	86.65%	41.00%	111.33%

Secondly, if compared to the past 15 years, nowadays, potential Chinese consumers have a wider cognition towards the brands from different countries. For example, during the investigation in 2000, university students only knew about the brands from the Netherlands such as Philips (19%) and Shell (6.8%). As for today, they are also familiar with Heineken (15.1%), Dumex (9.3%), TNT (3.5%) and etc. Among the European countries which are asked in the research, the highest rate of answering of the respondents is the brands from the United Kingdom which shows an increment of 225% and this is followed by Italian brands (78%) as shown in Table 3.

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Table 3,The rate of answering of theuniversity students towards the brand associated with each country.

	2015	2000	Rate of increase
Germany	86.96%	76.30%	13.97%
Netherlands	36.02%	29.30%	22.95%
United Kingdom	56.83%	17.50%	224.76%
Spain	29.50%	--	--
France	77.02%	75.00%	2.69%
Switzerland	64.29%	--	--
Italy	40.99%	23.00%	78.23%
Sweden	22.98%	--	--
Russian Federation	12.11%	10.80%	12.15%
U.S.A	90.68%	85.50%	6.06%
Japan	89.44%	92.50%	-3.31%
Korea	82.92%	78.00%	6.31%

Brand association of each country among the university students has shown a tremendous rise (Table 4). They do not only have a better understanding about various product and brands, but also, they have a better understanding about different brands' segmentation of the similar type. In 2000, the university students understanding towards German home appliances products are only limited to Siemens; for now, the consumers are exposed to more segmented products such as such as Bosch, Braun and Zwilling. In 2000, the university students only knew British-brand vehicle like Rolls Royce, but now, they also mentioned Land Rover, Bentley, Jaguar and other brands.

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Table 4, Quantity of the brands which are associated with each country of the university students.

	2015	2000
Germany	53	18
Netherlands	30	6
United Kingdom	85	13
Spain	31	——
France	79	31
Switzerland	49	——
Italy	48	17
Sweden	15	——
Russian Federation	18	5
U.S.A	116	46
Japan	77	32
Korea	67	11

2.2 The distinctive brand characteristics

In these days, potential Chinese consumers have a more explicit brand cognition towards European brands and certain discrepancies for brand cognition of different country has been shaped.

2.2.1 Germany and Switzerland: Countries with expertise in manufacturing

In the survey, our respondents have given grading which is evidently higher in terms of the workmanship, technology and quality of German and Switzerland product, if compared to the products from other country (Figure 3). Either the household appliances, kitchen utensils, machinery or vehicle, "Made in Germany" symbolizes durable, practical, reliable, safe and detail-oriented of the product. German's rigorous and meticulous attitude in product manufacturing has given a durable image to the Chinese consumers. Germany manufacturing industry with solid technical foundation and sophisticated technology is undeniably the world's role model in manufacturing. "Swiss made" symbolizes exquisite workmanship, accurate time, and credible technical quality in the watch industry of the world.
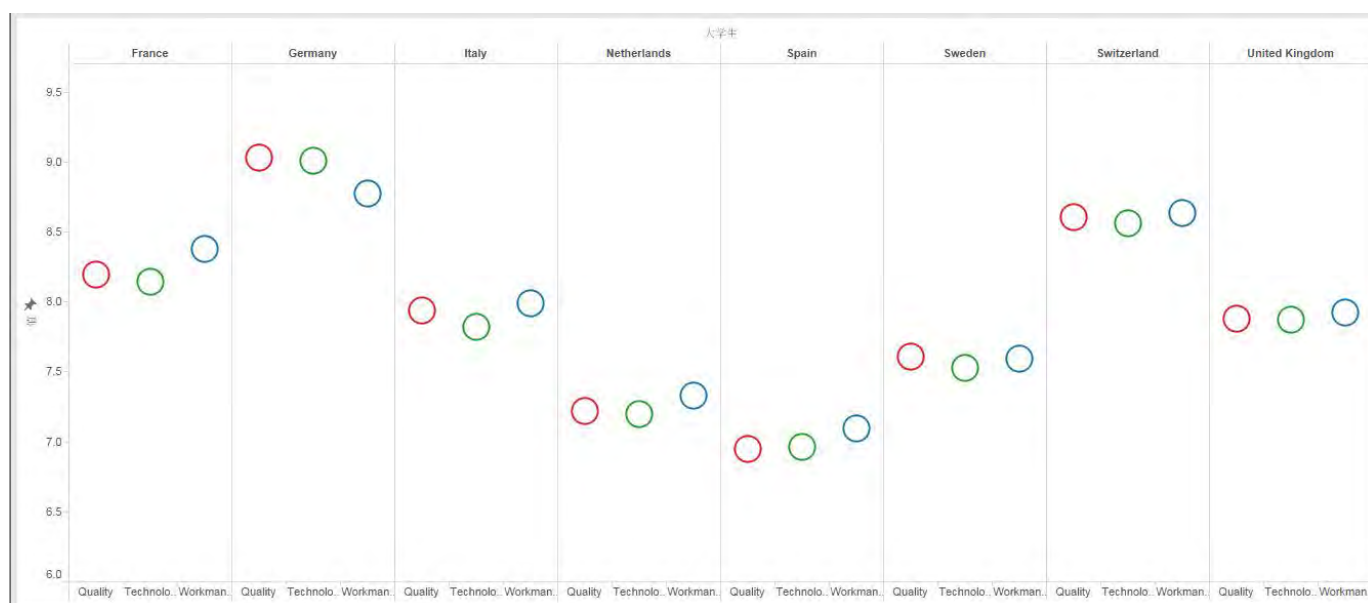
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Figure 3,The grading of university students towards the workmanship and technology of European products.

2.2.2 The Netherlands, Sweden, Spain: Small Countries with Glamorous Brands

The university students only have limited understanding about the products and brands from the Netherlands, Sweden and Spain. According to this research, neither the rate of answering about brands and products (as shown in Table2 and Table3), nor the understanding about number of brands is high(Table4). However, the university students did mention some of the brands such as Philips (53.5%), Ikea (53.8%) and ZARA (58.8%) quite often. From the point of view of the Chinese students, the three countries are not the common destinations for travel and overseas study and the cultural exchange between these counties and China is comparatively lower. Fundamentally, they are aware of these countries through secondary source of information such as books, lecture and etc. Nevertheless, the brands from these three countries are mentioned by more than half of the respondents and this actually reflects the influence of their brands.

2.2.3 France and Italy: Countries with Romantic and Fashionable Design

France and Italy have lots of common similarities. Most of the respondents associate the products from both of the countries with tourist attractions and luxury goods. Both of them are among the top-ten in the survey when asked about brands of different countries especially the brands of their luxury goods are being mentioned quite often (80%).

Meanwhile, in the survey of grading the various product aspects, French and Italian products have achieved a high score in terms of their 'design', 'workmanship' and 'price' (Figure 4). One of the interviewees said:"French and Italian brands as well as some European brands have profound cultural accumulation and historical background which are totally different from the 'fast brand' of the USA". With numerous cultural exchanges between China and France, these act as a stepping stone in helping the university students to have better understanding about the brands from France. The rate of answering of the respondents for the products and brands from France is higher than that of Italy (as shown in Table 2 and Table 3), same goes to the grading of the various product aspects.
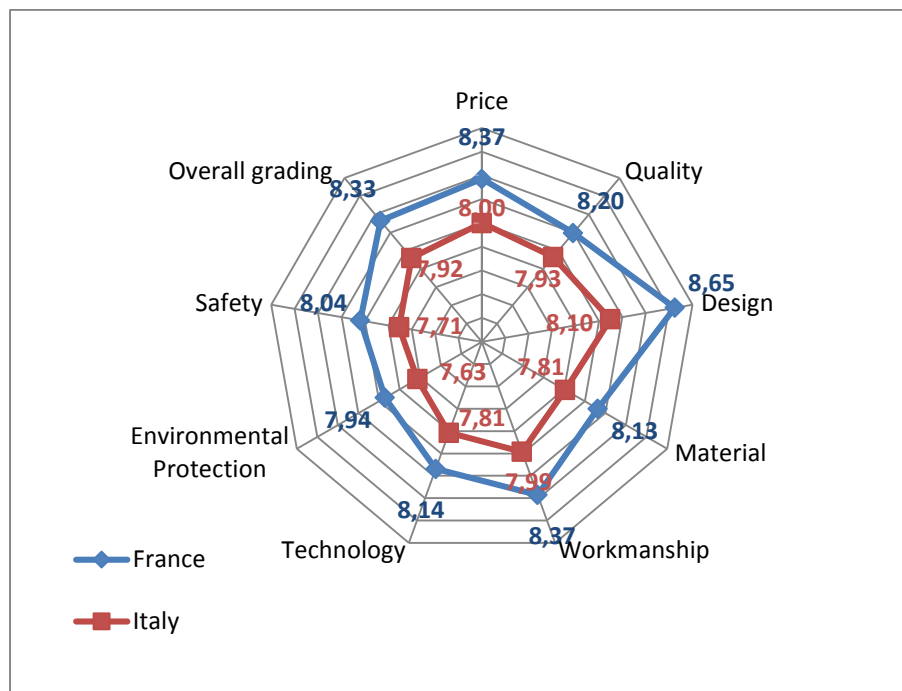
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Figure 4, The grading of university students towards Italian and French products or services

2.3 Cognition-differentiation of industry and brand

The rate of product association with the brands from Germany, the United Kingdom, France, Italy and Switzerland is very high. For example, when the respondents are asked about the product associated with Germany, most (81.4%) of the mentioned about German vehicle. Besides, the respondents also associate German brands with Mercedes-Benz (60.3%), Volkswagen (32.2%) and other vehicle brands on a regular basis. Also, the university students have also mentioned about the Swiss-made watch (74.5%) quite frequent. Among the brand from Switzerland stated by the respondents, 80% of the top-ten brands mentioned are watches' brands. This signifies that Switzerland is definitely the best watch maker in the world.

In contrast, the rate of product association from the Netherlands, Spain and Sweden with their correspondent brand is comparatively lower. For instance, flowers and tulips (28.6%) are the most-mentioned products of the Netherlands. However, it is not found in the research that there is any brands which are associated with flower. Besides that, Philips, the brand with highest brand association towards the Netherlands' brand which is categorized as the electrical appliances, is not being mentioned as the product associated with the Netherlands at all. The brand which is most associated with Spain is Zara (58.8%), a brand which is corresponding with clothing. However, there are only 17.8% of the respondents know the clothing brands in Spain. Moreover, the most-mentioned brand from Sweden, Ikea (58.8%) which corresponds with home appliances(15.2%), followed by H&M (43.1%) which corresponds with clothing (10.1%), and Volvo (35.4%) which corresponds with vehicle(15.2%), are seldom being mentioned by the respondents when they are asked about the product category associated with the brand of each country. Thus, in the point of view of potential Chinese consumer, among the same product category of each country, there are only a few brands which are popular. This implies that it is insufficient to form a competitive industry for that particular product category.

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2.4 Ambiguous awareness of the countries' of origin

In this research, although some of the European brands have high reputation, the university students are often confused with the countries' of origin, just like Adidas from Germany. As Adidas and Nike which are the favorite sports brand among the youngsters have lots of similarities, thus, Adidas are often assumed as the brand from the USA (Figure 5). Furthermore, the fashionable brand, H&M and C&A which originated from Sweden and the Netherlands respectively, are mistaken for the USA brand (Figure 6 &Figure 7). The top-two brands associated with the Netherlands, namely Philips and Shell are also misunderstood as the USA brand as well (Figure 8 & Figure 9).

During an interview, an interviewee said: "I do not have much understanding about Europe , I can hardly differentiate most of the European brands as they give me the feeling that European and American products are almost the same. As for the USA, as I have planned to have my overseas study in The States, thus, I am more aware of the product from the States." However, there are quite a big number of interviewees who said that: "American brands are fast-consumption products and they are only responsible for designing and marketing, whereby all the manufacturing are outsourced to other country. That is why the quality of its product is only at an acceptable rate. Conversely, European products are meticulously manufactured and have exquisite craftsmanship." European brands which are often being mistaken for American brands might weaken their brand image. It's essentially to strengthen the dissemination of the country of origin.
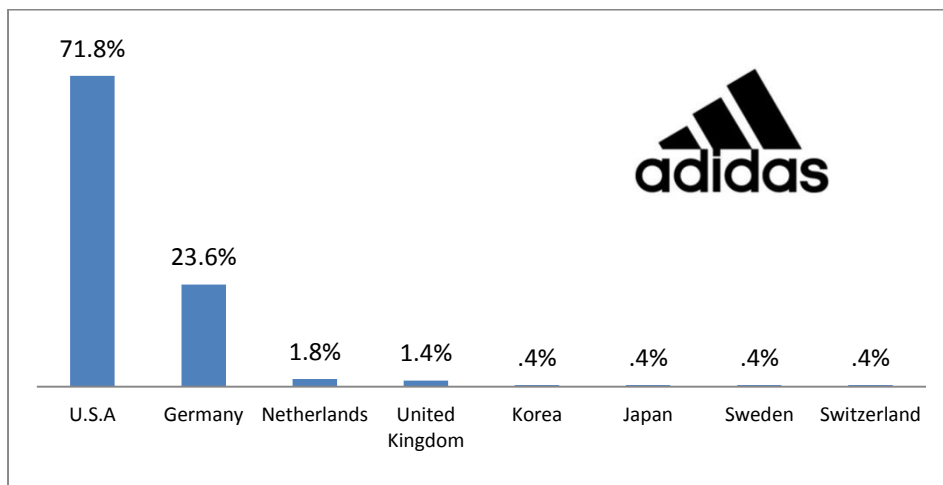

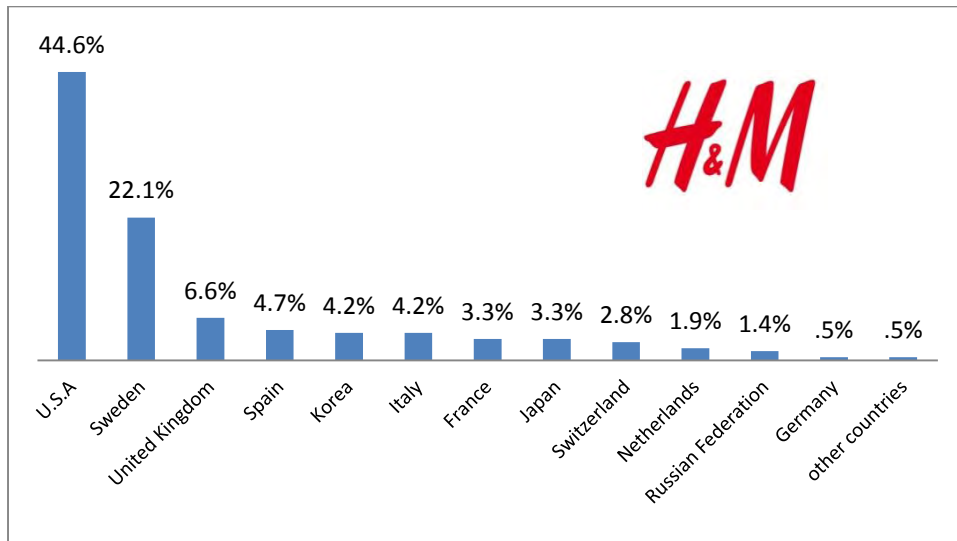**Figure 5,** Recognition on the origin country of Adidas

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Figure 6, Recognition on the origin country of H&M
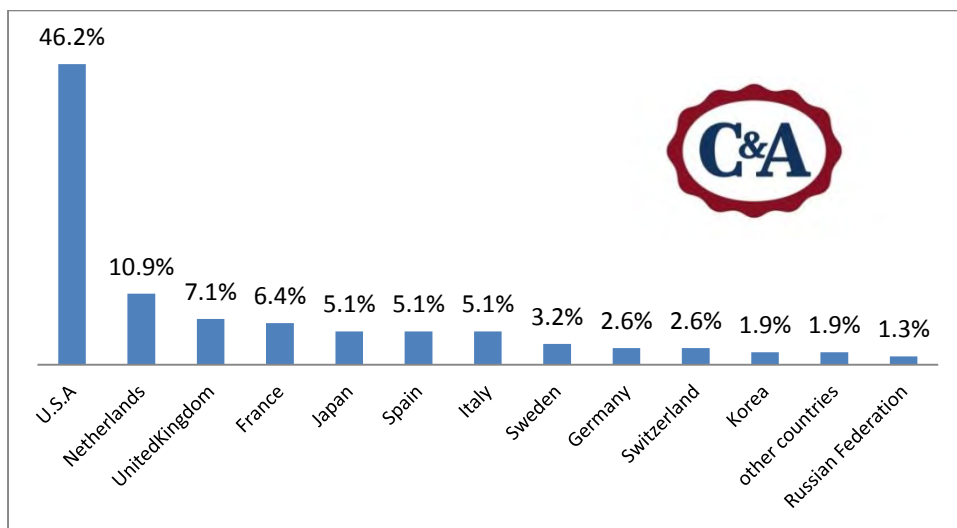
Figure 7,Recognition on the origin country of C&A

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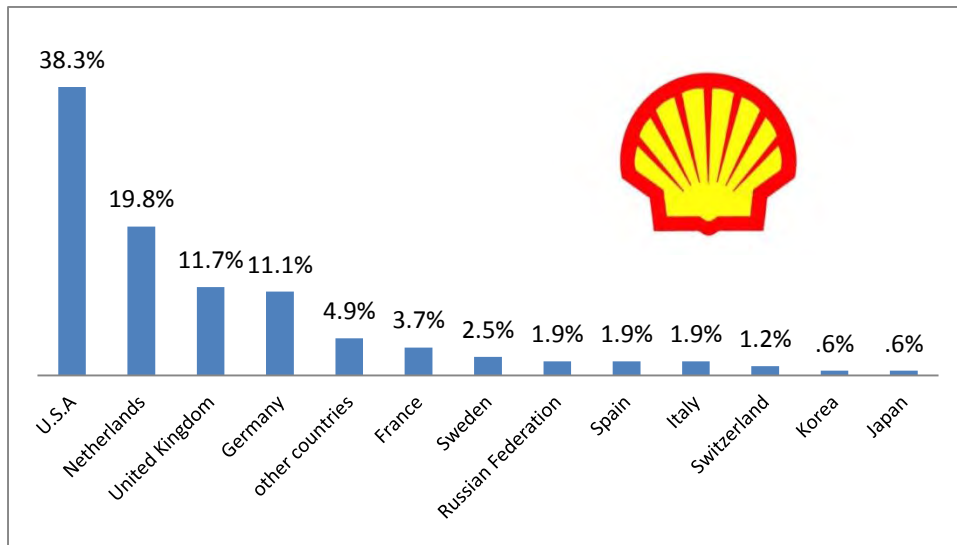
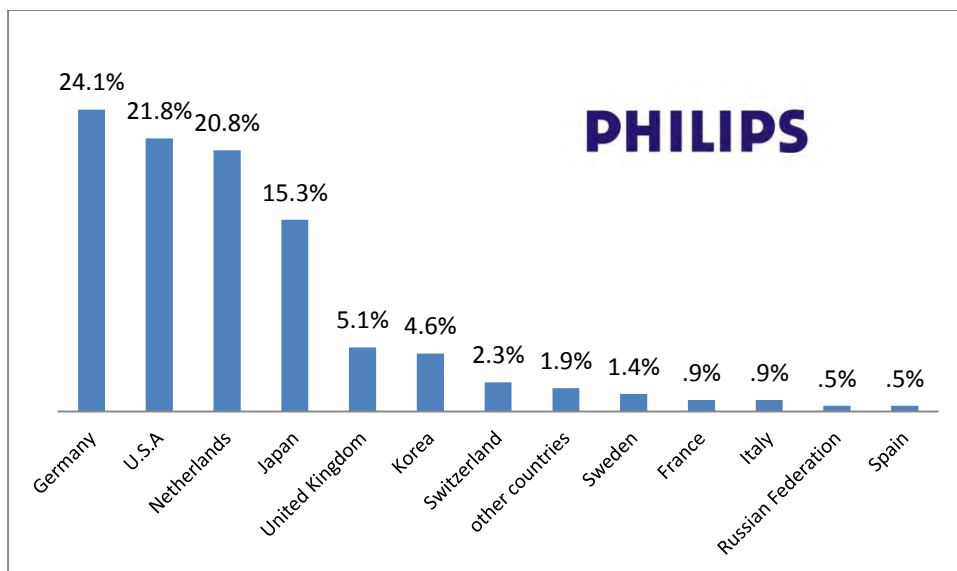**Figure 8,** Recognition on the origin country of SHELL

Figure 9, Recognition on the origin country of Philips

3 The factors affect the potential Chinese consumers towards European brands' cognition

From the angle of internal factors, cognition in terms of environment, approach and structure play vital roles towards the formation of consumers' brand cognition. This survey found that the European culture, the Internet word of mouth and the country of origin are the factors which affect the potential Chinese consumers towards their European brands' cognition.

3.1 Imperceptible cultural infiltration

The survey found that lots of cultural-related products such as British Drama (10.2%), American film (15.2%), Korean drama and celebrity (32.5%), Japanese anime (30.4%) and etc. come to the mind of Potential Chinese consumers when they are asked about the product associated with each

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country. In addition, the rate of answering by the respondents regarding the country's product and brand associated is relatively higher. Therefore, cultural dissemination does not contribute to the development of the country's cultural industry, but it also helps in promoting the country's product and brands.

In the past 15 years, the cognition of British products and brands has risen tremendously as a result of the effective dissemination of British culture. BBC documentary which has excellent production and wide-array of topics is just like the window to the world for the Chinese students. For Example, production of "*Sherlock*" which is the representation of British film and TV gained popularity among the youngsters. Moreover, Korean cultural infiltration has affected the brand cognition of Chinese university students. Recently, a large number of Korean drama, variety show, pop music and entertainment products have been 'exported' into China market. These have led to the development of Korean cosmetics, clothing and entertainment industries in China market. Korea is no longer the representation of its home appliances (8.3%), automotive (10.3%) and food (14.3%) as compared with the research in 2000. Korean product association is now dominated by its cosmetic products (27.8%), drama (22%) and entertainment (32.5%) industries.

In comparison, the movies, TV shows and other cultural activities from The Netherlands, Spain, Sweden and Italy which do not have much cultural dissemination and cultural exchange in China are not really well-known as potential Chinese consumers are lack of the cognition channels. The respondents associate 'football' with five of the European countries which are Germany (29.7%), the United Kingdom (13%), Italy (20.6%), the Netherlands (18.7%) and Spain (33.2%). The wide-spread of World Cup, Champions League, European Cup and all major football tournaments in China causes anything related with football to become a catalyst for European brand to penetrate into China market. Basically, the sponsorship of football games and appointment of football players as spokesman will be very impactful in promoting the brand.

3.2 Word-of-mouth communication through social networking sites

Development of the Internet causes an enormous impact to the Chinese consumer when accessing the information and online shopping. According to the recent announcement of "2015 China Digital Consumer Investigative Report" by McKinsey and Company, China becomes one of the countries with the most 'social lover'. It is found that Chinese spend an average of 78 minutes on social networking sites, which is 11 minutes more than the American. 50% of the Chinese consumers rely on word-of-mouth communication while there are 40% of American who are depending on this. According to the "35th Statistical Report on Internet Development in China" published by China Internet Network Information Center (CNNIC) in February 2015, there are 60% of the Internet users who have enthusiastic sharing habit on the Internet. Internet users can share their information and resources. This will bring mutual benefits among themselves as well as reducing the transactions cost which in turn created new values. Teenagers from 10 to 29 years old are more willing to share on the Internet if compared to those of other age groups. As teenagers will soon become the main force of the society, the effect of boosting reciprocity, sharing, cooperation and innovation by the Internet will become more obvious[64].

In this research, it can be found that there are more university students (65.9%) who obtain the latest brand-information by using the Internet (Figure 7). Among the Internet information channels, Wechat, Weibo and search engines are the tools which are commonly used. The user experience of the existing users on the social media platform, sharing among close friends, professional buyers and

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[64] China Internet Network Information Center (CNNIC) ,"35th Statistical Report on Internet Development in China", February 2015,

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recommendations of products by opinion leaders who are expert in particular aspects will also cause an impactful effect on the university students towards brand cognition.
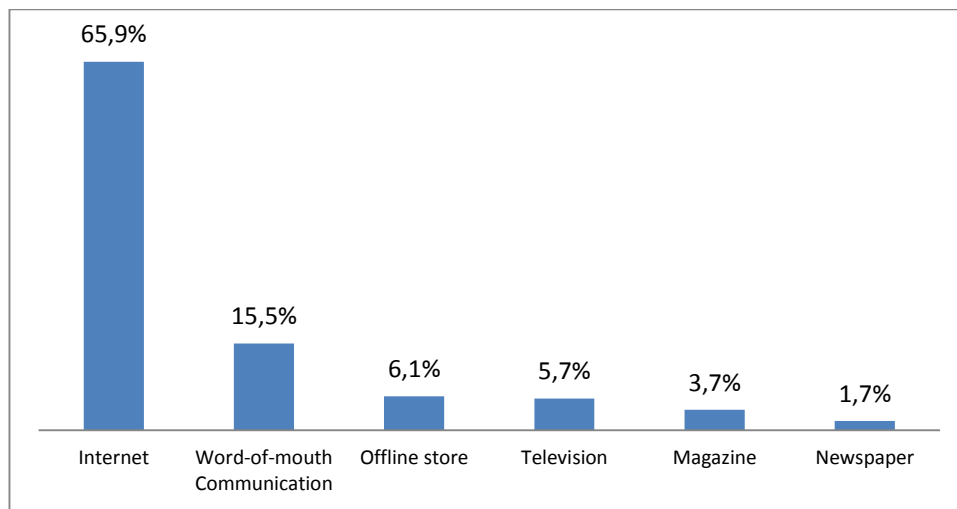

Figure 10,The channels of obtaining information about new brands among the university students

3.3 The Endorsement Effect due to the country of origin

Origin country of a brand will instill a certain image to the market in long term. This causes the consumer to be stereotyped toward the country's brand cognition which will affect consumers' grading on a brand[65]. Just like the university students who associate Germany with "rigorous" (20.6%), "Product with high quality" (6.9%) and "Industrially developed" (8.1%), they actually gave a high grading on German's quality and technology (Figure 11).
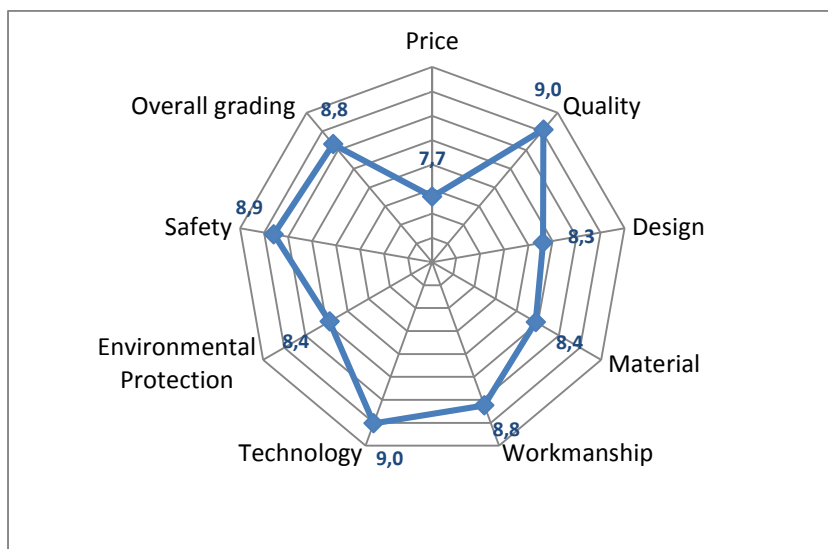

Figure 11, University students' grading on the several aspects of German products or brands.

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[65] Wang Hai-zhong,Zhao Ping,*Country of Brand Effect:An Empirical Study in China and Its Marketing Managerial Implications,* China Industrial Economy ,Jan 2014

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The respondents recalled of "Queen of England"(18%), "gentlemen"(12%), "royal family" (10.4%) and other terms which symbolizes nobility when they were asked about the country's image of the United Kingdom. Thus, respondents will associate the price of British product with expensive (Figure 12).

Figure 12, University students' grading on the several aspects of British products or brands.

The respondents who were asked about France eventually recalled of "romantic" and "fashionable". So their grading on design and workmanship of the country's product are higher in these aspects (Figure 13).
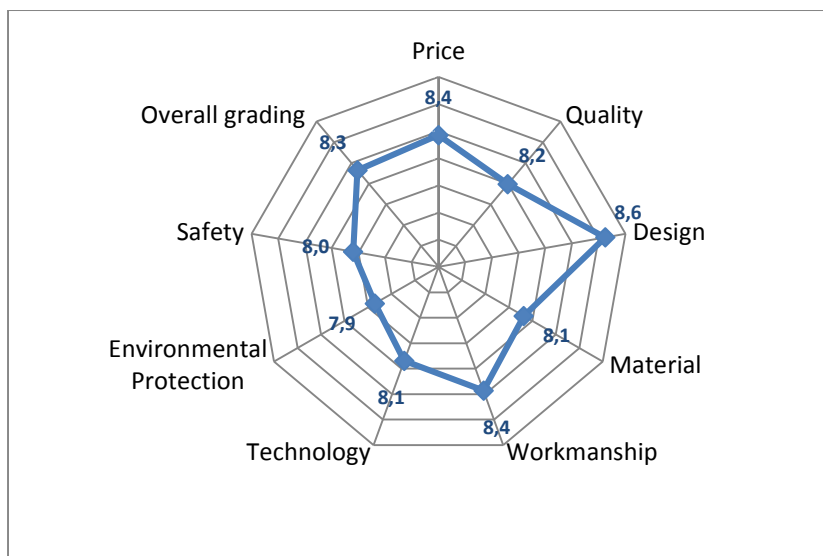

Figure 13,University students' grading on the several aspects of French products or brands.

National image of a country can be the image-endorser and brand-endorse for a product. For instance, the Netherlands' image is highly associated with the windmill (59.5%) and tulip (31%) by the respondents. As the Netherlands is associated as the "Agricultural country with excellent environment" by most of the Potential Chinese consumer, thus, the aspect of "environmental protection" show a higher grading (Figure 14). Consumers also have a high level of acceptance on the dairy products from the Netherlands. However, as the country's image does not have any

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endorsement related with "design" and "technology". Thus, Philips and Shell will easily being misunderstood as an American or German brand (Figure 8 and Figure 9).
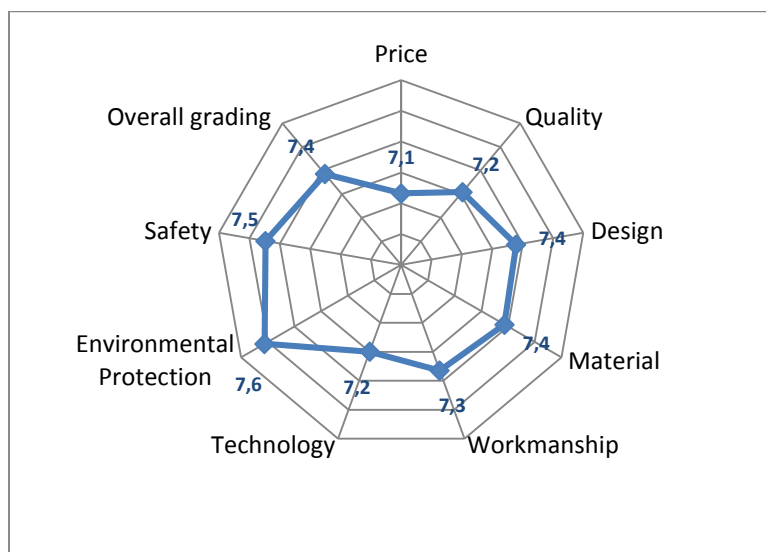

Figure 14, University students' grading on the several aspects of Netherland's products or brands.

4 Suggestions on the way of disseminating European Brand in China

In this survey, we have drawn a clear conclusion: If compared to the past 15 years, there are enormous changes in potential Chinese consumers towards the European brand cognition. In order to further promote the future development of European brand as well as strengthening the brand dissemination in China market, the European government departments and enterprises should strengthen themselves in the following aspects.

4.1 Respect Chinese Culture and Consumers

With the increased of Chinese living standard, there is an increasing demand for the potential Chinese consumers' towards the high-quality and branded product from overseas market. This phenomenon will definitely be a great appeal for the European enterprises. Although opened and transparent information environment has brought the emergence of "citizen of the world" among the potential Chinese consumer who are willing to accept a variety of lifestyle and information from all parts of the world, there are still a big difference in terms of their cultural traditions, living habits, consumption environment when compared with the European consumers. Due to the influence of Confucianism since a few thousand years ago, the cultural practice of Chinese consumers who emphasize the noble values such as family relationship, respecting the elderly, face-saving and thrift are still exist. Before entering into the China market, European brands shall adhere to the principle of 'When in Rome, do as the Romans do' by understanding the cultural background in detailed so that brand dissemination can be carried out effectively. The brand will be easily accepted by the Chinese consumers only if it is integrated with the Chinese local culture while adhering to the Chinese core values.

Besides that, there are also significant changes undergone by the Chinese consumers especially in terms of their channels of accessing the information, consumption habits and consumption psychology for the past 30 years. Their brand awareness toward European brands is totally different from the past. Therefore, for any European brands which intend to establish itself in China market,

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they will only be accepted by the China market only by grasping the Chinese consumers' consumption attitude accurately.

4.2 Increasing Brand exposure through cultural exchange

Nowadays, with the development of the Internet, potential Chinese consumers are adept at utilizing the information around the world by familiarizing with various channels. They prefer watching Hollywood blockbusters, American drama, English drama, Korean drama, Japanese anime, sports events and even playing online games during their leisure time. Moreover, they are also keen in participating seminars and exhibition to widen their horizon. All these are definitely the best platforms to promote the overseas brands conveniently and vividly.

With Europe long history of commercial civilization, European brands have inherited and promoted their modern European culture and history to the world. However, if compared with America, Japan and Korea, European countries are still lack of effective dissemination and diversified promotion in China. Thus, European countries shall strengthen their cultural exchange with China. Youngsters' cognition toward European brands can be enhanced through cultural exchange in sports, movies, education, tourism and gourmet. For instance, European countries can information about their products and brands through the export or co-production of TV drama and movie. Mackintosh waxed jackets, Cuter and Gross glasses, Swaine Adeney Brigg umbrellas, and George Cleverley shoes are widely spread after the release of "Kingsman: The Secret Service" in China. Additionally, various cultural exchange and exhibition activities can also be a great platform to promote European brands. For example, work art and movie from France are exhibited during the French cultural year and French spring cultural events organized in China. Chanel and Dior have also organized brand exhibition which has successfully attracted the attention of the youngsters.

4.3 The use of eminent brands to drive the development of other related industries in China

From the perspective of the relationship between industry and brand, well-known brands play vital roles in pioneering, innovating and cultivating socio-cultural which will enhance their quality standard and promote technological improvement. This will in turns boost the development of the whole industry. Furthermore, mature industries which have large economical scale and brand endorsement effect will be very useful in providing an excellent endorsement for the development of a brand.

However, potential Chinese customers only know one of the brands of each European countries. Philips (the Netherlands), Zara (Spain) and Ikea (Sweden) achieved more than 50% in the "Brands associated with each country" survey. Thus, home electrical appliances industry in the Netherlands, clothing industry in Spain and home industry in Sweden can rely on the influential brands from their countries to drive the industries which they are adept in, so that their brand awareness in China can be raised. Thus, European enterprises shall take the brands which already have their solid foundation in China market as a stepping stone so that the export of the related industries can be strengthened. This will form economies of scale which will in turn build a strong foundation for more brands to enter China market. On the other hand, European enterprises can also get help from the pioneering brands of the related industry which are influential in the China market as this will boost the trust and favorability of consumers.

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4.4 Opinion leaders drive the trend of brand consumption

Dissemination by traditional media is useful in increasing brand popularity while word-of-mouth communication is the most effective tactic to create and transform brands' image. Besides the communication through word-of mouth among relatives and friends, various shopping forum, shopping agent website, fashion expert's Weibo and Wechat public account which are very widespread in China will also cause a great influence.

The convenience of social networking sites allow the "shopping experts" who are popular in the Internet to become the opinion leader for brand consumption. Usually, Chinese youngsters' brand cognition and shopping decision are influenced by these "shopping experts". In addition, online-shopping sites such as "What is value for money" is a website which guides the decision-making when shopping and it is also a platform with the combinational of media, shopping guide, community interaction and tools. It allows the users to search for the brands from all parts of the world as well as recommending merchandises which are value for money to the consumers at a neutral standing. With the increase in the number of users who share their shopping experience at the social networking sites which contribute to the massive accumulation of brands' evaluation, this has led to the increase of its level of authority and influence which will further influence more consumers on their decision-making.

Thus, for the European brands which intend to enter the China market, besides promoting through advertisement, they shall also comprehend the various communication channels such as website for agent-purchase, overseas purchase forum, maternal forum, specialized websites, and social networking sites. These will help them in carrying out effective dissemination based on different products and market demand.

5 Conclusions

By comparing both of the investigations on brand cognition of university students in 2000 and 2015, we have drawn two conclusions. The brand cognition of the potential Chinese consumers towards European brands has become more diversified, detailed and clearer. In addition, there is also a confusion in the origin country of the European and American brands. Lack of linkage between the brands with the industry is also one of the problems. Nowadays, there are increase in the number of channels that can be used by the consumers to access to the information about brands as the information and trend about the brands has become more transparent. Thus, besides respecting the cultural and consumption habit of Chinese consumers, promotion of brands can also be carried out through the cultural exchange between countries and dissemination of various cultural events. With the help of word-of mouth communication of the social media as well as leveraging the strong brand and industry which opened the Chinese market, these will absolutely be an opportunity for the European brands to establish an excellent brand image in China. In our upcoming investigation, we will carry out more comprehensive investigation on the matters regarding the specialized issue of the brand from each country, as well as the changes of Chinese consumer behavior.

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Sociotechnical evaluation of alternative and innovative shop floor control systems

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Abstract

In this paper we present a sociotechnical evaluation of three new, and alternative shop floor control systems. The three alternative systems concerns the application of:

- POLCA, a card-based system to connect semi-autonomous cells;
- LPS (Lean Planning System), a detailed scheduling system to guide the flow of work in a low-volume/high-variety system;
- The CONWIP/FISFOS/TAKT system, a system which limits the amount of work at the workfloor and only indicates priorities on job order level.

We show how sociotechnical principles can be used to assess alternative shop floor control concepts. Concurrently, we discuss workplace innovation by means of the alternative shop floor control systems.

1. Introduction

Many SME companies can be characterizes as high-variety/low-volume companies. Each job may require a different routing through the manufacturing department. Also lead times of jobs may differ substantially. Furthermore, the number of jobs in the orderpool of a company may vary in the course of time. It is difficult to balance the load on the workfloor such that short and reliable delivery times are realized, in an efficient way. This is the reason why there is so much research in the area of job scheduling and interest in practice for shop floor control systems. A well-controlled manufacturing system support the control of lead times in manufacturing companies. See figure 1.
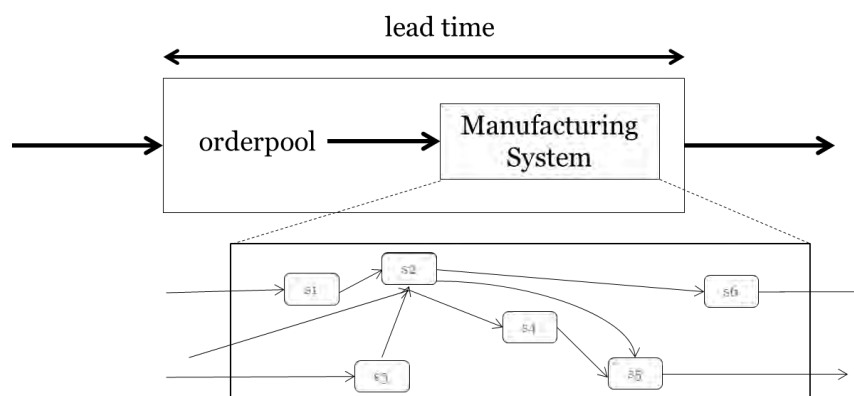

Figure 1 Schematic representation of a

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Many scheduling algorithms can be found in the scientific literature. It is difficult to find applications in practice. There are many reasons for this practicality gap. Scheduling algorithms presented by scientists are mostly complex, and practitioners prefer inferior solutions above complex algorithms. It may be costly to implement the complex algorithms. Also, much data is needed, which is mostly not available. Furthermore, it is doubtful to what extent the scheduling algorithms come up with good solutions. When proving the optimality of the algorithms, scientists assume that the available data is correct. They also assume that their model of reality (e.g. number of machines, capabilities of machines, working times, etc) do grasp the most important elements of the real system. This may not be true. Variability in processing times needed by different workers, variability in the number of available workers, and the presence of sequence-based setup times are, amongst other things, issues which are rarely incorporated in scheduling algorithms. Most scheduling algorithms assume single resource problems (only machines), while reality has to cope with multi resource problems (machines, workers, fixtures, etc.).

An important issue is the allocation of the scheduling task. In case of using computer support, the task mostly has to be performed by a planner, on his office. From a Lean perspective, scheduling has to be integrated in the manufacturing system. From a sociotechnical viewpoint, the workers responsible for the manufacturing tasks should also perform the scheduling (i.e. sequencing and dispatching) of jobs. By doing so, they will not be confronted by unrealistic scheduling plans. Although decentralizing the scheduling task to the workfloor may seem attractive, it may be questioned to what extend workers are able to perform the scheduling task satisfactorily. Some support may be needed.

Brown et al. (1988, pp.266-267) mention the need to apply socio-technical principles in the design of a production control system. In their opinion, the relative failure of many 'production management systems' (here: shop floor planning and control systems) can be explained, at least partially, in terms of the lack of a true socio-technical approach to the design and installation of these systems (pp.266). They criticize the overemphasis on the technical aspects of production control systems and argue that disappointments arise because of failure to give regard to the social aspect system.

In this paper, we argue that sociotechnical principles can be used for selecting an appropriate shop floor planning & control system. For this purpose, we adopted the sociotechnical principles as formulated by Cherns (1987, 1997). We will illustrate the applicability of the principles by evaluating three innovative and alternative shop floor planning and control systems, successfully applied in practice. In section 2, we give a short overview of sociotechnical principles. Section 3 is used to describe the three shop floor planning and control systems 3. In section 4, we evaluate the three systems by means of the sociotechnical principles. Finally, section 5 gives the main conclusions of our study.

2. Applying sociotechnical principles for the design of a Shop Floor Control System
A key term which may cover the meaning of the socio-technical idea is 'self-organization'. Self-organization has to be realized through the design of a production structure as well as the design of a control structure. Self-organization has to be seen as a means to realize the objectives of an organization and its workers. Each situation requires its own degree of self-organization. The more complex tasks are, and the more variety to deal with, the higher the required level of self-organization. Self-organization refers to the result of the design process as well as to the design process itself (see e.g. Cherns, 1978).

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A well-known list of socio-technical design principles, which supports the idea of self-organization, is given by Cherns (1976 and 1987). Table 1 gives a brief summary of the principles. Several authors have used the list of Cherns as a starting point for analysis. Huber and Brown (1991) use Cherns' list to recover human resource issues in cellular manufacturing. Hyer et al. (1999) apply the principles of Cherns in the design of manufacturing cells. Slomp and Ruel (2006) illustrate the use of the principles in the design of a planning and control system. In this paper, we apply the principles to compare three new and innovative shop floor control systems.

Table 1. Socio-technical design principles

Principle	Explanation	Focus
1. Compatibility	The way in which design is done should be compatible with the design's objective.	Design process
2. Minimal critical specification	No more should be specified than is absolutely essential. What is essential should be specified.	Design outcome
3. Variance control	Variances should not be exported across unit, departmental, or other organizational boundaries.	Design outcome
4. Boundary location	Boundaries should not be drawn so as to impede the sharing of information, knowledge, and learning.	Design outcome
5. Information flow	Information for action should be directed first to those whose task it is to act.	Design outcome
6. Power and authority	Those who need equipment, materials, or other resources to carry out their responsibilities should have access to them and authority to command them.	Design outcome
7. The multi-functional principle	If the environmental demands vary, it then becomes more adaptive and less wasteful for each element to possess more than one function.	Design outcome
8. Support congruence	Systems of social support (systems of selection, training, conflict resolution, work measurement, etc.) should be designed so as to reinforce the behaviors which the organization structure is designed to elicit.	Design outcome
9. Transitional organization	The design team and its process should be seen as a vehicle of transition.	Design process
10. Incompletion	Design is a reiterative process. The closure of options opens new ones. At the end we are back at the beginning.	Design process

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The socio-technical principles, mentioned in Table 1, can be applied in the design process of a production control system, as will be shown in the remaining part of this chapter. The sequence of the principles in the list, however, is somewhat random. Some of the principles refer to the (re-)design process, other principles concern the characteristics of an ideal design.

The principles concerning the process can be used in the design of a shop floor control system (SFCS). An SFCS is a system which asks for cooperation of the workers. They have to accept the rules of the system. Most important is that the workers feel that the system is helpful for them to select the next job to work on and, subsequently, to realize their targets with respect to efficiency and delivery performance. They need to cooperate with the system. *The compatibility principle (principle 1)* demands that the process and the outcome of a design should be compatible. Therefore, workers should be able to participate in the design, or at least in the selection, of the SFCS. The principle of *Transitional Organization (principle 9)* demands that the main designer/selector of the SFCS should also be responsible for the implementation of the system. The principle of *Incompletion (principle no. 10)* recognizes the fact that shop floor control will need development in the course of time, because of a changing context and/or improvement ideas. There should be room for improvement. It is not easy to change a fully automated system…

The principles concerning the outcome of the design process give some guidelines for designing a successful SFCS. The principle of *Minimal Critical Specification (principle 2)* demands a careful specification of the essential elements of shop floor control support needed by the workers. Only these elements should be dealt with by the SFCS. The SFCS should not unnecessarily limit the freedom of the worker to take planning and control decisions. The principle of *Variance Control (principle 3)* Cherns states that variances should not be exported across unit, departmental, or other organizational boundaries. This means that each organizational level in a production control system should be able to cope with the variances that may arise at that level. In other words, decision making tasks (levels) should reflect the variances that may arise at the organizational level. A machine breakdown, for instance, should ideally not ask for actions of the planning department. The workfloor should be able to cope with these disturbances. The principle of *Boundary Control (principle 4)* says that boundaries should not be drawn so as to impede the sharing of information, knowledge, and learning. The principle contributes to the considerations with respect to the assignment of decision tasks and responsibilities to the organizational levels. Principally, all levels should contribute to the overall objectives of the production control system. Because of the complexity of the planning and scheduling functions, however, each of the levels of the decision and organization hierarchy may have its own objectives. It is required that these objectives are tuned to one another. A system of co-ordination (= sharing of information, knowledge, and learning) is needed to avoid sub-optimizations. The principle of *Information Flow (principle 5)* says that the required design of the information system, which is part of the SFCS, depends on the division of tasks and responsibilities. If workers are responsible for efficiency and delivery performance then they should be informed first if they should act. The principle of *Power and Authority (principle 6)* stresses the importance that workers, who have to act, should have access to the means of the SFCS. This may be difficult in case a computer is needed to determine which action have to be taken. The *Multifunctional Principle (principle 7)* creates awareness for the fact that decision support tools, which can only be used by one employee, for instance the foreman of a work group, are not usable if the employee is absent. The principle of *Support Congruence (principle 8)* is related to the context of the SFCS. If workers become responsible for the planning, scheduling and control of their tasks, then it is likely that they become also responsible for other decision making tasks (e.g. hiring temporary personal, organizing preventive maintenance, etc.). The support systems in a company should be congruent.

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3. Three innovative, alternative Shop Floor Control systems for high-variety/low-volume environments

This section describes shortly three innovative, and alternative, Shop Floor Control Systems. These systems will be assessed in section 4 by means of the sociotechnical principles. The three alternative systems are:
• POLCA, a card-based system to connect semi-autonomous cells;
• LPS (Lean Planning System), a detailed scheduling system to guide the flow of work in a low-volume/high-variety system;
• The CONWIP/FISFOS/TAKT system, a system which limits the amount of work at the workfloor and only indicates priorities on job order level.

3.1 POLCA

POLCA stands for Paired-cell Overlapping Loops of Cards Authorization and is developed by Suri (2006) as part of the Quick Response Manufacturing (QRM) toolbox. In POLCA the manufacturing department is divided in a limited number of cells, each responsible for a number of operations. The division is done in such a way that the number of flows between cells are limited. If a flow exists between two cells, than a loop between these cells is created and a limited number of cards is in this loop. A worker is only allowed to perform an operation on a job if two cards are available: a card also belonging to the cell where the job is coming from and a card also belonging to the cell where the job has to go to next, see figure 2. Furthermore, the operation has to be performed after an earliest starting date and before a latest finishing data determined by a high level MRP system, see figure 3.
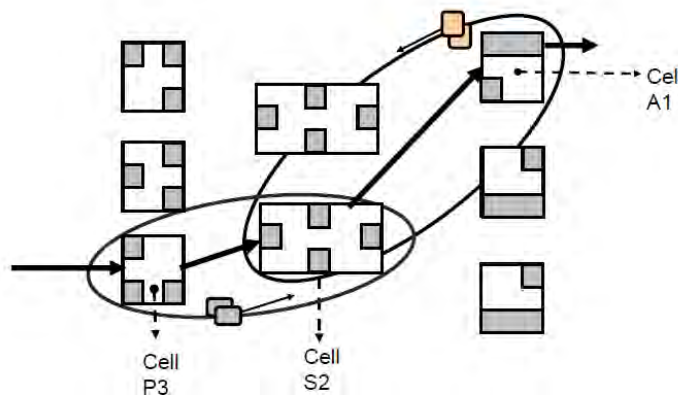
Figure 2. POLCA: a self-balancing system

Basically, POLCA is a self-balancing system. MRP takes care that cells are not overloaded in the course of time. The card system directs jobs to cells where capacity (i.e. free cards) is available. Furthermore, the total number of cards in the system limits the number of jobs in the whole system. This takes care of short lead times.
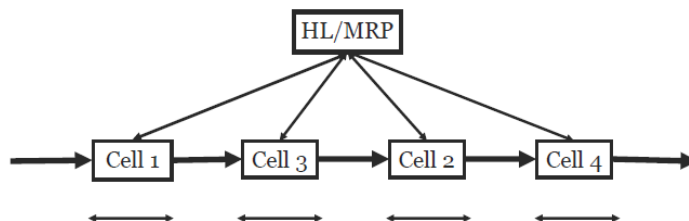

Figure 3. High level MRP to control the loading of the cells

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POLCA is used in several companies, in USA as well as Europe. One of the companies where POLCA is used, is Variass B.V. (Veendam, The Netherlands). Management is very satisfied with the system. A central board is used for all available cards (i.e. cards not connected to jobs), see figure 4. The central board makes clear to all workers which cell needs new jobs (many cards) and which cell has probably to less capacity (no or few cards). The information on the board helps to make sequencing and dispatching decisions in the cells. Furthermore, it provides information for the manager of the department to allocate workers to another cell, if needed.

Figure 4. POLCA cards indicating the need for jobs. The manager points to the number of workers in a cell.

3.2 Lean Planning System (LPS)

The Lean Planning System is developed by Raukema Bedrijfsprocessen, see: http://www.raukema.nl/ The system is used in several companies in the Netherlands. Also companies in other companies are interested in the system. Basically, the LPS creates a Gantt Chart, showing the sequence and timing of manufacturing orders, see figure 5. The Gantt Chart is usually made daily by a department planner. Input comes from the MRP system of the company. There are mechanisms in the software to support the scheduler. Main mechanism is that all operations of a job are scheduled sequentially, starting with the operation which needs the bottleneck machine.

One of the companies using the LPS is Neopost Drachten (The Netherlands). They have several digital screens on the workfloor, showing the Gantt Chart. When finishing an operation, the worker has to inform the system by mean barcode. Immediately, the changing status of the operation is visible on the screens. The screens show which operations are in time, and which are too late. This informs the workers what to do next. It is the challenge for the operators to perform all operations in time. The scheduling does not change during day time.
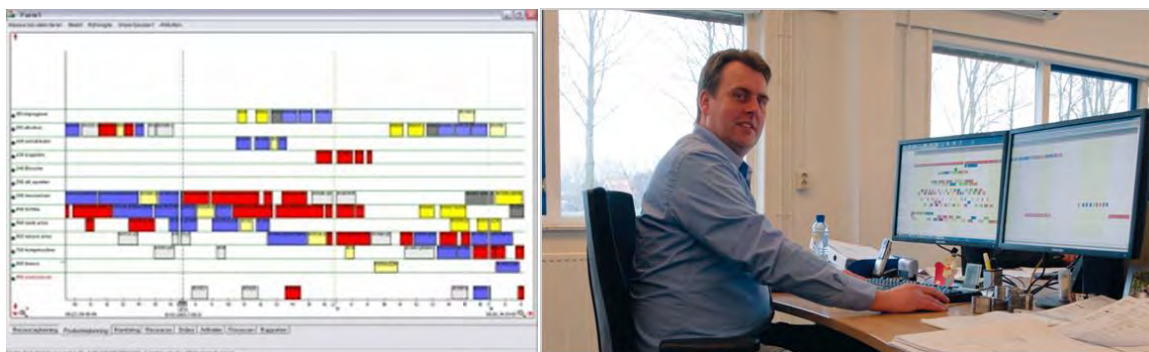

Figure 5. The Lean Planning System.

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3.3. The CONWIP/FISFOS/TAKT system

The CONWIP/FISFOS/TAKT system is developed at Eaton Holec (Hengelo, The Netherlands) and is described in two papers (Slomp et al., 2009 and Bokhorst and Slomp, 2010). The system is first developed for the cupper department of the company. Later, it is also implemented in other departments. The system is now used in several companies.

In the system, the number of jobs is limited to a certain number (CONWIP). This takes care of a short average throughput time of jobs. Next, workers are stimulated to work on the jobs that are longest in the system (First In System, First Out System, FISFOS). This takes care of, more or less, equal thoughput times of jobs. Finally, workers get information about the real and desired number of orders to be produced at each time.

An important element in the CONWIP/FISFOS/TAKT system is the socalled Production Progress Screen, see Figure 6. This screen shows the number of jobs in the system (18 jobs in Figure 6), the jobs which needs most attention (job 388390 is already to late), and difference between the real number and the planned number of orders to be produced at each moment (11 orders ahead). The screen was initially programmed in Excel. Later the screen was reprogrammed and integrated in the ERP system of the company. The Production Progress Screen is positioned somewhere in the department, visible for all workers, see figure 7.

Production progress screen					
Day	Wed	Start	06:00 am	Finished products	26
Takt time (min)	18	Stop	11:00 pm	To be produced	34
Daily production	60	Time	10:33 am	Lead/backlog	11

Nr.	Order	Time	Nr.	Order	Time	Nr.	Order	Time	Nr.	Order	Time
41	688390	23:34	54	687872	03:50	19	0	00:00	38	0	00:00
17	688140	16:36	16	688238	02:58	20	0	00:00	40	0	00:00
47	688131	15:47	3	688202	01:34	21	0	00:00	43	0	00:00
11	688184	13:17	1	0	00:00	22	0	00:00	45	0	00:00
44	688221	11:50	2	0	00:00	23	0	00:00	48	0	00:00
46	688239	10:46	4	0	00:00	24	0	00:00	49	0	00:00
29	687899	10:38	5	0	00:00	25	0	00:00	51	0	00:00
10	687873	10:34	7	0	00:00	28	0	00:00	52	0	00:00
39	688237	08:54	8	0	00:00	30	0	00:00	53	0	00:00
34	687874	08:39	9	0	00:00	31	0	00:00	55	0	00:00
50	687900	08:33	12	0	00:00	32	0	00:00	56	0	00:00
6	688405	06:34	13	0	00:00	33	0	00:00	57	0	00:00
26	688402	06:03	14	0	00:00	35	0	00:00	58	0	00:00
27	688395	04:26	15	0	00:00	36	0	00:00	59	0	00:00
42	688387	04:10	18	0	00:00	37	0	00:00	60	0	00:00

Figure 6 The production Progress Screen (part of the CONWIP, FISFOS, TAKT system).

Workers at the cupper department of Eaton company have the responsibility to realize their daily target (60 jobs) and to limit the throughput times of jobs, by means of CONWIP and FISFOS. The production progress screen gives sufficient information. They also have to enter te correct jobs to the production progress screen. The planning department of the company daily releases jobs to the cupper department to a level of 2.5 days of work. Each day has its own color. Information sheets of jobs get covers in the color of the day of release. The workers of the cupper department are responsible to finish released jobs within three days. When the first operation of a job starts, then the job enters the production progress screen and one day is available to finish that job. The release level of 2.5 days is used to give the workers of the cupper department the opportunity to cluster jobs for saving setup time. The presence of undesired colored covers at the workfloor and red jobs on the production progress screen is a reason for the production manager of the department to ask what is wrong.

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Figure 7 The production progress screen, connected to the wall.

4. Evaluating the three production control systems

All companies are happy with their production control system. The systems serve their needs. The three SFC systems are slightly different and may be the best option in certain cases. If there are shifting bottlenecks (machines), then the LPS may be best. In case of long routings, POLCA may be preferred. Then the department can be divided in cells. In case of a high variety of routings, the CONWIP-FISFOS-TAKT system may be best. For many companies however, the three systems are alternatives. If no other systems are available, then these companies have to make a choice.

With respect to the process of integrating a SFCS in the company, POLCA and CONWIP/FISFOS/TAKT do have substantial advantages. It is a simple system. Development of a POLCA game/simulation is not complex. It is easy to let workers, team leaders, and/planner participate (principle 1) in the development of the system. And this is necessary. The design of a POLCA system (incl. cells) needs to be done customer specific and requires detailed knowledge of the production system. This supports the Transitional Organization principle (principle 9). POLCA also gives clear improvement parameters: cell lead times and number of POLCA cards (principle 10). The CONWIP/FISFOS/TAKT system is also simple and can be easily understood by workers. Workers may participate in the setting of the parameters in the system (i.e. CONWIP level, release level). Introduction of the system was easy at Eaton Holec. The operators did not need any training. Parameters for improvement are the number of jobs in the system (CONWIP level) and the output (e.g. jobs per day). This can be measured easily. The LPC system is less easy to implement in a company. Participation of workers in specifying the system for the company is difficult. This also may complicate the acceptance of the system in the company. Improvement parameters are also not that clear for workers at the shopfloor.

Table 2. Assessment of the three SFCS by means of sociotechnical design criteria.

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	Conwip/fisfos /takt	POLCA	LPC
1. Minimal critical specification	+ (too less or too much)	++	+ (too much?
2. Variance control	+ (only global)	++	+ (only local)
3. Boundary location	++	++ (previous and next cell)	+ (not clear)
4. Information flow	o (limited)	++	+ (too much)
5. Power and authority	+	++	o
6. The multi-functional principle	o	++	o
7. Support congruence	o	+ time focus	o

Table 2 gives an assessment of the design of the three SFCSs by means of sociotechnical criteria. The assessments will be motivated in the remainder of this section.

POLCA can most easily be adapted to a specific situation. The number of cells and the cell lead times are parameters which can be set, dependent on the particular situation. Cell design also determines the number of loops. In the case described in section 3, the routings were simple and the POLCA cards were linked to cells instead of loops. The cards were used to identify the 'work-in-next-queue'. The focus of shop floor control was to produce according the dispatching rule 'lowest-work-in-next-queue'. This example show that POLCA can easily be adapted to a particular situation. The manager of the company did have experience with CONWIP. He enjoyed POLCA because it serves the setting of local and global accountability. CONWIP/FISFOS/TAKT sees a department as a whole and does not offer tools to specify further, to the level of machine groups. The LPC asks to specify everything, perhaps too much. Therefore, POLCA seems to be most able to design the SFCS according the principle of minimal critical specification.

POLCA also performs well with respect to the sociotechnical principles of variance control and boundary location. POLCA defines clear decision making tasks connected with the organizational levels. Unit Level Control, or cell control, is guided by the availability of cards and earliest starting and latest finishing dates (which comes from high Level MPR-control). The coordination between cells is taken over by the Paired Overlapping Loops of Cards. High level MRP control takes care of loading the production cells. The division of responsibilities are clear. POLCA does not give guidelines for establishing an escalation model: what to do if a cell does not have enough jobs to work on? What to do with SFC if a machine breaks down? When to act? The CONWIP/FISFOS/TAKT and the LPC system are also not clear about coping with unexpected variances. The CONWIP/FISFOS/TAKT system, as implemented at Eaton, illustrates the possibility to clearly divide responsibilities between different levels of the organization. The LPC system is less clear about the division of responsibilities. To what extent may workers deviate from the schedule, which is just based on a model of reality….

POLCA keeps all information gathering and processing on the workfloor. The other two systems also ask for information gathering at the workfloor. However, in case of CONWIP/FISFOS/TAKT only limited information is available. The status of the job is not known when the job is in the system. The LPC system registers everything. Probably too much. It is also questionable who has to take action based on the status of the system: the planner, the production manager, or the workers.

With respect to the principle of power and authority, the workers are owners of the POLCA system. In the case of section 3, the workers developed the system themselves by playing a lego game which corresponded to the situation of the company. They own the system. There is less ownership in case of CONWIP/FISFOS/TAKT and the LPC system. The workers are not able to interact with the systems.

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POLCA is also a simple visual system, which don't need software. This simplifies the abeyance of the multifunctionality rule. The system is not dependent on specialists. This is different in the other cases, especially in the case of the LPC system.

It is difficult to say much about the principle of support congruence. In the case of POLCA, the system fits in the QRM philosophy of the company. In the case of CONWIP/FISFOS/TAKT, it was difficult to connect the system to the MRP information system. It was/is hard to connect the pull principle of CONWIP/FISFOS/TAKT with the push principle of MRP. The lead time reservation in MRP was not connected to what happened on the workfloor. This also was the case in the LPC example in section 3.

5. Conclusion

This paper illustrates how sociotechnical principles can be used to evaluate alternative shop floor control systems. It may help the selection of a system. It has to be noted that the evaluation need to be specified for real cases. This may lead to different results. In case of shifting bottlenecks, the LPC may be preferable, because it has the required minimal critical specification. Furthermore, in some cases, it may fit perfectly in the context of the company (congruence).

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How Innovative New Zealand firms Procure Environmental Technical innovations for the Construction Industry: a Literature Review

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Paper prepared for USE 2015 - how SMEs organise competitive advantage.

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Abstract

Construction industries in New Zealand and abroad have a low track record for successful sustainable innovations. This often has a negative impact on private and government spending, and on quality, society and the environment. This paper posits that the construction industry needs step-change (i.e. architectural, system, radical, modular) environmental technical innovations to make drastic improvements.

Often entrepreneurial or small to medium-sized firms at the beginning of supply chains or from other industries will introduce such innovations. These firms will use the innovation capacity of suppliers and of their own organisations to transform and commercialise such innovations into the industry. *However, after an extensive literature review it remains unclear how innovative New Zealand firms procure environmental step-change technical innovations for the construction industry.*

The research focuses on procurement activities within such firms who supply the New Zealand construction industry. These procurement activities interact with (internal and external) innovation activities for an optimal firm performance (in economic and environmental terms) and are affected by clusters of internal and external variables.

The heart of the research consists of two rounds of case studies alternating with two rounds of collaborative focus studies. The research focus is on New Zealand although part of this study will be replicated in the Netherlands. It is part of a doctoral project.

Key words

Construction industry, building industry; entrepreneurs, small firms, SMEs; New Zealand; step-change technical innovations; procurement, purchasing; sustainable, environmental.

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1. Introduction

Traditionally the construction industry in New Zealand and abroad has a low productivity and a low track record for successful innovations (Fairweather, 2010). The industry also lags in sustainability performance (e.g. NZGBC, 2013; BRANZ 2014, p. 20) when seen from a broader or lifecycle perspective. This has a negative impact on private and government spending, on quality and health/wellbeing, and on the environment. The construction and occupancy of buildings cause between 25% and 35% of the environmental impact (EIPRO, 2006, p. 16). Occupancy during the life-time of buildings constitutes to 25% of the national energy consumption. Construction & demolition landfill waste in New Zealand is approximately 40% of total landfill (BRANZ, Special Report 279, 2013). Nevertheless the industry is an important contributor to the New Zealand economy (Page, 2013), and "can be an even bigger part of the solution… with proven and commercially available technologies … without significantly increasing investment costs" (Arnel, 2009, p. 2).

Figure 1 shows a construction supply chain (Pryke, 2009, p. 2). The smaller dashed oval indicates the primary research area; the larger dashed oval the wider research area. The 2nd tier suppliers which are the focus of this research often have no direct client contacts. These include *trade contractors* (e.g. plumbers, carpenters); *component suppliers* (supplying systems as window facades or other off-site manufactured structures); *material* or *trade suppliers* (supplying commodities as bricks, nails, cladding material); and *specialist services or others* (supplying secondary material as machineries, tools, or a range of specialist services).
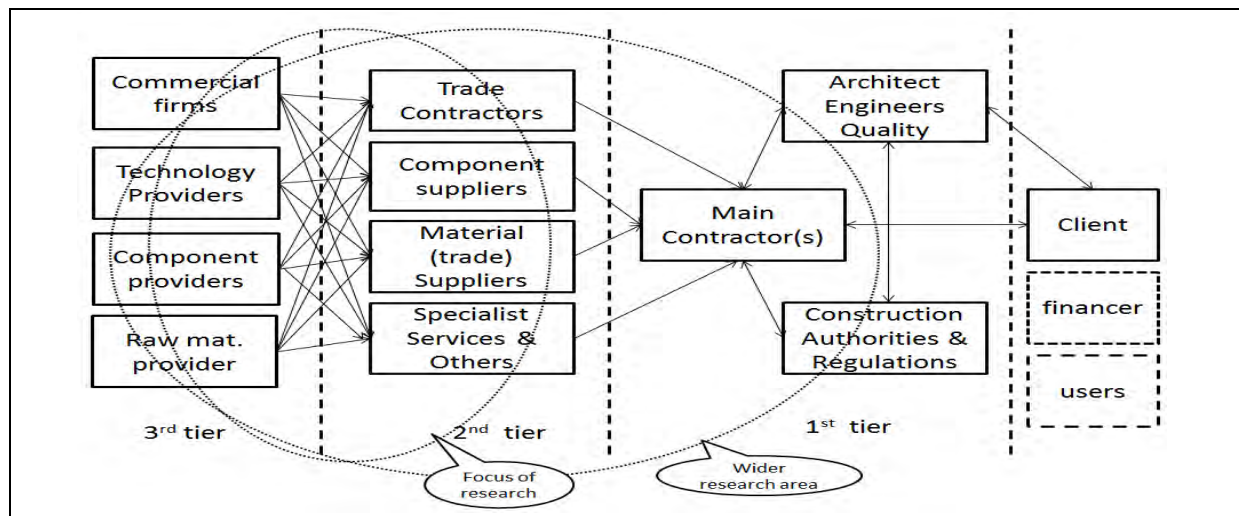

Fig. 14. Actors in a simplified construction supply chain based on Pryke (2009, p.2) & Van Weele (2010, p.15)

The 3rd tier suppliers can offer a variety of goods and services (Van Weele, 2010, p. 15). This research distinguishes *commercial firm*s supplying ready-to-sell tangible innovative products (e.g. machinery or materials) with know-how; *technology providers* supplying intangible products (competencies/skills or technology know-how); *component providers* supplying tangible innovative (semi-manufactured) products and know-how that must be transformed (processed or built) into a product offering; and *raw material providers.* The financer and users are considered less important for this research.

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This research relates to sustainable construction processes and subsequent sustainable buildings as a result of such processes. It focusses on a specific subset of sustainability: on *environmental aspects.* This concept in itself is still a broad term with differing interpretations. It originates from the Brundlandt report (1987) and relates to the use of raw materials and energy, and the production of physical waste and contamination during the life-cycle of buildings. Literature and practitioners then relate to "eco-efficient buildings". Such buildings and hence the innovations of this research (UNEP, 2010, p. 11) will:

1. *Minimise the amount of resources used in relation to the size of the building;*
2. *Maximise the ease with which resources can be refurbished, reused and / or recycled;*
3. *Minimise the amount of resources required to provide thermal comfort and services in a building; and minimize the proportion of resources wasted during construction, refurbishment and demolition.*

In practice these resources often relates to energy efficiency, water efficiency, material efficiency. The notion of Green Buildings (UNEP, 2010, p. 11) additionally takes into account the life-cycle impact on occupants, minimizing pollution and using environmentally-friendly materials or energy systems. This is often covered by rating schemes such as Greenstar, LEED or BREEAM. The research does *not* focus on the social or cultural aspects of sustainability *per sé.* Nevertheless an environmental innovation can also impact social or cultural aspects of sustainability.

In line with Kibert & Grosskopf (2005), Schaltegger & Wagner (2008) and Van den Dobbelsteen (2004) this paper posits that the construction industry needs step-change (*disruptive or discontinuous, i.e. modular, architectural, system or radical*) environmental technical innovations to make drastic improvements in sustainability. Such innovations are often procured and (co-) developed by (2nd tier) innovative firms thus introducing such innovations to the innovation superstructure (e.g. Hardie, 2011; Pries & Janszen, 1995; Slaughter, 1998; Winch, 1998) and hence further into the construction industry. In the New Zealand context such innovative firms will be entrepreneurial Small to Medium-sized Enterprises (SMEs). *However it is unclear how such firms procure step-change environmental technical innovations for the construction industry.*

This paper will now continue with a literature review ($2), leading to a gap in extant research ($3). It will then discuss a conceptual framework ($4), research questions ($5), and briefly discuss the proposed research design ($6). It will end with conclusions and limitations ($7).

2. Literature review on procurement and innovations in construction

This section gives a brief overview from literature. It discusses the concepts of procurement ($2.1) and innovation ($2.2), technology and Intellectual Property ($2.3), aspects of networks and collaboration ($2.4). This section ends with characteristics of the unit-of analysis, the innovative 2nd tier suppliers ($2.5). Research shows that such innovative firms are either entrepreneurial or relatively small, or sometimes even both. Hence the review discusses literature from these two aspects.

For small construction firms innovation are a means to survive or make profit (Abbott *et al.* 2006). Chesbrough (2004) coined the concept of open innovation as "the use of *purposive inflows and outflows of knowledge* to accelerate internal innovation and to expand the markets for external use of innovation, respectively" (italics added). This concept is increasingly being used in small to medium-sized firms (Pullen, 2010; Van de Vrande 2009), but its use in construction is unknown. There is an on-going debate (Gronum & Verreynne, 2007) on how this concept can be applied in small firms. There is research on innovation types in the construction industry (Slaughter, 2000 Hardie, 2011). Literature also suggests (e.g. Hardie, ibid, Sheffer & Levitt, 2010) several barriers to adoption of innovations on a *meso* (industry) level and on a *macro* (systemic) level in the construction industry. There is also literature on how small firms successfully diffuse (commercialize) step-change environmental innovations in the construction industry (e.g. Hardie, 2013; Sheffer & Levitt, 2010, 2013). Utterback (1994) concluded that these (in-frequent) step-change innovations trigger (more frequent) process and incremental innovations, and hence deliver large benefits to stakeholders.

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Small firms are not miniature versions of large firms (e.g. Torrès & Julien, 2005) and small firm innovation and procurement processes will differ from those of larger firms (Ramsey, 2007). Processes are likely to be more informal, simplistic and holistic, and centred round the firm-owner, although Meijaard *et al.* (2005) suggested a wider variety of organisational small firm structures including formal and complex structures. In line with Julien (1995), in her French research Reboud e.a. (2011, p. 3) saw a continuum from "SMEs Ordinaires" (traditional small firms) to "SME entrepreneuriales" entrepreneurial firms, with differing characteristics and dynamics. There is also some debate (Ozmen, *et al.* 2014, p. 1) on whether bying behaviour of small firms does include aspects of individual buying behaviour like impulse buying.

There is a wealth of literature on how large organisations procure goods and services but it remains unclear how small firms procure these (e.g. Hagelaar *et al.*, 2014; Morrissey, 2011; Paik, 2009). There is some literature on innovation and SMEs. Often (small) entrepreneurial firms from outside the industry or at the beginning of supply chains play an important role in introducing innovations to the industry (e.g. Baumol, 2002; Farschi & Brown, 2011; Johnsen & Philips, 2011; Gambatese & Hallowell, 2011; OECD, 2005, 2010; Pries, 1995, 2005). There is Australian literature (e.g. Hardie, 2006, 2011, 2013) on small firms successfully introducing environmental innovations in the construction industry, but this literature does not reveal (e.g. Hardie 2011, p. 260) supplier relationships of such firms. Likewise, there is a growing body of literature (e.g. Johnsen *et al.*, 2011; Philips *et al.*, 2004) on how large organisations procure step-change innovations.

Not all firms are entrepreneurial firms. Entrepreneurial firms realize substantial growth and renewal (OECD, 2010b). Owners will have a pivotal role (Burns, 2011) and often act as gatekeepers or ambassadors (North & Smallbone, 2000). Their innovation and procurement activities will be determined by their experience and attitude to innovation (Chandler, *et al.*, 2000; Songip, 2013) by their holistic approach to procurement (Quayle, 2002; Pressey *et al.*, 2009) and hence by their perceptions on risks, strategies and objectives. Altruistic (social and environmental) motives of firm owners could play a role in the choice of wanting to offer environmental innovations. However it is expected that entrepreneurs are pursuing opportunities (Zortea *et al.*, 2013) and that business objectives (growth, profits, or even continuity) are more import drivers. This is in line with research of Hardy *et al.* (2013, p. 186) on environmental innovative small firms who found that the drivers regulatory climate, industry networks, project-based conditions and client and user influence all ranked substantially higher than the owners' personal motivation. Vörosmarty (2012) found similar drivers for sustainable procurement of Hungarian SMEs.

2.1 On definitions for procurement

This research sees the procurement process related to construction innovations as a part of the wider adoption (diffusion) process of such innovation (see e.g. Hardie, 2005; Weidman *et al.* 2009). Definitions and terms related to *procurement, purchasing, sourcing* or *supply management* vary considerable and are often being used interchangeably (see e.g. Johnsen *et al.*, 2014, p. 10). This research takes a wide approach on procurement and for example includes decisions related to make or buy, to transactional or longer relationships, to choosing high or low risk (value) suppliers. The research uses the following definition for *environmental procurement*:

> is the consideration *of environmental and economic issues* in the management of the organisation's external resources in such a way that the supply of all goods, services, capabilities and knowledge which are necessary for running, maintaining and managing the organisations primary and support activities *in exchange for financial means* provide *economic* and *non-economic* value for this organisation and *environmental* value for other stakeholders.

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This definition is an adaptation of Miemczyk's *et al.* (2012) definition on *sustainable* procurement which again was based on Van Weele (2010) and the Brundtland report (1987). The definition additionally incorporates the aspect of *financial means* to delineate procurement activities from non-financial adoption, partnering or network activities (such as knowledge exchange, or creating joint-ventures). Put briefly: procurement activities will result in an invoice from a supplier (Telgen, 1994). A more popular synonym for "environmental procurement" would be "green procurement" as is used by for example the European Union (2011).

This research defines the related construct of *procurement performance* as (1) a change in process performance (i.e. while managing activities in a procurement process) and (2) a change in output performance: i.e. realising *economic firm benefits* (e.g. cost price as a % of sales), realizing *non-economic firm benefits* (e.g. on quality, logistics, exclusivity) and *realising (firm or non-firm) environmental benefits* (for stakeholders: suppliers, employees, society). This reasoning is for example in line with Hartmann (2007) and Bos (2010).

2.2 On definitions for innovation

In her research Hardie (2011, p.33) defined an innovation *as an improvement in functionality performance as perceived by the owner of the firm*. The OECD manual describes a *technological product innovation* as the implementation and commercialisation of a product with improved characteristics such as to deliver objectively new or improved services to the customer (OECD, 2005).

In this research the focal firm procures innovations and additionally adds value through its own innovation activities. This research uses the term *innovation* in three different meanings. The firm's perception of *innovation* relates to (1) an input (from suppliers), (2) a process (internally and with external parties), and (3) an output (for customers and stakeholders).

This *increase in functionality* relates to *technology* or *technical* aspects which can both be seen in *product* and *process* innovations (OECD, 2005, p. 47-49). A *product* innovation is the introduction of a good or a service that is new or significantly improved. A *process* innovation is the implementation of a new or significantly improved production or delivery method. The research focusses on procurement and development of product innovations, which downstream can be used as process innovations.

For this research three further definitions on innovations are relevant:

(1) Innovation is the process through which firms seek to *acquire* and *build upon* their distinctive technological competence, understood as the set of resources a firm possesses and the way in which these are transformed by innovative capabilities (Tidd & Bessant, 2009).
(2) Innovation is the *tool of entrepreneurs*, the means by which they exploit change as an opportunity for a different business or service (Drucker, 1985).
(3) Innovation is the actual use of *nontrivial change and improvement* in a process, product or system that is *novel to the developing organisation[s]*, [...] and can be *associated with market growth* [...] and *reductions in the cost* of production (Slaughter, 1998, 2000).

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The innovation objectives are improved results in environmental and economic terms. This research combines the above three definitions and the Hardie definition (2011, p. 33). For this research the focal firm when _innovating_:

> procures technical product or process innovation(s), and through innovation activities is able to produce and commercialise (implement) a *step-change* technical product innovation with significantly improved or new functional performance in economic and environmental terms.

The research focuses on the "step-change" innovations, and excludes incremental innovations or improvements. Hence this research focuses on technical innovations with a higher degree of newness, risks and uncertainties (c.f. Holahan *et al.*, 2014, p. 332). It hence either relates (Slaughter, 2000) to a higher degree of changes in linkages (that is the number of stakeholders involved), or a to higher degree of changes in technology concepts (that is the number of changes of technology or technology components). This is visualised in Figure 2 below.
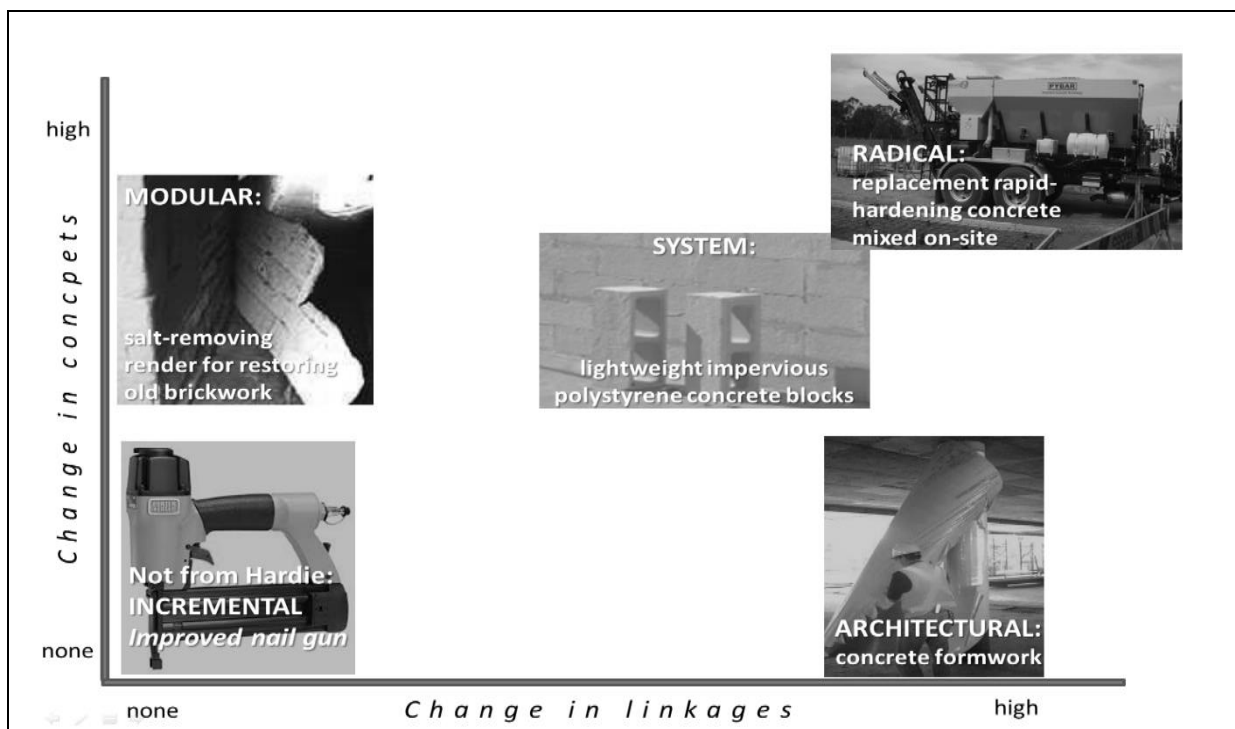
Fig. 15. Construction innovation typology as used in Hardie (2011) and based on Slaughter (2000)

In line with seminal work of Henderson & Clark (1990, p. 12), incremental innovations and improvements must be seen as *reinforcing* the current status whereas the step-change innovation of this research will *change* the current status of either technology (concepts) or actors or firms (linkages). Slaughter (1998, 2000; see Table 1) saw a relationship between the types of innovation and supplier involvement. Slaughter (2000, p. 4-13) suggested a relationship between the type of innovation, the phase of implementation and the type of company. She suggested that contractors

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may be good sources for *architectural* and *system* innovations, whereas suppliers may be good sources for *modular* innovations. *Radical* innovations will often originate from R&D or engineering research. Wynstra & Pierick (2000, p. 51) discussed that such relationships will depend the development risk versus the responsibility held by the supplier. Similarly, Cousins (2002) discussed that such relationships will change with the level of trust (confidence) in the supplier versus the level of dependency, whereas Kraljics (1983) discussed that such relationships will depend on the economic balance of power and the availability of alternatives.

Mlecnik (2013) adopted the Slaughter taxonomy in his research on 2nd tier SME suppliers on construction innovation (Table 1). His research found that innovative suppliers (in his case suppliers of main contractors) have a broader vision on innovation and use a wide network in the construction chain. Such suppliers can for instance start with what seems an incremental innovation but through collaboration with other players change this into a step-change innovation (Mlecnik, 2013, p. 109).

The related construct *innovation performance* relates to (1) managing innovation activities (processes) in several innovation phases, and (2) the change in output performance with the product innovation. This performance relates to realising financial firm benefits (e.g. cost price as a % of sales), realizing non-financial firm benefits (e.g. quality, logistics, flexibility, use of material & energy, market share, brand image), and realising non-firm environmental benefits (for stakeholders: suppliers, society, employees). This reasoning is in line with the OECD manual (2008, p. 46 and p. 108) and Cooper (2012).

Table 1. Categories of construction innovation (Mlecnik, 2013, p. 106) based on Slaughter (1998; p. 228-230)

	impacts	source	phase
Increment al	Improvement of current practice; minimal impact of components & systems	Companies with knowledge base (can be all parties in SC)	Any time
modular	Significant improvement in concept; no changes in other components or systems	Companies responsible for a module, or new entrants	Design / selection
Architec- tural	Small improvement on concept; major change on other component or systems	In the field (eg general or specialty contractors)	Design to implementatio n
System	Complementary innovations with new attributes	Companies with no vested interests; coordinators	Conceptual design
radical	Completely new concept; often renders a previous concept obsolete	Outside existing industry; based on R&D; new venture	Technical feasibility

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2.3 Technology and Intellectual Property

The innovation definition mentioned above in $2.3 relates to technology. This research focuses on *technical, technological,* or *technology* innovations. These terms seem to be used somewhat interchangeable to denote the same constructs. Hardie (2011, p. 33) uses the phrase "*technical* innovations with significantly improved functional performance". Afuah (2003), BRANZ (2014) and OECD (2005, 2010b) use the phrase "*technological* innovation". Sexton & Barret for example use the phrase "*technology* innovation".

In general the adjective "*technical*" is defined by the Merriam-Webster dictionary as "the *practical use* of machines or science in industry". The adjective "*technological*" is defined by Merriam-Webster as "relating to technology; resulting from improvements in technical processes that increase productivity of machines". The Merriam-Webster dictionary defines *technology* as "the *use* of science in industry, engineering, etc., to invent useful things or to solve problems, or a machine, piece of equipment or method that is created by technology". Following this reasoning, this would include innovations out of research & development (R&D). In extant research the term "*technology*" furthermore seems to relates to intangible assets *per sé*, hence the focal firm (see Figure 1) can procure know-how, prototypes, and intellectual property rights such as patents, trademarks or software (OECD, 2005). Others (Afuah, 2003) see a broader scope in that it also focuses on innovations that *apply* such intangibles for solving technical problems. Hence the focal firm can also procure (see Figure 1) innovative components or raw materials, or ready-to-sell innovative products. These need not originate from science or from R&D.

This research hence has a slight preference for the phrase "technical innovations". It focuses on procurement of *technical product or process* innovations which the focal firm (via innovation processes) then transforms into a step-change *technical product* innovation for its customers.

A well-established means to protect technical innovations is using patents and other forms of intellectual property such as trade secrets, copyrights, brands, trademarks or database protection (Jell, 2011). Holgesson (2012) found that small or entrepreneurial firms use patents to attract financial means and customers and less for protection. In the New Zealand context Deakins (2013) found that patenting can be a good albeit expensive and imperfect strategy for small innovative firms. In their research Manley (2008) and Hardie (2011) found that a large part of innovative construction small firms (subcontractors and manufacturers) use patents as a means of protecting their technical innovations. (In a survey among innovative small firms Hardie (2011, p. 107) found that 67% of innovations had been patented). Koebel (2008, p. 47) saw patenting relevant for (3rd and 2nd tier) manufacturing and supplying firms but not for innovative home builders as they could not extract value from their suppliers' patents. Brochner (2013) concluded that patents are relevant for small construction service firms in industry-university R&D interactions and for their intellectual property strategies.

A detailed search in the online database of Espacenet[66] and IPONZ revealed approximately 100 New Zealand patent owners (patentees) with national construction patents but *also* with related patents in Europe or the United States. The existence of such European and US patents indicate that these patent owners are prepared to invest (or have invested) in their patents. Furthermore (following e.g. reasoning of Holgersson, 2012) such patent owners see commercial or strategic value in their

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[66] www.espacenet.com; www.iponz.co.nz Preliminary patent search in IPC-class E04, with NZ priorities or Non-NZ priorities. (Data extracted 20 May 2013; updated 28 February 2015). See also Brochner (2013 p. 415, p. 417) for technology classifications (IP classes and US classes). Espace uses classes Y02 and Y04 for 'climate change' patents.

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patented innovations and their related complementary assets (e.g. Burgelman *et al.*, 2009, p. 33). At the same time the two patent databases revealed approximately 100 European or American patent owners with valid construction patents in New Zealand. This then indicates that overseas companies see commercial potential for their patented innovations. A broader patent search indicated 300 New Zealand construction patents filed abroad, and 700 foreign construction patents filed in New Zealand. However part of these patents from this broader search may commercially be less relevant, allowed to lapse or declared invalid. Espacenet indicated that 45 of these (1000) patents were explicitly related to climate change, but probably more will have a (intended) positive environmental impact.

2.4 Networks and collaboration

It must be noted that technology protection is not the only strategy that firms use although the above discussion shows it can be an important one. Firms can also use their upstream networks of suppliers and their downstream networks of customers to create an environmental value proposition (Gambatese, 2011, p. 508; Treacy & Wiersema, 1997; OECD, 2010a). Finally firms can use marketing strategies like early-time-to-market or joint innovation strategies with customers (Fairweather, 2010) to gain a competitive advantage. In all these instances upstream and downstream networking and collaboration capacities are crucial for successful innovations. (e.g. Chesbrough, 2004; Gronum *et al.*, 2012; De Jong, 2005).

In this respect it should be noted that the simplified construction supply chain of Figure 1 actually relates to a dynamic network with potential partners and suppliers, rather than a static one. Additionally Figure 1 only shows a simplified innovation-related network. The total network of a focal firm from distant (loose) end-customers to distant (loose) 4th or 5th tier suppliers) could easily include tens to hundreds of existing and potential network partners (De Jong, 2005).

2.5 New Zealand innovative firms supplying the construction industry – the unit of analysis

This research focuses on innovative firms within the context of the construction industry. In the New Zealand context, the focal firms are relatively small (probably between 6 – 150 employees) and will have entrepreneurial traits. With this size they only partly fit in the New Zealand definition of SMEs (between 1 – 99 employees), but fit well within the European Union definition of SMEs (1-250 employees). Literature uses terms such as small firms, small business, small company or SME. This paper prefers to use the term SME for the focal firms. In these focal firms separated innovation and procurement activities can be discerned. Such firms can be construction firms or firms supplying to construction firms.

In general 92% of construction firms in New Zealand are micro firms and have less than 5 employees (Page, 2013, p. 16). They will work on smaller construction projects. Firms with more than 5 employees are more often involved in bigger or more complex construction projects (Fairweather, 2009). Micro firms will probably not be innovative and if they are, it will be difficult to distinguish procurement from innovation activities. This means that the research focusses on the remaining 8% of firms working in the construction industry.

The research focusses on innovative firms and as stated earlier these firms will have entrepreneurial characteristics. However, only a minority of entrepreneurial firms will have a sustained entrepreneurial orientation *and* also create substantial growth. An international OECD study (2010a, p. 24) found that high-growth enterprises account for 2% to 8% of the total firm population. Keijzers & Bos (2006, p. 28) were somewhat milder in stating that although only 2% of (Dutch) SMEs can be considered innovative front-runners conducting own R&D, another 28% can be seen as innovation adopters. Still

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they found that 60% of SMEs do not have innovation as part of their business. These percentage can probably be lower in the New Zealand construction context. From a quantitative international comparison of entrepreneurship and performance Frederik & Monsen (2011; p. 202) concluded that "current Kiwi *entrepreneurial disequilibrium* of high entrepreneurial activity but lower economic development comes from a singular constellations of events that disfavour *creative destruction* in the Schumpeterian sense" (original italics from the authors). They found that that several macro factors (e.g. lack of adequate governmental interventions) hindered the creation of wealth from entrepreneurial activities. Deakins (2013, p. 3) cited a New Zealand treasury report stating that competitive forces are generally relatively low due to the size of the domestic market (Deakins, ibid).

Following the reasoning of Schumpeter (1942) this would imply low innovation or improvement rates. This however would contradict general opinion that 2nd tier construction firms experience fierce competition on lowest-price contracts (e.g. Bemelmans, 2012; Hinton, 2013). When using 2010 New Zealand Statistics data Deakins concluded that a lack of investment in business R&D hindered adoption of innovations. Rinne & Fairweather (2011, p. 77) concluded that cultural attitudes like the tally-poppy-syndrome, individualism and a focus on lifestyle can limit implementation of innovation.

For defining entrepreneurs the OECD (2010a, p. 33) proposed the following definition: "Entrepreneurs are those persons (business owners) who seek to generate value, through the creation or expansion of economic activity, by identifying and exploiting new products, processes or markets." Shane (2003, as cited in Hardie, 2011, p. 29) also linked entrepreneurship to innovation and defined this as an activity that "involves the discovery, evaluation and exploitation of opportunities to introduce new goods and services as not previously achieved". Entrepreneurship will include characteristics of *pro-active to innovation and risk, competitive aggressiveness, autonomy opportunity recognition, growth ambitions, and organisational learning* (Lumpkin & Dess; 1996), as used in Zortea, 2012, p. 147-148) to which this research adds *a longer term vision on how to achieve this growth* (e.g. based on Burns, 2001).

As argued above, micro firms with less than 6 employees probably have too simplistic structures (Meijaard *et al.*, 2005). This research *à priori* does not exclude firms with more than 150 employees although (a) in the New Zealand context these firms will probably behave as mature and large firms, and (b) the theory of innovation and procurement activities for such firms has been more developed. Although Koebel & Cavell (2006) concluded otherwise it is also expected that such larger firms have a less distinct entrepreneurial and innovative approach (see e.g. Verreynne & Meyer, 2010). This is supported by an OECD report (2010, p. 16) that found that small firms *(AS: probably with less than 100 employees)* are more active than large firms in "breakthrough innovations […] not just as knowledge exploiters but also as knowledge sources".

In conclusion, this research has a unit-of-analysis of innovative firms supplying the construction industry with a minimum of 6 and a maximum of 150 employees.

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3. Gap in extant research

The literature review reveals *a lack of knowledge on New Zealand innovative firms procuring step-change environmental technical innovations with the intent of supplying the construction industry.* In more detail it is unclear:

(1) What interacting procurement activities such firms conduct when they innovate and procure innovations.
(2) How such firms react (deal with) or use external variables in managing these interactions.
(3) How firms deal with the variables of the innovations in managing these interactions.
(4) How such firms use their variables (characteristics) in managing these interactions.
(5) What the procurement performance is as result of these interactions.
(6) What the innovation performance is as a result of these interactions.
(7) What the combined firm performance is as a result of these interactions.

There is a considerable research gap on how procurement activities interact with innovation activities and literature mentions a wide number of (potentially dominant) variables that can affect such activities. Hence the industry practice of the focal firms can also exhibit a variety in such interaction activities. This research will be able to identify firm performance from such interacting activities, but seeing the state of the current extant research, will *not* be able to generate best practices for the industry.

4. Conceptual framework and variables

The conceptual framework for this research (Figure 3) shows two (dependant) constructs of interacting procurement activities (1a) and (internal and external) innovation activities (1b) of the innovative New Zealand firm. It furthermore shows clusters of variables and performance indicators found in extant literature which for the sake of brevity are not discussed in this paper. (These can be found in Figure 3).

The procurement activities and innovation activities will lead to interdependent procurement performance (5a) and innovation performance (5b). The resulting entrepreneurial firm performance (6) is the dependant construct. These constructs are affected by five (extraneous) constructs which describe the firm's macro (2a) and meso (2b) environment, the characteristics of the innovation (3), the characteristics of the owner and the innovative firm (4a), and the firm's strategy and business model (4b). The dotted squares around some constructs indicate possible relationships that will be tested early in the empirical research. These relationships follow reasoning of the holistic and integrated nature of the firm and thinking of the entrepreneur (Hagelaar *et al.*, 2014). However, as this research wants to examine the *interaction* between procurement (1a) and innovation (1b) activities and the effects of several extraneous variables, it *à priori* wants to separate constructs. Furthermore, as this research wants to determine (isolate) value-adding procurement activities, it also wants to distinguish the performance types (5a, 5b, 6).

For classifying the procurement activities (1a) this research analysed the validated procurement process framework of Van Weele (1988, 2010), which is used extensively in industry and for example also used in Pressey *et al.* (2009) in his SME research. It is also used in a recent text book (Johnson *et al.* (2014) for sustainable procurement. For simplicity reasons this research proposes the modified (4 phase) framework as used by Pressey *et al.* (2009) and by Staal & Walhof (2015) which combines the three post-contractual phases into one phase for managing the supplier relations. It must be noted that these phases need not follow a strict-step approach starting with *specifying wants* and

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ending with *managing suppliers*. The procurement phases can be iterative. For example in line with best value procurement thinking, the focal firm could start with selecting a trustworthy supplier and proceed from there (Kashiwagi, 2002).

For classifying the (internal and external) innovation activities (1b) this research analysed several classification methods (Slaughter, 2000, p. 4; Rogers, 1970; Gambatese & Hallowell and Cooper & Kleinschmidt, 2001; p. 40). It proposes the validated framework stage-gate process of Cooper & Kleinschmidt (ibid). In his later work Cooper (2013, p. 3-4) emphasised that his stage-gate process need not only focus on financial estimates but also on qualitative (subjective) measures. Especially with step-change innovations and within SMEs the process phases of both frameworks will most likely not follow a linear or sequential pattern but may be "iterative and messy" (Compare Sexton & Barrett, 2003, p. 630; compare also Bocken *et al.*, 2014).
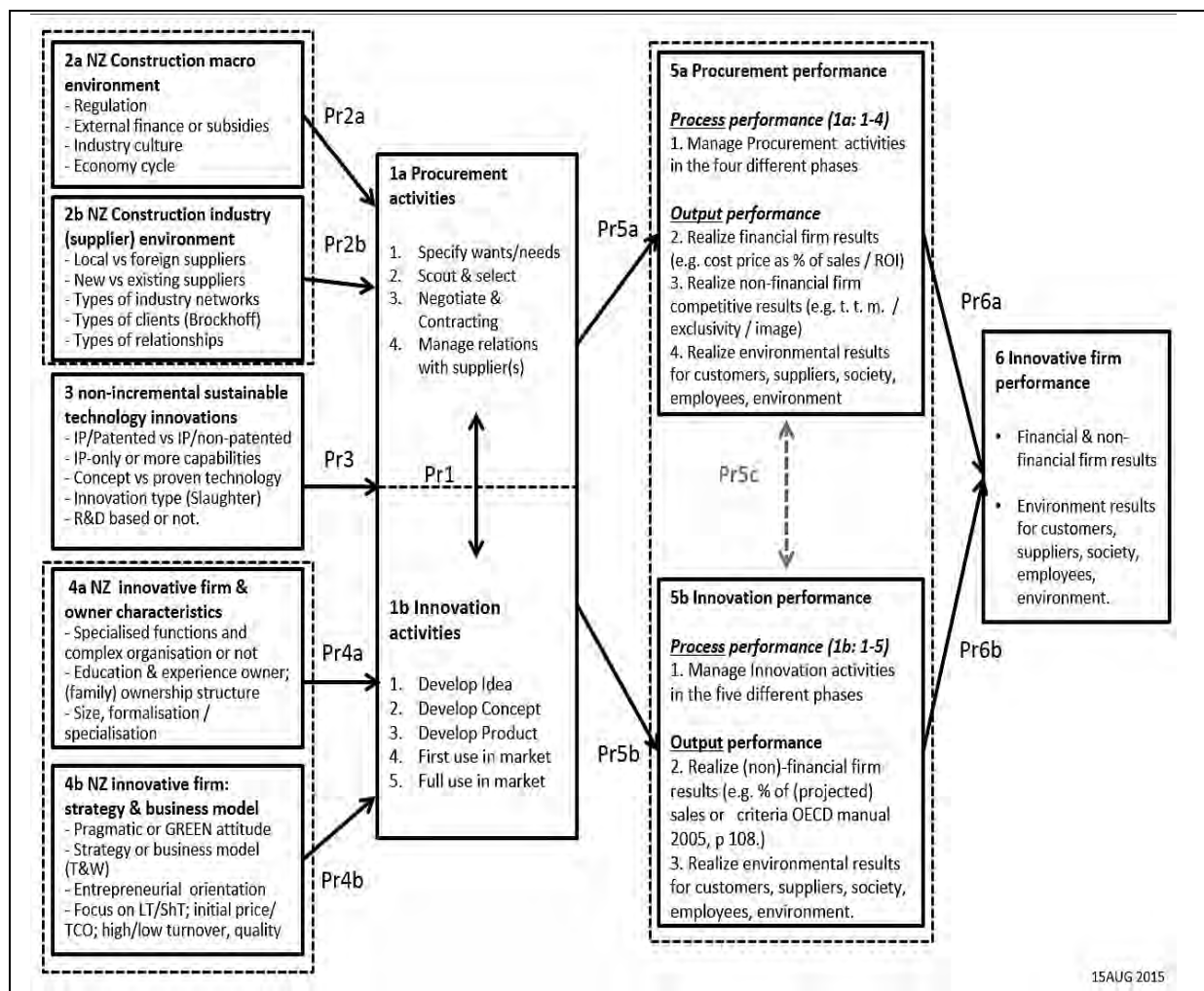

Fig. 16. Conceptual framework, with variables (2a-4b) and performance indicators (5a, 5b, 6) found in literature

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Both frameworks are on a sufficient high level to account for informal and iterating procurement and innovation activities *interacting* within innovative firms (Table 3 below). During the empirical research the phases of both frameworks can be modified or subdivided into several sub-phases. Koen *et al.* (2001) for example developed an innovation process model for the "fuzzy" (i.e. unstructured and with high-uncertainties) ideation phase into five sub-phases. (See also Philips *et al.*, 2006). In Hagelaar *et al.* (2015) the four procurement process phases were subdivided into eight phases for a better apprehension of procurement in small firms. Hence the empirical research starts with high-level process phases and in the empery can adjust accordingly.

Table 3. Interaction matrix on possible innovation activities (*vertical*) & procurement activities (*horizontal*)

	Specify wants or needs	Scout & Select suppliers	Negotiate contracts	Manage supplier relations
Ideation				
Concept				
Develop product				
First use in market				
Full use in market				

The phrase "interaction" in this research is broadly defined as an *interactive* process (that is a set of interactive activities) between procurement and innovation. This *"interaction"* implies collaborative activities and interdependencies for ultimate firm performance and would imply "involvement" which Wynstra (1998, 2004) described as joint *prioritising, mobilising, co-ordinating, and timing.* This PhD research would add the aspect of *joint decision making* as one of the key aspects of management. Similar phrases found in other research include the *"role"* or *"involvement"* of procurement (Johnsen, 2012). Others used *"contribution"* of procurement (e.g. Hartmann, 2007) when relating to the outcome of such involvement. Van Echtelt (2004, p. 10, p. 28) used the phrase *"effective integration"* when discussing multi-functional project teams in large organisations consisting of both procurement and innovation experts. This PhD research prefers the phrase *interaction* (and related phrases like *interactive* or *interacting*) as it à priori implies a more equal process (with regards to activities, interdependencies and output) than the single-sided dependency in phrases such as "involvement" or "contribution".

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5. Research question and objectives of this research

The overarching research question is: *How do innovative New Zealand firms procure environmental step-change technical innovations for the construction industry?* Related research objectives are to:

(1) Determine how procurement activities and innovation activities (i.e. related to environmental step-change technical innovations) interact within the focal firms.

(2) Determine the effects of dominant (internal and external) variables with said interactions.

(3) Determine dominant procurement activities in economic and environmental terms (within the focal firms) when interacting with innovation activities.

(4) Develop and communicate new insights to the firms and other participants involved in this research, and via academic journals or conferences. Provide recommendations on further research.

6. On the research design

Answering the research questions in the previous Section would need exploratory, descriptive and to a limited extent explanatory research (Kumar, 2005) and hence need a qualitative and flexible research design.

"Beauty is in the eye of the beholder" (Hungerford, 1855-1897). In part the researched phenomena are social constructs i.e. subjective and individual perceptions and social interactions (e.g. Zhou *et al.*, 2014, p. 138). Interpreting these will develop subjective meaning and knowledge. This relates both to the perception of dominant variables and the perception of performance.

Variables. The appreciation (see also Vickers, 2010) whether an innovation is indeed a *step-change environmental innovation* will vary with the *position* in the construction supply chain and the *particular interests* of stakeholders. This appreciation will also vary with *time* and with the *geographical place* or *specific industry*. For the stakeholders involved in this research *step-change* will be related to their perception of *non-trivial change.*

Performance. Innovation or procurement activities will lead to value via innovation or procurement performance. This value may relate to economic or environmental performance. Such performance can have *a realised value* or a *potential value* which is not yet or ultimately will not be realised. Similarly, a value may have been realised in other New Zealand industries or in overseas construction industries, but not (yet) within the context of the New Zealand construction industry. This research will comprehend such value from the position of the focal firm, its suppliers, and its customers and other stakeholders, taking into account these aspects of time, industry and geographical position. The perceived added-value within the three performance constructs will hence be measured via qualitative and subjective means (Rose & Manley, 2012, 2014).

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In brief, the research uses the following methods:

(1) Ongoing literature review, exploring interviews and collaboration with researchers on closely related research questions. This will enable the researcher to continually contrast and compare his findings in order to develop his knowledge on the research topic and design.

(2) Two rounds of explorative and descriptive multiple case studies (Eisenhardt, 1989). The first round will use classic case study methodology. The second round could also include elements of action research (Seuring, 2008). This will enable the researcher to generate findings on dominant variables and dominant procurement activities.

(3) Two rounds of research world café sessions (Schiele, 2012). This collaborative focus method (Latham, 2008) is based on the world café of Tan & Brown (2005) It differs from traditional focus group methods[67] as academics and practitioners both have the role of co-researchers and both generate, refine and test knowledge (Schiele, 2014). This will enable the researcher to better appreciate the complexity of the subject matter and to strengthen and validate his findings.

The two rounds of case studies and the two research world café sessions will be conducted in alternating rounds. In line with Eisenhardt (1989) as cited in Manley (2008), it is expected that two rounds totalling 6 - 10 case studies will suffice to obtain sufficient rich data with effective cross comparison. Hoffmann (2011) and Schiele (2014) find that the research world café sessions each need 10 - 15 participants. Depending on the intermediate research outcomes, the 2nd round of case studies could be replaced or supplemented by a survey. Likewise the 2nd round of world café

sessions could be designed differently. The selection of participants and case study companies will be done carefully to fit the research objectives and safeguard the validity (Dubois & Araujo; 2007; Swanborn, 2010).

7.   In conclusion

(1) This research wants to increase knowledge on the role of procurement in innovative New Zealand firms supplying the construction industry when procuring step-change environmental technical innovations. It has established a knowledge gap in extant literature.

(2) To bridge this gap this paper has developed a conceptual framework with dominant variables which will be tested in empirical research.

(3) The empirical research will conduct exploring interviews and collaboration with fellow researchers, and two rounds of case studies alternating with two world research cafés sessions (round-table discussions).

(4) By nature of the research problem, this research is explorative, descriptive and to a limited extend explanatory. The research will be able to identify interacting procurement and innovation activities and resulting firm performance from such activities, but seeing the state of the current extant research and contingencies, will *not* be able to generate best practices for the industry.

(5) The research outcomes will however be beneficial to innovating firms and their business partners, to owners and occupants of buildings, and to the wider environment. Hence it has a scientific and business relevance, and a social and environmental relevance.

The authors welcome feedback and suggestions from the USE 2015 conference.

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[67] This research will use the term *"round-table discussions"* to adhere closer to participants' expectations.

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Medical fitness assessment for work and the role of physicians in occupational health services

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Abstract. Framework Directive on Health and Safety at Work 89/391/EEC is concentrated on three main issues: the risk evaluation, the protective and preventive services and the consultation and participation of workers. Protective and preventive services called occupational health services (OHSs) should be represented by multidisciplinary expert team; medical part of this service is realized by occupational medical service (OMS) providers. One of the crucial medicolegal activity of occupational medical service providers is the certification of medical fitness for work issued by examining physician and based on knowledge of working conditions/health risks at work and on results of occupational medical examinations of workers/ employees. Author analyzed impact of the Czech health care legislation in the field of occupational medical/health services on the working population (at about 5 million people working in more than 74 000 subjects/enterprises). Conclusions of 25116 certificates of medical fitness assessments for work in SMEs during 30 years (1985-2014) were: medically fit (20118; 80.1%), medically fit with the certain condition/medical restriction (4948; 19.7 %) and medically unfit/lost permanently medical fitness (50; 0.2%). The main limitation of medical fitness to work was represented by allergic diseases in history (2471; 9.8%) and impaired vision (795; 3.2%). Other different concrete limitations (for shift work, work at heights, exposure to hand-arm vibrations etc.) were present together in 1672 certificates (6.7%). A keystone of quality performance by an examining physician is the familiarity with specific working conditions and demands of the respective job and the knowledge of the state of health of individual workers. The simplified approach when only health examinations of workers without any other important activities (such as workplace visits, risk assessment, consultations for employers and employees etc.) are realized, may have serious consequences, particularly in incorrect medical fitness assessment for work especially for vulnerable workers (f.e. pregnant women, older workers), which can lead to the negative impact on occupational health and can influence the general perception of working culture in enterprises.

Keywords: occupational health services – workers health - occupational physician - fitness assessment for work

1 Introduction

Framework Directive on Health and Safety at Work 89/391/EEC is concentrated on three main issues: the risk evaluation, the protective and preventive services and the consultation and participation of workers. Protective and preventive services called occupational health services (OHSs) should be represented by multidisciplinary expert team; medical part of this service is realized by occupational medical service (OMS) providers.

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The provider of OMS is required

- to inform employee about the possible influence of factors of working conditions on his/her health, and with knowledge of the development of his/her state of health,
- to inform employers about the possible influence of factors of working conditions on the health of employees,
- to perform periodic monitoring of the workplace conditions,
- to cooperate with the employer, employee, safety and health at work specialist, governmental inspection authorities and trade unions,
- to notify promptly the employer of serious or repeated facts adversely affecting health and safety at work,
- through employer to ensure the measurement/expertise and analysis of the working conditions, working environment including the results of categorization of health risks.

From cost-benefit point of view there is need of standardization of the certification of medical fitness for work based on internationally adopted recommendations and national legislation.

2 Materials/methods

Author analyzed impact of the Czech health care legislation (incl. new reform in 2012) in the field of occupational medical/health services on the working population (at about 5 million people working in more than 74 000 subjects/enterprises). One of the crucial medicolegal activity of OMS providers is the certification of medical fitness for work issued by examining physician and based on knowledge of working conditions, knowledge of health risks of work and on results of occupational medical examinations. Because there are not centralized data about the number of certificates of medical fitness for work, author used for this analysis his own data (25116 certificates) issued for small and medium enterprises (SMEs) since 1985 till 2014 (30 years). The whole database wasn´t in the electronic form so it was necessary to realise final assessment data from paper health records (Fig. 1) The data analysis was focused on the conclusions of the certificates during the analyzed period for different occupations (medically fit, medically fit with the certain condition/medical restriction, medically unfit/lost permanently medical fitness**).**

3 Results

Conclusions of 25116 certificates of medical fitness assessments for work during 30 years (1985-2014) were: medically fit (20118; 80.1%), medically fit with the certain condition/medical restriction (4948; 19.7 %) and medically unfit/lost permanently medical fitness (50; 0.2%). The main limitation of medical fitness to work was represented by allergic diseases in history (2471; 9.8%) and impaired vision (795; 3.2%). Other different concrete limitations (for shift work, work at heights, exposure to hand-arm vibrations etc.) were present together in 1672 certificates (6.7%). (Fig.1)
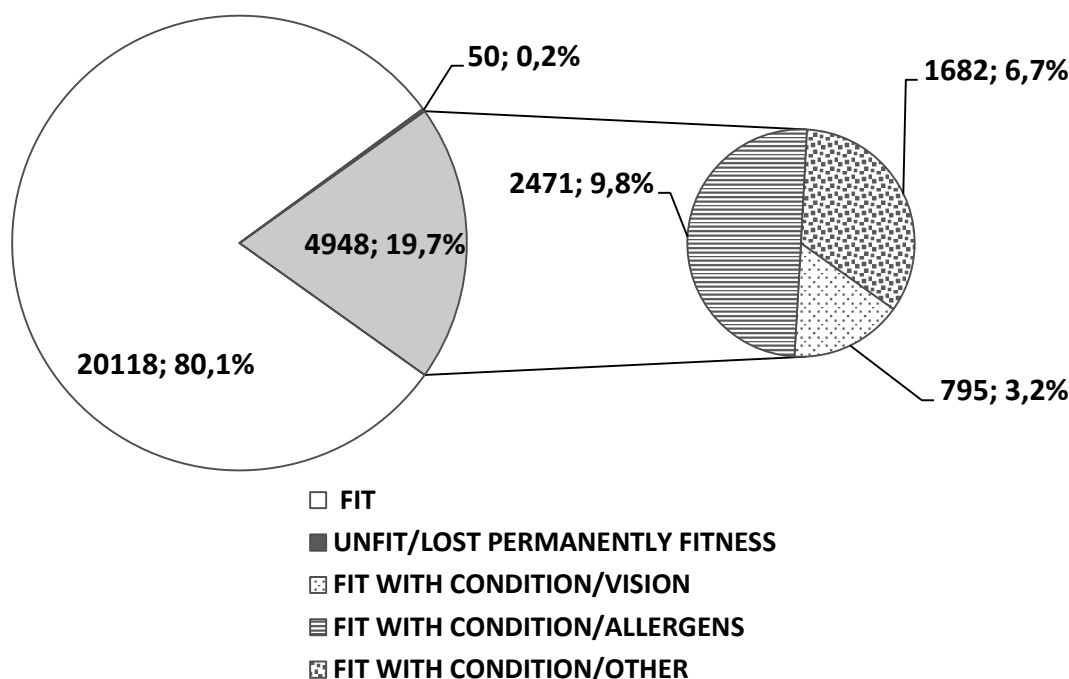
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50; 0,2%

1682; 6,7%

2471; 9,8%

4948; 19,7%

20118; 80,1%

795; 3,2%

☐ **FIT**
■ **UNFIT/LOST PERMANENTLY FITNESS**
▣ **FIT WITH CONDITION/VISION**
▤ **FIT WITH CONDITION/ALLERGENS**
▣ **FIT WITH CONDITION/OTHER**

Fig. 1. Medical fitness assessment results in SMEs 1985 – 2014 (25 116 certificates)

4 Discussion

Occupational medical examinations of individuals (workers and employees) are initial/entry, periodic, extraordinary, output and consequential. A keystone of quality performance by an examining physician is the familiarity with specific working conditions and demands of the respective job and the knowledge of the state of health of individual workers. Correct medical fitness assessment for work is crucial from medical point of view for prevention of negative health impact. Conclusions of certificates of medical fitness assessments for work in SMEs were usually medically fit, but sometimes with certain condition/medical restriction, which is related to the concrete technology, type of production or service and individual health status (mainly allergy in medical history, impaired vision, sometimes impaired hearing, metabolic, cardiovascular or neurological diseases). The medical unfitness for work is relatively rare.

Working conditions are generally assessed by specific health risk assessment (so called System of categorization of work operations) established in the Czech Republic on monitoring 13 harmful factors in the workplace (dusts, chemical substances, noise, vibrations, electromagnetic fields, physical load, working position, thermal exposure, cold exposure, psychical burden, visual burden, biological agents, high air pressure). Special guidelines for assessment of various types of risks are available. The category of the work operation and the most important risk factor determine the frequency and range of periodic medical examination of workers and frequency of periodic measurements of different harmful factors at workplaces. There are 4 risk categories of work operations according to the extent of risk : category 1 is the safest, category 4 is the worst. Some occupations (drivers, railway workers, firemen etc.) have besides the examinations described above special content of preventive occupational medical examinations.

There is sometimes negative health impact of working conditions (occupational injury and occupational disease). An occupational disease (OD) is defined in the Czech Republic as a disease

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caused by the noxious effects of chemical, physical, biological, and other factors, provided that the disease originated under conditions described in the List of Occupational Diseases. The number of officially recognized occupational diseases is at about 1000 per year (1042 in 2013; 23.5 cases per 100.000 employees). One half of them was recognized in enterprises with 500 and more employees (50.1% in 2013), one half of them in smaller enterprises (1-49 employees: 11.6%; 50-99 employees: 7.8%; 100-249 employees: 15.0%; 250-499 employees: 13.8%; data not available: 0.8%) or in self employed persons (0.9%). The prediction of occupational disease in correlation to the risk category based on number of employees in risk categories 1 - 4 is 5/100.000 in risk category 1 (12% of OD), 1/10.000 in risk category 2 (25% of OD), 9/10.000 in risk category 3 (47% of OD) and 9/1000 in risk category 4 (12% od OD) (for 4% of OD are data about risk category not available).

Percentage of workers covered by occupational physicians' surveillance (coverage) is about 72.5 % (13.6 of occupational full-/part- time physicians per 100.000 workers). There are in principle two types of OMS providers in reference to the level of their medical training: (1) occupational physicians specialized in occupational medicine (recognized/certified occupational physicians), and (2) non-specialists in occupational medicine, usually general practitioners (some of them with short training in occupational medicine: company/factory physicians).

5 Conclusions

One of the crucial medicolegal activity of occupational medical service providers is the certification of medical fitness for work issued by examining physician and based on knowledge of working conditions/health risks at work and on results of occupational medical examinations of workers/employees. The simplified approach when only health examinations of workers without any other important activities (such as workplace visits, risk assessment, consultations for employers and employees etc.) are realized, may have serious consequences, particularly in incorrect medical fitness assessment for work especially for vulnerable workers (f.e. pregnant women, older workers), which can lead to the negative impact on occupational health and can influence the general perception of working culture in enterprises.

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Alcohol use among seasonal employees in small businesses at ski resorts

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Abstract: This paper presents results from a survey aimed at shed some light on drinking and alcohol-related problems among seasonal employees in small businesses at ski resorts. In total, 292 employees (49 % men, 51 % women) answered a questionnaire with a response rate of 46 %. The questionnaire covered areas as employment relations, social aspects, psychosocial working conditions, health, alcohol consumption and preventive measures. Results were that there are several significant differences between seasonal employed men and women. The women are younger, have more university education, work more less than full-time and in restaurants or hotels and they live outside the ski resort to a higher degree after the winter season. Concerning psychosocial working conditions, health outcomes, hazardous drinking and preventive work at the workplace there are no significant differences between the groups. Around 75 percent of both seasonal employed men and women have a hazardous drinking behavior, which is significant higher in comparison with Swedish studies of other occupational groups. Regression analyses with hazardous drinking (AUDIT) as an outcome variable showed different patterns for seasonal employed women and men, although there are also similarities between the groups. Multivariate regression analyses showed that particularly social aspects as living with other employees and having friends with heavy drinking were significantly associated with hazardous drinking. It is important to reduce the seasonal employee's alcohol consumption behaviors by influencing attitudes towards hazardous drinking and to change the culture among this group in working life. There is also a need for developing strategies for effective workplace preventive measures and rehabilitation measures for employees with alcohol consumption problems. For small businesses it can be successful to integrate work-related alcohol problems with occupational health and safety issues.

1 Introduction

Alcohol consumption has increased in Sweden and was almost 20% higher in 2009 compared with the mid-1990s. It is reasonable to believe that many problem drinkers could be reached with early interventions in the workplace, and it can be assumed that young seasonal employees in small businesses at ski resorts have a higher than average alcohol consumption. Also, small firms have not been as active as larger ones in occupational health and safety issues, usually because they lack the expertise, time and economic resources (Vinberg, 2006). The general aim of the present study is to shed some light on drinking and alcohol-related problems among seasonal employees in small businesses at ski resorts. More specifically, we address the following research questions: 1) What is the prevalence of hazardous drinking among the studied employees? 2) How are factors as employment relations, social aspects, psychosocial working conditions, preventive work and health outcomes associated with hazardous drinking among the seasonal employees? 3) Are there differences concerning the above mentioned factors related to gender?

Seasonality in tourism can be defined as cyclical variations in tourism demand (Joliffe & Farnsworth, 2003). In tourism employment seasonal jobs, defined as "a non-permanent paid job that will end at a specified time or in the near future, once the seasonal peak has past" are common. In Sweden, the number of temporary employed as for example seasonal employed have increased during the last years and is higher among women (LO, 2014). This type of employment are a risk for stress-related problems and ill-health among employees (De Witte & Näswall, 2003). Seasonal employees at tourism resorts represent a high risk population for using alcohol and other negative life-style behavior (Kelly et al., 2014).

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As a domain for alcohol-problem prevention the workplace holds great promise because the majority of adults who are at risk for alcohol problems are employed (Roman et al., 2002). Elevated or risky alcohol consumption can increase the risk of sickness absence, accidents and work-related injuries among employees, and can have a detrimental effect on the work environment (Hermansson, 2004). Also, research about alcohol in working life is limited although there are research studies indicating positive effects of preventive measures at workplaces (Hermansson, 2002).

Based on the above mentioned conditions and that seasonal employees, particularly among young individuals, will increase in the future it is important with more knowledge about alcohol use among seasonal employed at tourism resorts.

2 Material and method

This study is a part of an alcohol- and drug prevention project with the purpose to reduce alcohol- and drug consumption among seasonal employees in small businesses with fewer than 50 employees (Warne & Vinberg, 2015). It was conducted in the northern part of Sweden where several ski resorts are situated. Key industries in this area are small and medium sized enterprises in the tourism sector. Each year around 2000 individuals are employed in seasonal employments, nearly 60% of them stay temporary in the municipality during the season. In total, 292 employees (49 % men, 51% women) answered a questionnaire with a response rate of 46 %. The questionnaire consisted of 46 questions covering areas as employment relations, social aspects, psychosocial working conditions, health, alcohol consumption and preventive measures.

The Alcohol Identification Test (AUDIT) was used as an outcome variable to measure *hazardous drinking* (Babor, et al, 1989; Bergman & Källmén, 2002). The AUDIT questionnaire consists of 10 questions about alcohol consumption, drinking behaviour and alcohol-related problems, each of which can give a maximum of 4 points (i.e., the total score range is 0-40 points). If the total score exceed 8 points for men and 6 points for women it means a hazardous drinking behaviour (Berman et al., 2012).

The variables for employment relations, social aspects, health and preventive measures were dichotomized in the following way. For *employment relations* questions about scope of work (1=less than full-time, 0=fulltime or more than full-time), organizing work (1=day time, 0=evenings/shift), work hours (1=more than 40 hours, 0=less than 40 hours) and sector (1=restaurant/hotel, 0=other sectors) were used. To measure *social aspects* questions about place of living (1=outside ski resort, 0=ski resort), living with other employees (1=living with other employees, 0=other living conditions) and having friends with a heavy drinking behaviour (1=often, 0=sometimes/never) were used.

Psychosocial working conditions were measured by three questions about work engagement, three questions about feed-back, four questions about justice, three questions about team spirit and four questions about work demands which have been validated in earlier studies (Christensen et al., 2012). For each question area, a summation index were created: work engagement 0-21, feed-back 0-12, justice 0-16, team spirit 0-12 and balanced work demands 0-16. For all indices, high values means positive psychosocial working conditions.

Preventive measures were measured by questions about if the company has an alcohol policy (1=have policy, 0=do not have a policy), alcohol tests (1=yes, 0=no/do not know) and individual employee dialogues (1=yes, two times a year or more, 0=no). To measure *health*, a positive health scale was used consisting of nine questions (Warne et al., 2014). This index was dichotomized with a cut-off at the upper quartile. *Sickness presence* (going to work despite being ill) was dichotomized (1=2 to 5 times or more during the last year, 0=never/one time/no sickness). Age and education were used as background variables.

For descriptive statistical analyses Chi^2-test and t-test were performed for studying differences between men and women. Univariate and multivariate analysis were used to study relations between assumed independent and dependent variables.

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3. Results

In Table 1 descriptive data in show several significant differences between seasonal employed men and women. The women are younger, have more university education, work more often less than full-time and in restaurants or hotels and they live outside the ski resort to a higher degree after the winter season. The seasonal employed men are older and have friends with a heavy drinking behaviour to a higher degree. There are no significant differences between the groups concerning how work is organized, the number of work hours and if they are living with other employees.

Table 2 presents five indices concerning the psychosocial working conditions, three health related measures and three indices related to preventive measures at the workplace. The only significant difference is that seasonal employed men to a higher degree have structured dialogues with their managers. Concerning how women and men experience work engagement, feed-back, justice, team spirit, work demands, health, sickness presence, hazardous drinking, alcohol policy and alcohol tests at the workplace there are no significant differences.

Table 1. Descriptive data of age, education, employment relations and social aspects. P-values from Chi²-test of differences related to gender. Significance level $p<0, 05$.

Variables		Women n=150	Men n=142	
Age		Percent	Percent	p-value
	18-24 years	59.3 (89)	43,0 (61)	0,005
	25-34 years	22,0 (33)	29,6 (42)	0,139
	35-64 years	18,7 (28)	27,4 (39)	0,074
Education				
	University	29,7	19,0	0,034
Employment relations				
	Scope of work (less than full-time)	62,6	41,5	0,000
	Organizing work (evenings/shift)	25,4	31,9	0,231
	Work hours	10,9	14,1	0,410
	Sector (restaurant/hotel)	57,3	36,6	0,001
Social aspects				
	Living outside ski resort	64,9	50,4	0,020
	Living with other employees	37,8	34,1	0,506
	Friends with heavy drinking	34,0	47,8	0,018

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Table 2. Descriptive data concerning psychosocial working conditions, health and preventive measures. Mean values and percent, t-test and Chi²-test, significance level p <0,05.

Question area	Index	Women n=150	Men n=142		
		Mean value	Mean value	t-value	p-value
Psychosocial working conditions					
	Work engagement	17,58	17,44	-0,411	0,681
	Feed-back	9,67	9,83	0,601	0,548
	Justice	11,89	11,91	0,051	0,959
	Team spirit	10,06	10,07	0,040	0,968
	Work demands	6,32	5,90	-1,255	0,211
		Percent	Percent		
Health					
	PHS (Positive Health Scale)	30,2	31,6		0,808
	Sickness presence	31,3	38,0		0,238
	AUDIT +6, +8	75,4	77,5		0,724
Preventive measures					
	Alcohol policy	85,2	83,0		0,599
	Alcohol tests	50,0	45,1		0,399
	Employee dialogues	58,8	72,1		0,017

The regression analyses with hazardous drinking (AUDIT) as an outcome variable showed different patterns for seasonal employed women and men, although there are also similarities between the groups (Table 3). When looking at unadjusted odds ratios (OR) for seasonal employed women there were significant associations between the predictor variables scope of work, living outside the ski resort, living with other employees, high team spirit and hazardous drinking. For men the predictor variables sector (restaurant/hotel), living with other employees, have friends with heavy drinking behaviours and high team spirit were significant correlated to hazardous drinking.

In the next step, multivariate regression analyses with significant predictor variables from the univariate analyses were performed. For women, living with other employees remained significant (OR=19,84). For men, scope of work (OR=0,18), living with other employees (OR=12,71), having friends with heavy drinking (OR=13,07) and high team spirit (OR=1,39) were significant related to hazardous drinking. For the two models, Nagelkerke were high – 0,357 respectively 0,459.

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Table 3. Logistic regression analyzes with the dependent variable hazardous drinking (AUDIT +6, +8) and with employment relations, social aspects, psychosocial working conditions, preventive work and health as independent variables. Odds ratios (OR) and confidence intervals are presented, Significant values in bold style.

Question areal	Index	Unadjusted OR		Adjusted OR	
		Women	Men	Women	Men
Employment relations					
	Scope of work (less than full-time)	**2,51 (1,06–5,95)**	1,33 (0,49–3,60)	1,38 (0,42–4,59)	**0,18 (0,04–0,86)**
	Organizing work (evenings/shift)	1,61 (0,54–4,74)	3,23 (0,87–11,97)		
	Work hours (< 40 hours)	0,76 (0,56–4,35)	1,19 (0,31–4,65)		
	Sector (restaurant/hotel)	1,25 (0,83–1,87)	**6,78 (1,49–30,98)**	1,08 (0,34–3,44)	3,82 (0,55-26,54)
Social aspects					
	Living outside ski resort	**6,02 (2,16–16,80)**	1,08 (0,36–3,23)	1,41 (0,39–5,14)	0,61 (0,12–3,21)
	Living with other employees	**28,88 (3,76–221,86)**	**13,40 (1,71–104,93)**	**19,84 (2,21–178,00)**	**12,71 (1,05–154,29)**
	Friends with heavy drinking	1,94 (0,71–5,31)	**6,50 (1,78–23,78)**	1,16 (0,30–4,45)	**13,07 (1,58–107,88)**
Psychosocial working conditions					
	Work engagement	1,08 (0,90–1,29)	1,12 (0,97–1,28)		
	Feed-back	1,05 (0,86–1,28)	1,20 (098–1,47)		
	Justice	1,09 (0,97–1,22)	1,09 (0,95–1,24)		
	Team spirit	**1,31 (1,07–1,60)**	**1,22 (1,01–1,46)**	1,17 (0,91-1,51)	**1,39 (1,02-1,88)**
	Work demands	0,89 (0,77–1,04)	0,95 (0,78–1,16)		
Preventive work					
	Alcohol policy	1,42 (0,40–5,02)	0,37 (0,08-1,74)		
	Alcohol tests	1,90 (081–4,45)	0,38 (0,15–1,01)		
	Employee dialogues	0,655 (0,281–1,528)	0,69 (0,25–1,87)		
Health					
	PHS (Positive health scale)	0,74 (0,30–1,82)	0,91 (0,32–2,57)		
	Sickness presence	2,83 (0,99–8,13)	0,78 (0,30–2,06)		
Nagelkerke R				0,357	0,459

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4. Discussion and conclusions

The overall purpose with this study was to identify alcohol use among seasonal employed men and women in small businesses at ski resorts and how hazardous drinking were related to employment relations, social aspects, psychosocial working conditions, preventive work and different health outcomes. This is an important research area according to the insufficient knowledge about alcohol-related problems in working life (Hermansson, 2002; Källmén et al., 2013). Research also shows that temporary employment relations as seasonal employments can cause work-related ill-health (Virtanen et al., 2005). Other motives for the study are that alcohol consumption among women today is more similar in comparison with the consumption of men (Hellsing, 2014) and that small enterprises often have limited resources for health and psychosocial working condition improvements (Vinberg, 2006).

The study results point at significant gender-related differences in employment relations, but more equal conditions concerning seasonal employed men's and women's alcohol consumption, their experience of psychosocial working conditions, health and preventive work at the workplace. The fact that around 75 percent of both seasonal employed men and women have a hazardous drinking behavior is significant higher in comparison with national studies of other groups (Bergman & Källmén, 2002). This is in line with other research of seasonal employees in the tourism sector showing a culture with high levels of alcohol consumption (Briggs et al., 2011; Kelly et al., 2014). The results point at the need for work-related preventive measures with the purpose to limit the consumption among seasonal employees.

The regression analyzes shows both differences and similarities between seasonal employed men and women. However, the multivariate analyzes shows some differences: for women only living with other colleagues contribute significantly to hazardous drinking, for men also having friends with a heavy drinking behavior, high team spirit and scope of work contribute significantly to the outcome variable. For both men and women are variables related to social aspects associated with hazardous drinking with high odds ratios. This results might be explained by cultural aspects associated with group norms, social capital and the risk of being excluded if you as a group member have other behaviors (Wenger, 2000; Paecher, 2006). The fact that also an experienced high team spirit is associated with hazardous drinking is in line with the reasoning about exclusion by Paecher (2006).

The differences in employment relations between the two groups are in accordance with other Swedish studies. The amount of temporary employed is higher among women in all age groups, and particularly among the age group 16-24 years (LO, 2014). Research shows that unsecure employment conditions are a risk for stress-related problems and work-related ill-health among employees (De Witte & Näswall, 2003). The found differences in employment relations between women and men point at the need for measures also in this area.

A positive result is that both men and women experience good psychosocial working conditions. However, many employees experience high work demands such as intensive work with demands of quick decisions. High work demands in connection with low job control means a risk for stress-related health problems (Karasek & Theorell, 1990). Results, which is not in accordance with earlier research, are that there are no significant differences between seasonal employed women and men concerning psychosocial working conditions and studied health outcomes. Studies often shows worse outcomes for women when it comes to these factors. Explanations beyond these results can be that the group is selected and that the employees are exposed for working condition factors during shorter periods.

There are some methodological considerations in this study. The sample is limited to a smaller group of Swedish small businesses and we do not analyze causality between assumed predictor and outcome

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variables. The high odds ratios and broad confidence intervals for some variables means that the results must be interpreted with caution. However, the study's strength is that validated survey questions from other research studies in the field have been used.

There are several practical applications of the study results. For preventive reasons it is important to reduce the seasonal employees alcohol consumption behaviors by influencing attitudes towards hazardous drinking. There is also a need for developing strategies for workplace preventive measures and rehabilitation measures for employees with alcohol consumption problems. For small businesses it can be successful to integrate work-related alcohol problems with occupational health and safety issues. Another practical implication is to change the culture among seasonal workers according to their lifestyle and to have rules about their living conditions. The unequal conditions between women and men concerning employment relations and employee dialogues are not acceptable and point at the need for gender-related measures.

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Decision-making process in elderly care: an explorative study

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Abstract. Currently many changes are taking place in the elderly care: care is changing from supply-oriented to demand-driven, problems have to be more serious than previously to get a placement in a nursing home, furthermore the demand for heavier care will increase due to ageing. The aim of this study is to acquire a clear insight in the decision-making process with regard to placement in a nursing home facility.

Semi-structured interviews were held with various stakeholders (n=24) in the three Northern Netherlands provinces aimed at gaining insight into who is involved in the decision-making process, sources that are used by decision-makers to require information and the criteria that are involved in the decision process.

The results of the study show that the following persons are involved in the decision-making process whether or not the client will get intramural care: the client, a possible partner in dialogue with the family, the family, employees of the home care organization, the general practitioner and (if involved with the client) a case manager. The first three mentioned persons are also important contributors to the decision about at which nursing home facility the client will be placed, but the final decision is mostly made by the family. Furthermore the study shows that the internet, especially the website of the nursing home, is an important source of information for the family. A short distance to the current home or to the family have shown to be an important selection criterion. Also positive experience of other people and/or familiarity with the nursing home, domesticity and a positive attitude of the employees to the family and the client might be important criteria.

Nursing home facilities should focus on the family, especially on the children of the client, in their marketing communication. Furthermore they should share positive experience of clients and/or their family on their websites. Furthermore health care organizations have to take care that they are known by persons involved with possible clients, including the client and/or the family and the general practitioner. Finally the nursing home facilities should further distinguish from each other.

1 Introduction

1.1 Background

Within the elderly care a change is taking place from supply-oriented to demand-driven care (Gastel, 2013). This is reinforced by the transition of the elderly care, aimed at stimulating persons to live at home for as long as possible. Problems have to be more serious than before to get a placement in a nursing home, with the consequence that nursing homes are depopulated. Furthermore the demand for heavier care will increase due to ageing (ActiZ, 2013). The consequence of this is that nursing homes were transformed to nursing homes for heavier care (De Klerk, 2011).

1.2 Shared decision making model for clients with psychogeriatric problems

The basic assumption within health care is that the needs of the client are very important. Healthcare professionals are respectful to the client, and clinical decisions are based on the values of the client. Shared decision making is a very important element of this assumption. Making decisions together leads to solutions for healthcare problems that will be approved by the client and the professional. The client should be involved in the decision-making process and nowadays this is frequently also the wish of the client. Nowadays clients have many information sources such as social media. Furthermore, competition within the healthcare increases with the consequence that the number of options also increases.

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With the new policy that elderly have to live at home for as long as possible together with the increase in ageing population, the percentage of clients who suffer from dementia will increase in intramural care. Because of incapacity due to dementia the task of these clients in the decision-making process will be partly or completely taken over by the family (Castle, 2003). Next to the family, also other volunteer caregivers and health care organizations are involved with the client. Ducharme et al. (2012) and Wolfs et al. (2012) both developed a model on the decision-making process for health care for people with psychogeriatric problems, in which not only the client and the professional are included but also the other stakeholders as the family. The model of Ducharme focuses on whether or not the client will move to a nursing home. The model of Wolfs focuses on which care is needed by the patient. So both models describe a part of the decision-making process which takes place before a client moves to a nursing home. On the basis of these two models four stadia can be distinguished (figure 1). During the first stadium the process will be activated: is it necessary that the client moves to a nursing home? During the second stadium the actual situation will be evaluated: how is the situation at the moment? What are the needs of the client? Is it possible that the client stays at home or is it necessary that the client moves to a nursing home? During the next stadium the options are explored: which nursing homes are available? Which are the relevant differences between those nursing homes? During the final stadium the decision will be made: which nursing home is preferred?
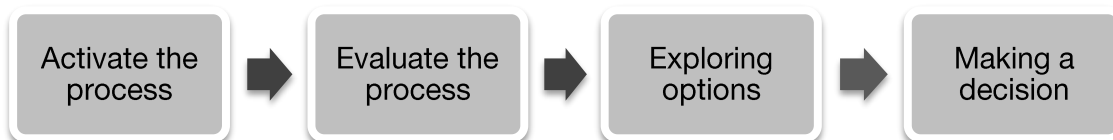

Figure 1. Model decision-making process Ducharme et al. (2012) and Wolfs et al. (2012)

For marketing and communication professionals of the nursing homes it is unclear which role the stakeholders play in the decision-making process, on who to focus and how. The changes in the elderly care have main consequences for the decision-making process of elderly for intramural care. Healthcare organizations should adopt their marketing- and communication policy to stakeholders.

1.3 Aim of this study

Aim of this study was to acquire a clear insight for the marketing and communication professional in the decision-making process with regard to a nursing home facility. In this study we focused on psychogeriatric patients. The influence of different stakeholders will be studied based on the four stadia. Besides this, the sources that were used for information during exploring the options for intramural care (the third stadium) and the criteria that are involved by the final decision (the fourth stadium) will be studied.

2 Methods

2.1 Procedure

Semi-structured interviews were held with various stakeholders in the three Northern Netherlands provinces (Groningen, Friesland and Drenthe) aimed at gaining insight into who is involved in the decision-making process for a nursing home, into sources that are used to require information and into the criteria that play a role in the decision process.

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2.2 Participants

All participants are involved in the decision-making process for a nursing home. In total 24 participants were interviewed: 7 clients and/or their family, 5 general practitioners, 1 general practice-based nurse specialist, 4 consultants of healthcare facilities, 3 employees of a home care facility and 4 case managers.

2.3 Data analysis

First, for each participant the information for each theme were gathered. After that all information of the participants were analyzed for the three themes.

3 Results

3.1 Involved stakeholders

The analysis showed that several stakeholders were involved in the decision-making process. Though there are differences regarding which stadium the stakeholder is involved and the extent the stakeholder is involved.

3.1.1 Client

First, the client is involved. Clients in the first stages of dementia might be able to tell whether or not they want to move to a nursing home and which nursing home they prefer. However, this opinion might be influenced by the opinion of their family. In case of advanced dementia family can tell the wishes of the client as expressed before and can evaluate the nursing home at the point of view of the client. However, in reality taking into account the opinion of the client is frequently not possible, due to changes of the name of the nursing home, the family of the client prefer another nursing home or practical reasons may play an important role.

3.1.2 Partner

Most of the participants indicate that also the partner of the client is involved in the decision about whether or not the client will move to a nursing home and to which nursing home. However, not every client (still) has a partner. If there is a partner and the client himself is not able anymore to take a decision then the decision will be made by the partner. Usually this is done after consultation of the family. The extent of involvement of the partner seems to decrease with increasing age of people.

3.1.3 Family

Most of the participants indicate that the family play an important role in the decision-making process. These are mainly the children of the client, but sometimes also other family members may be involved as a brother, a sister, a nephew or a cousin. Usually the family is involved during the whole process. They play an important role in the decision whether or not the client will move to a nursing home, mostly they are the activators of the process. They observe during their visits that the situation at home is not acceptable anymore. When a home-care facility is involved, they discuss the situation with them. When this facility is not involved usually the family bring up the problem by the general practitioner. Furthermore the family plays an important role in the decision which nursing home is preferred.

3.1.4 Home-care facility

Another regularly mentioned stakeholder is the home-care facility. Several employees are to a greater or lesser degree involved in the decision-making process. Mainly in the beginning of the process they are involved. Whether they are involved in the choice for a nursing home differs between organizations, which depends on the number of different caregivers that are involved. In case of a limited number of different caregivers the involvement increases.

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3.1.5 Case manager

In case of dementia mostly a case manager is involved. A case manager has knowledge of dementia and of dementia care, informs and advises the client and caregivers and coordinates the care. Usually the case manager is involved in the whole process. Furthermore, after the decision is made about to which nursing home the client will move, the case manager will take care of the logistic process.

3.1.6 General practice

Participants gave different answers to the question whether or not a general practitioner or another employee of the general practice was involved in the process. Some general practitioners take care that the client is on the waiting list for a nursing home or point out the client and/or the family to the existence of waiting lists. In the next stadium in which is evaluated whether or not the client will move to a nursing home the general practitioner or another employee of the general practice is frequently involved. In the subsequent stadia their roles seems less than in previous stadia.

4.2 Sources of information

Almost all participants indicate that internet is consulted for information about a nursing home. Mostly this is done by the family, since mostly the client is not able to use internet. Especially the website of the nursing home is visited. Only a few participants reported that comparison sites were consulted, most participants reported that this is not the case. The use of social media is rarely reported. Some participants indicate that flyers were read, other participants indicate flyers were not read or that they don't know whether flyers were read.

4.3   Criteria

4.3.1   Criteria client and/or family
Distance

The majority of the participants indicate that distance to the current address or to the family is a very important criterion for the choice. Especially when there is only one nursing home, as in small cities or villages, distance is a decisive factor. There is no agreement on the question what is more important: the distance to the current address of the client or the distance to address of the family. Furthermore, the presence of a partner may also play a role. One of the participants indicate that it frequently happens that the client still moves to a nursing home close to the family after the partner has passed away.

Although distance is often a decisive factor, for clients/family who have a choice between different nursing homes other criteria play a role as well.

Positive experience others and/or own familiarity
The majority of the participants indicate that positive experience of other people and/or own familiarity with a nursing home due to earlier visits plays a role.

Domesticity
Domesticity is also a regular mentioned criteria.

Positive attitude
Also a positive attitude of the employees to the family is a regular mentioned criteria.

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Other criteria

A few participants mentioned a high quality of care as an important criteria. Other, less mentioned, criteria are small scale, activities, short or no waiting list and having a single room. For family a single room is an important criteria. However, some professionals indicate that not all clients prefer a single room. A client who had a partner his/her whole life may experience loneliness when having a single room.

4.3.2   Criteria professionals
Some professionals indicate that for them the speed of taking action and the helpfulness are important criteria. Especially in case of acute admission these criteria are important.

5 Conclusion and recommendations

5.1 Conclusions
The main findings of this study are:
1. In the decision whether or not the client should be admitted to a nursing home the following stakeholders are involved: the client, a possible partner in dialogue with the family, the family, employees of the home care organization, the general practitioner and (if involved with the client) a case manager. The first three mentioned persons are also important contributors to the decision about at which nursing home facility the client will be placed, but the final decision is mostly made by the family. The remaining stakeholders have a consultative role.
2. Internet, especially the website of the nursing home, is an important source of information.
3. A short distance to the current home or to the family have shown to be an important criterion for the choice. Also positive experience of other people and/or familiarity with the nursing home, domesticity and a positive attitude of the employees to the family might be important criteria. Other, less important criteria are small scale, activities, a short or no waiting list and having a single room.

5.2 Recommendations
A first recommendation is that the marketing-communication of nursing home facilities should focus on the family, especially on the children, of the clients. The demand for heavier care will increase. As shown in this study the family plays an important role in the decision-making process for clients who have heavier care needs.

A second recommendation is to include testimonials on the website of the health facility. Positive experience of others seems to be an important criteria for the choice of a nursing home. Furthermore, the website of the health facility shows to be an important source for information.
Another recommendation is to make local inhabitants familiar with the nursing home, because distance is an important factor. Furthermore, general practitioners should be made familiar with the nursing home. Although general practitioners are limited involved in the decision to which nursing home the client will move, clients appreciate familiarity by the general practitioner with the nursing home.

A final recommendation is that health facilities should further distinguish from each other, considering the change from supply-oriented to demand-driven care.

A limitation of this study is the limited number of interviews. Therefore, further research is desirable.

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Development of a Participatory Workplace Environment Improvement Program to promote primary prevention for work-related stress in Japan

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Abstract. The purpose of this study was two-fold: (1) to discuss the requirements for practical action-oriented tools for reducing stress at work in SMEs and, (2) to develop new "action tools" for primary prevention of job stress in a manner adjusted to SMEs. The reviewed interventions let do meaningful improvements when they built on local good practices for improving the work environment in multiple aspects and used action-oriented tools. We recognized the action toolkit useful for facilitating the wide-ranging improvements.

1 Introduction

Recent experiences in using participatory approach to support workers in improving workplace environment for prevention of job stress were examined clarify these methods can be effectively employed in different settings.

Mental Health Action Checklist (MHACL) widely used as "action tools" in job stress reduction. In particular, it is important to discuss about need for practical improvements of workplace environmental in job stress reduction adjusted to small scale enterprises (SMEs).

The purpose of this study was two-fold: (1) to discuss the requirements for practical action-oriented tools for reducing stress at work in SMEs and, (2) to develop new "action tools" for primary prevention of job stress in a manner adjusted to SMEs.

2 Method

New action tools was developed through three steps. First, we review of related references and collection existing action tools. Then, discuss the practical ways and requirements for action tools in SMEs. Final, we conducted the first pilot workshop for occupational health staff members.

3 Results

The reviewed interventions let do meaningful improvements when they built on local good practices for improving the work environment in multiple aspects and used action-oriented tools.

The emphasis placed on adjusting the action tools to improve workplace environment for SEMs. We developed the new action tools such as photo sheets for good example, action checklist and worksheets for group discussion/ planning and implementing. These action tools utilized for promoting worker involvement, promoting step-by-step progress and facilitating focus on feasible improvements (Fig.1).
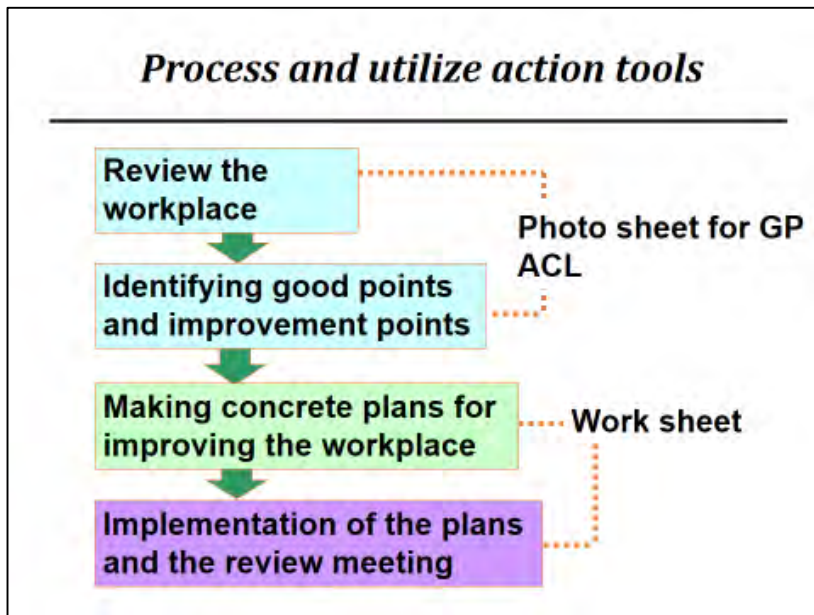
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Fig.1 Process and utilize action tools

4. Discussions

We recognized the action toolkit useful for facilitating the wide-ranging improvements. The simple procedures for serial group work steps facilitate the action-oriented process by both workers and managers as well as the consensus building on immediate improvements. This discussions in small groups also helped workers improve communication among them and with the management. It is suggested to spread participatory workplace improvement activities for reducing work-related stress in SMEs. The action tools which we developed promote this simple procedures.

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