Exploring Knowledge Circulation and Learning for Social Change and Innovation in the Context of Farmer Field Schools, Egypt.

Case Study: *Comparative Study of Male, Female and Mixed Farmer Field Schools of Fayoum District.*

A Research Project Submitted to Van Hall Larenstein University of Applied Sciences In Partial Fulfilment of the Requirements for the Master Degree
Management of Development
Specialization in Rural Development and Communication

By
Hashim Durrani
September 2012

Wageningen
The Netherlands

Table of Contents

LIST OF ABBRIVATIONS

AESA	Agro Eco-System Analysis
AKIS/RD	Agricultural Knowledge and Information Systems for Rural Development
BPH	Brown Plant Hopper
CE	Centre of Excellence
CSPP	Cotton Sector Promotion Program
DC	District Coordinator
FFS	Farmer Field School
FFSs	Farmer Field Schools
FFFSs	Fayoum Farmer Field Schools
FGD	Focus Group Discussion
FLG	Farmer Learner Group
IPM	Integrated Pest Management
IPMP	Integrated Pest Management Project
NFP	Netherland Fellowship Program
VHL	Van Hall Larenstein

ACKNOWLEDGEMENT

I would like to extend special thanks from the core of my heart to Dr. Adnan Koucher, my supervisor, for initiating the constructive idea of conducting research in Fayoum Farmer Field Schools Egypt, which shifted my attention from doing research in home country and I preferred to acquire an internationally different experience. Without the extensive support, guideline and encouragement of my supervisor it would have been impossible to avail this unique opportunity and conduct my thesis successfully.

I wish to extend my profound gratitude to Mr. Shah Nawaz Yousafzai, the Chief Executive of my organisation, for offering his unwavering support and assistance to undertake the master degree programme.

Many thanks to all the lecturers and staff of Van Hall Larenstein, University of Applied Sciences, for their continuous support and constructive criticism at all stages to make me able to face the challenges in my practical field.

I pay high gratitude to the entire project staff in Fayoum for their generosity, cooperation, inputs and supporting me with logistics and transportation which helped me in the field-work throughout data collection process.

I am also thankful to the District Coordinator and his team, facilitators and farmers for contributing their valuable time, vast experience and enormous information during the month of Ramazan (Fasting) and in extremely hot weather.

My high gratitude and thanks, to all my friends either in Netherlands or in Pakistan, who always provided their moral support, valuable suggestions and encouraged me to perform better for successful completion of my course.

I would like to thank the Netherland Government through the Netherland Fellowship Program (NFP) for granting me the scholarship and therefore the opportunity to do my masters course of Management of Development (Specialisation in: Rural Development and Communication) in this esteemed university of the Netherlands.

DEDICATION

My dear Loes witteveen,

This little work is the fruit of that guideline and advice, which I have been receiving continuously from you for the last one year during my course and until the last moment. To express my heartfelt gratitude; I solicit to dedicate it to your name. You have always analysed my work liberally and I hope you will judge these pages in the same spirit.

Hashim
Affectionately yours

PREFACE

This study is about exploring knowledge circulation and learning for social change and innovation among the three types of Farmer Field Schools (male, female and mixed) in Fayoum district, Egypt. The study was conducted in three different villages named as Hussien Agha Silla, Bahnes and Sila. Thirty farmers with 50% male and 50% female were taken as a strategic sampling. Three facilitators (2 male and 1 female) and a District Coordinator, were also interviewed for the data collection. Furthermore, three Focus Group Discussions were conducted with the farmers in each FFS. The study research based on case study which included interviews, FGDs and triangulation as an effective mechanism was also used to gain a holistic view.

The main outcome of this study is that the performance of Facilitator was found unsatisfactory in terms of information and knowledge delivery. The study found that more learning and knowledge circulation is taking place in mixed FFS. There is a growing demand by the farmers for experimental plots[1], study visits to the farms of other districts, nurseries, research centres and food processing factories. Lack of group dynamic activities were found to be the cause of dominant character of the farmers in the FFSs. Family problems in general and house chore activities by female farmers in particular affected their participation.

Despite the fact that agriculture is the major source of income, the study exposes that farmers also generate income by making chees, sweets, liquid soap and biscuits that are learnt in the FFSs. The female farmers in particular generate income by handicrafts, embroidery and suing clothes to support their husbands or families.

The study explains that how Knowledge circulates among member and non-member farmers through variety of ways and why more effective learning is taking place in mixed FFS? Why the village promoter lacked the opportunities for conducting sessions in FFSs? The un-satisfactory performance of facilitators in terms of information and knowledge delivery was also revealed. The study also illustrates the lack of financial resources among farmers and growing demand for experimental plots. Lack of group dynamic activities and factors influencing participation have also been discussed.
At the end, some recommendations have been made to further improve on pace of learning and knowledge circulation among member and non-member farmers for social change and innovation.

[1] *Experimental plot is a piece of land where different experiments are conducted with variety of seeds or with the application of new technologies. Such experiments if successful are applied by the farmers on their lands. The farmers might not take risk on their lands if there are no experimental plots.*

CHAPTER 1 INTRODUCTION & BACKGROUND

1.1 Background

Participatory approach has become one of the most accepted rural intervention methodology for extension services in the world which aims on sustainable rural development. Based on participatory approach, Farmers Field School (FFS) was developed to address the challenges faced by the farmers in the field. The focal attention of the FFS is to enhance competencies of the farmers to make informed decisions on crop management. The increased knowledge and understanding of agro-ecosystem will allow them to reduce pesticides for healthy and better crop production (Pontius et al., 2002).

The initiation of the FFS was founded on the use and abuse of pesticide application. The misuse of pesticides followed a devastating insecticide-induced Brown Plant Hopper (BPH) pest outbreak in rice farming in Indonesia in late 1980s. The BPH previously used to be a minor pest. It later transformed into a major problem through the destruction of its natural enemies and insect predators with the heavy use of pesticide sprays. This massive outbreak was induced by a policy that subsidised pesticides to the amount of US $ 100 million a year in Indonesia. (Fakih, 2003; Braun et al., 2006). Highly toxic pesticides promoted aggressively by private industry and government (Dilts, 2001).

The procedure mentioned earlier, did not fit the local ecological environment and undermined the indigenous knowledge of farmers regarding management of their own farms. The government of Indonesia in collaboration with United Nations Food and Agriculture Organisation (FAO) set up some methods for farmers. The methods were to cope the overwhelming situation by improving technical knowledge, pest management skills and to identify pest related issues by close observation in the field.

Presently the FFS emphasizes capacity building of farmers rather than transfer of technology (van de Fliert et al., 2007). Famers are involved in a self-discovery learning process and other activities in the field to manage the complex agro-ecological dynamics. The FFS as stated by Fakih, (2003) emphasises on learner centred and process oriented approaches, rather than on fixed blueprints driven by targets and indicators. Farmers are also encouraged to experiment with planting times, varieties, cultivation practices, rotations and biological controls to explore their effects on pest populations.

There is still a lack of consensus on the FFSs approach, some consider FFS as non-formal education centres (Friis-Hansen et al., 2012). It builds on the concept that adults learn optimally from real-life experiences through observation, experimentation and analysis under relevant circumstances (van de Fliert et al., 2007). According to David et.al, (2006), however, FFSs can be considered both as an extension tool and a form of adult education. Braun et al., (2006) clarifies the distinction. He illustrates that the

important impacts are those relating to change in practice, knowledge, technology, productivity and profitability, or whether changes in human and social capacity the impacts on human health and the environment are as important.

Farmer Field School has become an interactive, innovative and participatory approach throughout the world. Commencing from Asia it led to many parts of Sub-Saharan Africa, Latin America, the Caribbean, Near East and North Africa, Central and Eastern Europe. Recently it has been introduced in the Middle East and in at least a total of 78 countries (Braun et al., 2006). Farmer-led FFS is now a standard element in most FFS programmes around the world.

Farmer Field School also aims to affect farmers' knowledge (Ali and Sharif, 2012). The acquired knowledge encourages and motivates farmers to have profound observation of the fields and use visual methods analysis. Such methods involve drawing images on a large sheet of paper. They draw crops, pests, natural enemies, diseases and weeds. They also use other visual components of the ecosystem, relevant to understanding and managing crop health (Luther et al., 2005).

A farmer field schools consists of a group of (20-30) farmers from the same or nearby village who meet regularly and share their knowledge and experience. They conduct field visits in groups on a particular topic and after observation get together once again in the FFS to discuss their observations. They draw their findings on a piece of paper for discussion and come up with possible solutions. In this way, each farmer shares his/her experience and local knowledge that develops their confidence. They become more aware and modify their own learning style.

The quality of FFSs can be affected if an insufficient attention is given to the learning processes or there is a lack of appropriate facilitation during the course. The role of a facilitator in the FFSs is of a paramount importance. He/she facilitates the farmers during the entire process steering questions that provides backstopping and guides them through the exercises. Facilitator points out interesting new developments, this goes in line with the statement of Leeuwis and Ban, (2004) who argues, that facilitator is someone who brings people together (networking) and acts as catalyst for, and /or directs, learning and exchange processes. The facilitator does not lecture or teach lessons as that of a school teacher or as an instructor (Ali and Sharif, 2012). The facilitator rather ensures the participation and involvement of each farmer by providing them equal opportunities. This way they better communicate with others and raise their spirit to share knowledge in groups. In FFS, field is the teacher, and it provides most of the training materials like plants, pests and real problems (Gallagher, 2003).

Farmer field school is a school without walls and does not have a particular set of curricula. The curricula of FFS are the natural cycle of its subject that might be crop, animal or soil. The cycle may vary from "seed to seed" or "egg to egg". The lessons learnt during the field can be applied directly during transplanting the crop.

1.2 The Principles of the FFS approach

FFS approach is based on the following four principles

Grow a healthy crop: Healthy and dynamic crops can resist better against pest and insect damage

Protect natural enemies/predators: Natural enemies live naturally in the agro- eco-system in the field. They are productive and enemies to those insect pests which damage the crop. They should be carefully managed so that the increased number of natural enemies becomes more effective.

Regular field observation and analysis: Farmers regularly visit the field in groups in FFS where they closely observe the agro-ecosystem including weather, pest disease, natural enemies/predators, soil, water and plant growth. Later they analyse, identify the problem and come up with informed decisions.

Farmers are IPM experts: To avoid the unnecessary use of pesticides it is imperative for the farmers to have confidence in their own local knowledge and ability and become experts in crop management (David, 2006).

Ranging from the rice Integrated Pest Management the FFS approach is also used now for different kinds of crops, natural resource management (soil fertility, water management), livestock, forestry and social issues (food security, nutrition, health, HIV/AIDS and literacy training.

Farmer Field School approach is spreading over the globe and being adapted in enormous counties of the world with in no time. The concerns however, have been raised by different implementing organisations and critics regarding the relative cost of FFS approach as compare to the extension approach. The element of time-consuming has been taken into account and the measurement of impacts achieved by the FFS (Braun et al., 2006; van de Fliert et al., 2007). According to Henk Van den Berg and Jiggins, (2007) the FFS is not an extension method. Extension services, as their name implies, set out to deliver, and their effects are measurable by the level of adoption of specific practices, information, or technologies. The Farmer Field Schools, conversely, sets out to educate local people and enhance their capability to take informed decisions.

Farmer Field School is not a universal remedy for rural development. It is also not a substitute of profit making or technology-centred approach organisations such as credit making cooperatives, extension services, out-growers, farming training centres or mass media. They share their local knowledge and experience with each other in a participatory manner which leads them to social and discovery learning process. They

come up with a new change and innovation through application of knowledge circulation and communication.

1.3 Farmer Field School in Egypt

Initially the concept of FFS was introduced to Egypt by two Egyptian-German projects, implementing FFS Integrated Pest Management Project (IPMP) and the Cotton Sector Promotion Program (CSPP) in 1996 & 1997. The projects aimed on cucumber, tomato, citrus, mango and cotton. The term FFS was then replaced with a new term Farmer Learner Group (FLG) as the farmers expressed their concerns with the term “School” (van de Pol, 2003). Furthermore, there were a number of changes in the real concept of FFS that took place during the development of FLG. The changes recognised were decreased number of participating farmers, reduced length and number of sessions. It was observed that facilitators lecture too much, use little interactive dialogue and systematic farmer experimentation. It is required to strengthen farmers’ management and networking skills.

The FFS in Egypt was adopted with several modifications due to its unique cultural and societal features of the local farming communities and extension organisations. Such an adoption posed a number of challenges to the original concept of FFS in Egyptian context (van de Pol and Awad, 2002).

Farmer Field School approach was introduced in Fayoum district by a horticulture project in 1998. Use of the FFS approach became mature under the Integrated Pest Management (IPM) project from 2001 to 2007. As a result of the successful implementation of this approach in Fayoum, a need was felt to utilize the FFS as an innovative, inexpensive and effective instrument for more broadly defined rural development in Egypt. The main objective of the horticulture project was to improve the livelihood of the rural population in Fayoum Governorate[2]. (Project inception report, 2008).

Although the FFSs in Fayoum differ in a number of ways from the “original FFS concept” they are certainly “real” FFSs. They follow the main FFS principle of educating farmers to become better decision-makers (van de Pol, 2003).

Considering the cultural values and societal norm efforts has been made to approach female farmers in Fayoum, so that they could also become a part of the participatory process. It is for the same reason that separate FFSs were developed for females to contribute to FFSs. The female farmers also cultivate a variety of crops in the same regions such as medicinal, aromatic crops, tomato and share other issues important to them during FFS sessions.

Apart from that, there are also male and mixed-FFSs in Fayoum. These FFSs will further accelerate the process in the Egyptian cultural context and thus allow them to perform

[2] *Governorate is an anlternative term used for Province in Egyptian context. Currently, there are 29 Governorates in Egypt.*

better in a different setup. It is rather an extended approach to engage men and women separately in the culturally different environment as well as collectively in mixed FFSs. Such an approach allows both men and women to share joint interests. Thus, it will build a strong relationship for collective processes and among men and women in FFS. Questioning & discussions, sharing information openly, achieving greater mutual and consensual understanding can potentially lead to transformative learning (Taylor, 2007).

Presently there is an on-going FFS project which commenced on October 2010 and will continue until October 2015. The project is implemented by a consortium of Dutch and Egyptian universities with the collaboration of the Ministry of Agriculture and Land Reclamation (MALR) in Egypt. The aim of the project through establishing the FFS Centre of Excellence in Fayoum (FFS-CE) is to transfer the FFS model of Fayoum to other governorates in Egypt.

1.4 Problem Statement

The, FFS-CE project includes a broad range of actions at different scale to promote mutual learning, generate knowledge and information. It also aims at improving the Agricultural Knowledge and Information Systems for Rural Development (AKIS/RD). Knowledge is an important factor for social learning and innovation. It plays a key role for increased production and healthy crops.

The generation and diffusion of knowledge on sustainable farming practices has long been a problem in promoting rural development and sustainable livelihood in Egypt. According to the literature and project evaluation report untrained facilitators are the decisive factors for lack of knowledge circulation and innovation processes in Fayoum FFSs. Previously, (before the current project), no proper attention was paid to the role of facilitators in brokering knowledge and facilitating learning processes. In FFSs, moreover, the rate of knowledge circulation and social learning for innovation among different farmers' group (male, female and mixed) have not yet been studied. The researcher will, therefore, critically analyse and explore the application of knowledge circulation and social learning that how learning for social change and innovation is taking place in the three different types of male, female and mixed FFSs of Fayoum district.

In addition, this research will aim to explore the operationalization of learning processes in the FFSs. The research also aims to identify the factors that are influencing knowledge circulation and learning processes for social change and innovation. The research will also focus on the role of facilitators to explore the ways they adopted for facilitating farmers.

1.5 The research objective

- To explore how knowledge circulation and learning for social change and innovation is happening in the three different types of Farmers Field Schools of Fayoum district.

- To identify the factors that influence knowledge circulation, learning, and innovation in Fayoum FFSs.

1.6 Research questions: (Main question & Sub questions)

1. How knowledge circulation and learning for social change and innovation is occurring in the male, female and mixed Farmer Field Schools of Fayoum district?

- How is the role of facilitators for pace of learning and change defined, conceptualized and implemented in all the three types of FFS?

- What challenges are encountered by the facilitators in organising the farmers in effective working subgroups for mutual learning and knowledge sharing?

- What kind of communication strategies have been adopted in FFSs to improve farmers' knowledge and learning for social change and to enhance their learning competencies for innovation?

2. What barriers do farmers encounter in learning, knowledge circulation in the FFS to carry out successful field experimentation and innovation, and how do they deal with these barriers?

- What are the possible limitations for farmers in using the "learning field" to carry out field experimentation?

- What is the perception and attitude of the group affecting social learning and innovation in the FFSs?

- How do the farmers deal with every day issues affecting the group learning?

1.7 Operationalization of Concepts

The following concepts have been unravelled and will be understood in the same sense in the context of this study

Knowledge circulation

It is a process that involves individuals or multiple parties through which knowledge 'flows'. The knowledge processes involves knowledge development, sharing, utilisation and evaluation. Knowledge circulation, for this study, would mean that how farmers share their experience, local knowledge and the knowledge gained from other sources with other member and non-members of FFSs. In this particular context, knowledge circulation is an elementary process which guarantees a successful breakthrough in agricultural innovation.

Learning

Learning in the research study will mean the process of creating a positive change towards improving the livelihood and farming system through Agro-ecosystem Analysis (AESA), observation, discussion on crop related issues and problems. It includes additionally appropriate information and increasing knowledge, improving skills, learning new methods and techniques through the mistakes as well as getting feedback from other farmers. Such a streamline process of learning creates a sense of ownership and enhances farmers' competencies for better production and healthy crop.

Social Learning

It is a learning process which takes place between individuals and groups, in this study social learning refers to the learning process between farmers and facilitator and among farmers themselves. The farmers with different backgrounds come up with conflicting interest, differences in perception and beliefs during discussion. The facilitator steers the discussion with probing questions, develops mutual trust and come up with more logical end. Social learning in this process is collective action where farmers work together make coordinated efforts and are engaged in coherent practices.

Innovation

It is commonly defined as the successful exploitation of creative ideas. According to Hubert et al. (2005), innovation studies increasingly underline that innovation has a systemic nature; it is the outcome of collective action and depends on the social structure wherein innovators operate.

For the purpose of this research project, however, 'innovation' is understood to be an outcome of collective and integrated efforts, sharing of novel ideas, encouraging indigenous knowledge and giving value to the concrete experience of the farmers. They learn from each other and come up with innovative ideas within the local community for social change in their specific socio-technical structure. Such innovation also depends upon the specific needs and requirements of the farmers and the regional community.

Social change

Social change in this the study is defined as, the change in behaviour and attitude of farmers as the learning outcome of sessions in the FFS. They are more open to apply new technologies and techniques for field experiments by using the acquired information and knowledge.

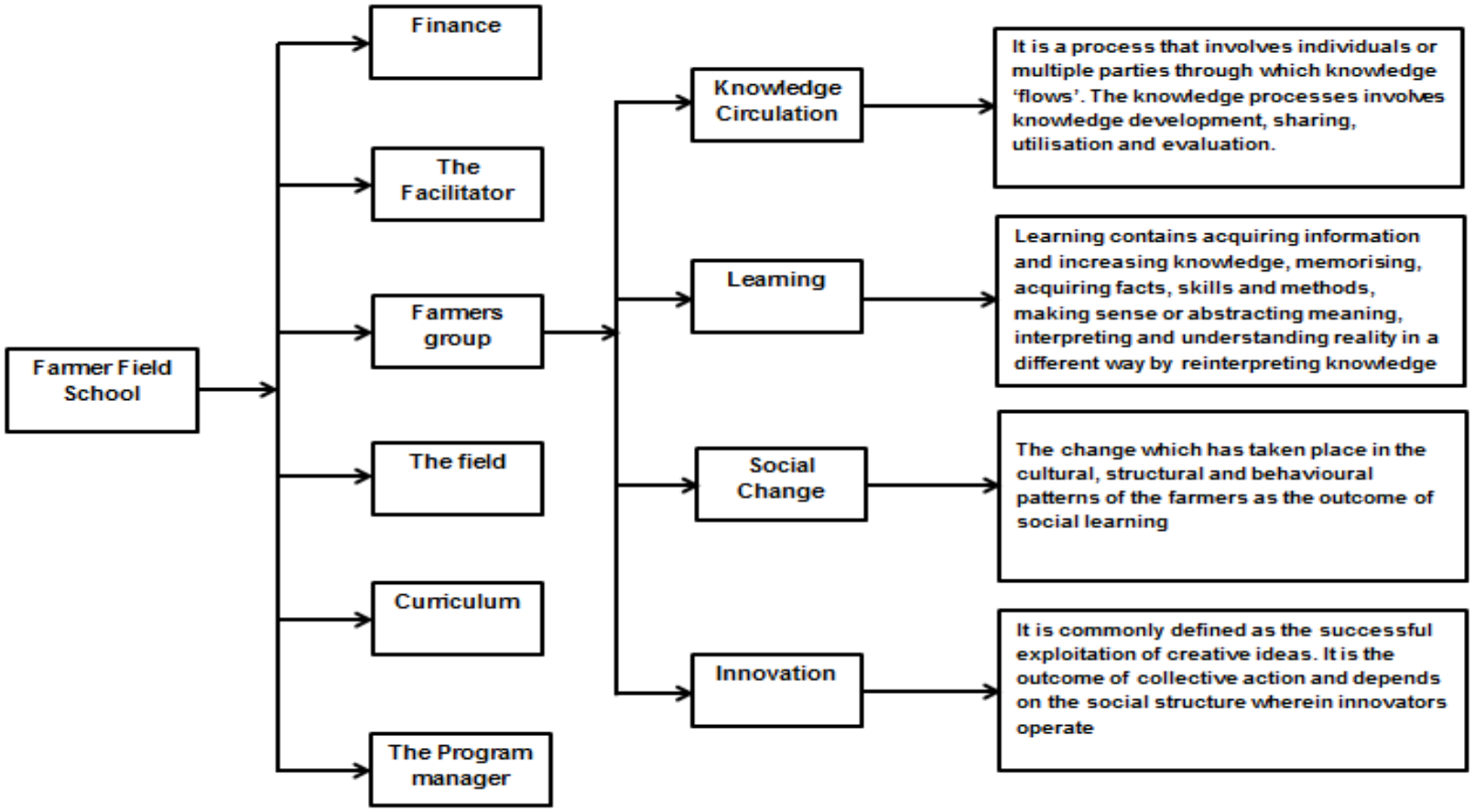


Figure 1.1 ***Conceptual Framework for Knowledge Circulation and Learning***
Source: ***Author, 2012***

CHAPTER 2 LITERATURE REVIEW AND THEORETICAL CONCEPTS

2.1 Knowledge Circulation

This chapter will unravel the concept of 'knowledge circulation' especially in the agricultural context of Farmer Field School. This concept has even become more debated currently; however, an in-depth discussion will give an insight for understanding controversies in an intervention context.

Knowledge circulation, for this study, would mean that how farmers share their experience, local knowledge and the knowledge gained from other sources with other members and non-members of FFSs. In this particular context, knowledge circulation is an elementary process which guarantees a successful breakthrough in agricultural innovation.

Knowledge is in fact the basic source to understand things and give particular meaning to them. Thus every one gives different meaning and interpretation to what they see, listen and observe. Knowledge is not only about the bio-physical world (e.g. Weather), it is also about the social world, where people give different interpretation based on their social knowledge. Looking at the dress, body language and facial expression, one can easily impute meaning to a person e.g. the local leader of a community is well recognised the way he is dressed up. Jacobson (1996) suggests that knowledge is something that exists in interactions among individuals and the context in which it takes place.

According to Leewuis and Ban, (2004), in everyday language, perceptions and beliefs relating to the functioning of the biophysical and social world, including also the causal processes involved, are usually referred to as 'Knowledge'. Knowledge concerns the way people understand the world, the ways in which they interpret and apply meaning to their experiences (Arce and Long, 1992). Whereas, Blaikie et al. (1997) describes that Knowledge is not about the discovery of some final objective 'truth' but about the grasping of subjective culturally-conditioned products emerging from complex and on-going processes. Such processes involve selection, rejection, creation, development and transformation of information. Knowledge is not homogeneous within a local population but varies according to the respondent, whose knowledge may be inflected by gender, class, age, occupation and social status (Blaikie et al., 1997).

Explicit & Tacit knowledge

Explicit as stated by Giddens (1984) 'discursive knowledge', refers to the knowledge which can be easily defined or explained. It is the knowledge that we are aware of, can easily be captured and stored in books, literature, in the library or used in the academic institutions. Such knowledge can later on be published and converted into information for public use. It also covers the knowledge of scientists, researchers and experts who put them in written text. It can also be referred to as formal and proven knowledge. In

the agricultural world this might be, for example, the knowledge that farmers are presented with on a course on pest management (Van Woerkum et al. 1999:3, cited in Leewuis and Ban, 2004, P. 97). Particularly such knowledge is passed by the experts, extension workers or facilitators in the field to the farmers. Explicit knowledge according to Leewuis and Ban, (2004, P.97) can be seen as only the tip of an ice berg.

Tacit knowledge

Tacit knowledge is something we know and apply, but find it difficult to talk about. It is not as clearly defined as explicit knowledge. It is difficult to draw lines between indigenous knowledge, local knowledge, popular knowledge, folk knowledge, and so on (Sillitoe, 1998). Tacit or 'Indigenous knowledge' has become a term which is used in the widest community of the contemporary rural development discourse.

However, most people find it difficult to explain. It is a kind of knowledge which is embedded within the society for a long span of time and passed on from ancestors to their generations. It is the knowledge which is already existing and originated naturally within the region. The farmers experience and exercise this knowledge practically in the field as part of their routine work. They, with this knowledge have their 'hands on' in the field, along with feelings and emotions.

Farmers do possess a lot of practical knowledge relevant to the crop and field, but in terms of explanation they find it difficult to put them in grammatically correct sentences. However, their local knowledge is embedded in their skills, routine work and physical memory. For example, farmers based on their practical experience know the best time to sow a particular crop, but they are not always able to explain the underlying principles and laws of nature for that particular action.

In principle farmers' local knowledge (Barnes, 1974), others speak of 'tacit knowledge' (Nonaka & Takeuchi, 1995 cited in Cess, 2004. P.97) or according to (Nonaka & Takeuchi, 1995 cited in Leewuis and Ban, 2004. P.97) or Van Woerkum et al., 1999, Scott, in the same citation states that, 'implicit knowledge' can be made partly if not fully transferable to others. A series of other terms has been used to describe these two systems as either 'western' or 'indigenous', 'formal' or 'informal', 'insider' or 'outsider' (Okali et al., 1994). Such practical knowledge can be made available in the text if only experienced and knowledgeable persons come up with cooperation for the task which requires considerable efforts and energy.

Furthermore, the local or indigenous knowledge of farmers can be explicitly described. For example, to attend farmers' in-depth group discussion, steer the discussion with questions that make an entry point for debate, observe their current practices in field, concentrate on the changes they make over time, experiencing their cultural norms and religious rituals etc.

Knowledge circulation can also be greatly influenced by different factors present in the society or community. For example, people using their particular knowledge may have different opinion and perception regarding one particular thing. They define and

interpret the same situation using different knowledge and give their own interpretation with entirely different arguments. According to Leewuis and Ban, (2004) the social influence underlying these different realities can originate from (a) peoples wider social back ground and history; (b) concrete political contexts and group interests; (c) individual interests in specific interaction settings.

Among other social factors culture is also one of the factors that influence the knowledge of people having different cultural history and background. In terms of agriculture many African farmers choose agricultural practices on the basis of their wish to appease spirits and maintain relationships with their ancestors (Sadomba, 1999, cited in Leewuis and Ban, 2004).

The local nature of Knowledge

The process of innovation continues and can add more value to the process if the explicit knowledge of scientists and tacit knowledge of farmers are merged together for the best ingredients production. They can enrich each other by sharing mutual knowledge. But such enriching process is massively disturbed by the fact that scientists sometimes tend to perceive their knowledge as universal, fitting in every context, and thus tending their knowledge superior to that of the local knowledge of the farmers. The scientists in such situation consider themselves expert while considering farmers as laymen. This issue has generated a lot of debate on the usefulness quality of validity of scientific versus local or indigenous knowledge in farming (Richard, 1985; Van der Ploeg, 1987; Rolling, 1988, Marglin, 1991; Warren, 1991 cited in Leewuis and Ban, 2004. P.106).

On the other hand some authors have gone to the extent and believe that science produces less relevant knowledge and they deem local knowledge superior to that of scientific knowledge. However, the important thing to realise is that all this generation of new knowledge is contextual bound to a particular environment and geographical location. Even the scientists cannot produce the same experimental conditions which are likely to be different outside the research facility and thus the knowledge they generate cannot be treated as universally valid outside of the research station. In spirit this means that scientific knowledge is also local knowledge which is created in a specific technical, cultural, spatial, climatic and socio-political and geographical context, which may not coincide outside the research station.

Nevertheless, it is not wise to say that local farmers possess all sorts of knowledge regarding agricultural development and that is circulated among farmers. Local farmers need to meet day to day challenges occurring in the agricultural sector as there is a rapid change in the context e.g. population growth, migration, climate change, industrialisation, degradation, globalisation and ecological changes, etc. Along with their strengths there are some weaknesses in local farming system which needs to be addressed. Local farming system can further be enhanced, renewed and improved if it is supplemented with scientific knowledge. It has been demonstrated that conventional (positivist and reductionist) laboratory research can at times provide extremely valuable

insights into solving farmers' problems (e.g. Van Schoubroeck, 1999; Lee, 2002, cited in Leewuis and Ban, 2004, p. 107)

Farmers in the field can make better use of their local knowledge already available by sharing and circulating among other farmers and thereby increase the number of successful innovations. Knowledge circulation will only work and continue to work if all farmers have a strategic interest in the process. Also, scientist, researchers and institutes play an important role, to generate opportunities for the local and smallholder famers to develop new knowledge for innovation. The process of Knowledge circulation, however, can be supplemented through a scientific research to the work. Indeed, knowledge circulation needs constant inspiration from farmers.

Knowledge circulation in the field can be focused or extended. Knowledge articulation between farmers and scientists, if encouraged, can be more responsive to the demand-driven problems

Knowledge circulation is necessary to guarantee a successful breakthrough in agricultural innovation process. It is a process that involves multiple parties through which knowledge 'flows'. The knowledge processes involves knowledge development, sharing, utilisation and evaluation. An improved knowledge circulation will increase the influence on the innovation process in a positive way. Knowledge circulation not only increases the use of knowledge but also contributes to a more intensive collaboration between the one develops knowledge and the one that applies the knowledge, thereby accelerating the knowledge uptake (Van, 2003).
The process of Knowledge circulation can better be understood by the following figure.

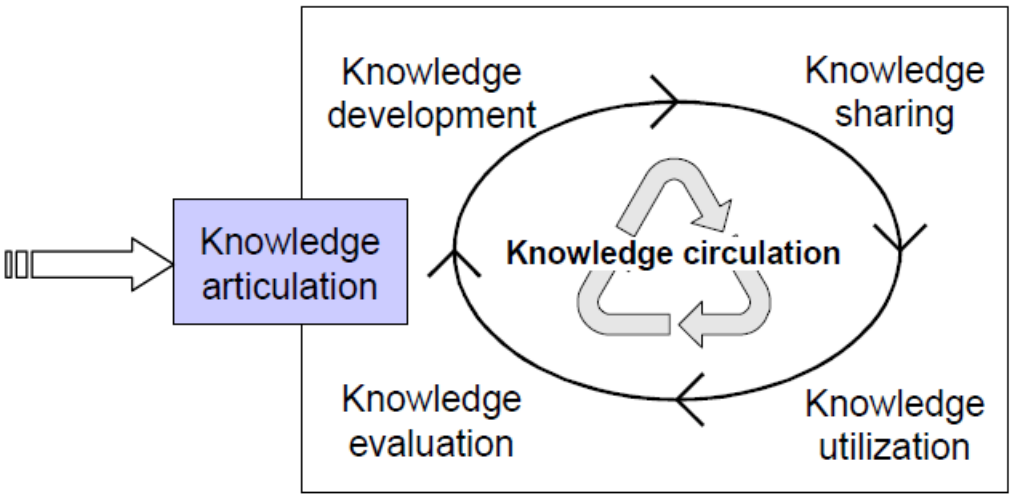


Figure 2.1 *The process of knowledge circulation*
Source: *(Harry van Vliet, p.10.2003)*

All five processes are important in innovating the knowledge infrastructure through the process of knowledge circulation (Hylton, 2000; Nooteboom, 2002 cited in Harry van Vliet, 2003).

2.2 Learning

What learning is, and how human beings learn, are difficult questions to answer. There are a number of theories that define certain learning processes; however, no unified view can be claimed regarding these theories. Particularly in 1960s and 1970s learning was defined as a change in behaviour (Muro and Jeffrey, 2008), and behaviour was seen as the observable, measurable indicator for learning, encompassing all the responses, reactions or movements by an organism, person or animal in any situation (Hergenhahn and Olson 2001, cited in Muro and Jeffrey, 2008).

Learning in this research study will mean the process of creating a positive change towards improving the livelihood and farming system through Agro-ecosystem Analysis[3] (AESA), observation, discussion on crop related issues and problems. Furthermore, it includes appropriate information and increasing knowledge, improving skills, learning new methods and techniques through the mistakes, and getting feedback from other farmers.

Learning is a vital part of our daily life. We perceive and conceptualize differently the situation based on our knowledge and the feedback we get for our acts. Thus, such kind of learning is quite distinct than that of we learn from educational activities in academic institutions. This goes in line with Jarvis (1987) who refers it as an adult education.

In rural settings learning takes place when farmers communicate, ask, listen and know each other's opinion. They share their knowledge, construct a co-ordinated cognition and organise experiment on the basis of their shared experience. Such a streamline process will create a sense of ownership and enhance their competencies for better production and healthy crops.

Learning here should not be perceived as that in the situation of student and teacher, where teacher fosters and the students cram or follow their direction on a fixed line of curriculum. In rural settings an adult learning also refers to the mistakes the farmer commits from the experiments on his farm and then formulates a strategy to refrain from the same mistakes next time. Thus, farmers in this case learn through their mistakes which can also be referred as 'Trial and error'. However, objective learning in individual capacity is always difficult to achieve. It can be more productive and innovative if farmers share their knowledge and discuss the issues they observe in the farms. Such collective and social learning will open new ways for change based on the communication process. In terms of rural development and innovation the farmers in particular as well as other adults who are involved in livelihood activities are the adult

[3] *Agro-ecosystem Analysis in the context of FFS means that farmers make observation on the crops and other aspects of the Agro-ecosystem including disease and pest infestation, the weather, weeds, water and the soil. They make drawings and present infront of other groups to analyse their findings.*

learners. These adults, in the rural settings are confronted in their daily life with changing circumstances and problems that require innovation.

2.3 Kolb's Model for Adult Experiential Learning

Kolb's Model, (1984) of 'experiential learning' is much recognised and widely used for organising communication in rural development process. The model explains the learning process that how successful learning happens. It identifies that the conclusion drawn by an individual on the basis of his own experience is worthwhile rather than the insights formulated by others on the basis of their experience that learners cannot identify with (Leewuis and Ban, 2004). Such kind of learning is also referred to as 'Learning by doing' or 'Discovery learning'.

Kolb describes in his model that how experiential learning occurs. He indicates that there is a continuous interaction between thinking and action and concrete action results new experiences which further enhance the innovation process. Kolb's model has also been criticized by different authors and critics (Leewuis and Ban, 2004, 1993:287 and Phil Race, 2001). However, Kolb's idea that different people tend to learn in different ways is valuable, as it teaches us that different people may need different forms of support in reaching similar conclusions (Leewuis and Ban, 2004, p.150). For example, in the case of farmers some are found quite enthusiastic and willing to share their problems and experiences with other farmers in a group to get their feedback and learn from their valuable experiences, conversely, there are some other farmers who are more inclined to individual or bi-lateral learning and don't involve other farmers in the learning process. In line with the statement of Leewuis and Ban, (2004) in some cases it rather seems as cooperative versus a competitive issue at stake. The figure 2.2 will further explain Kolb's Model of experiential learning process.

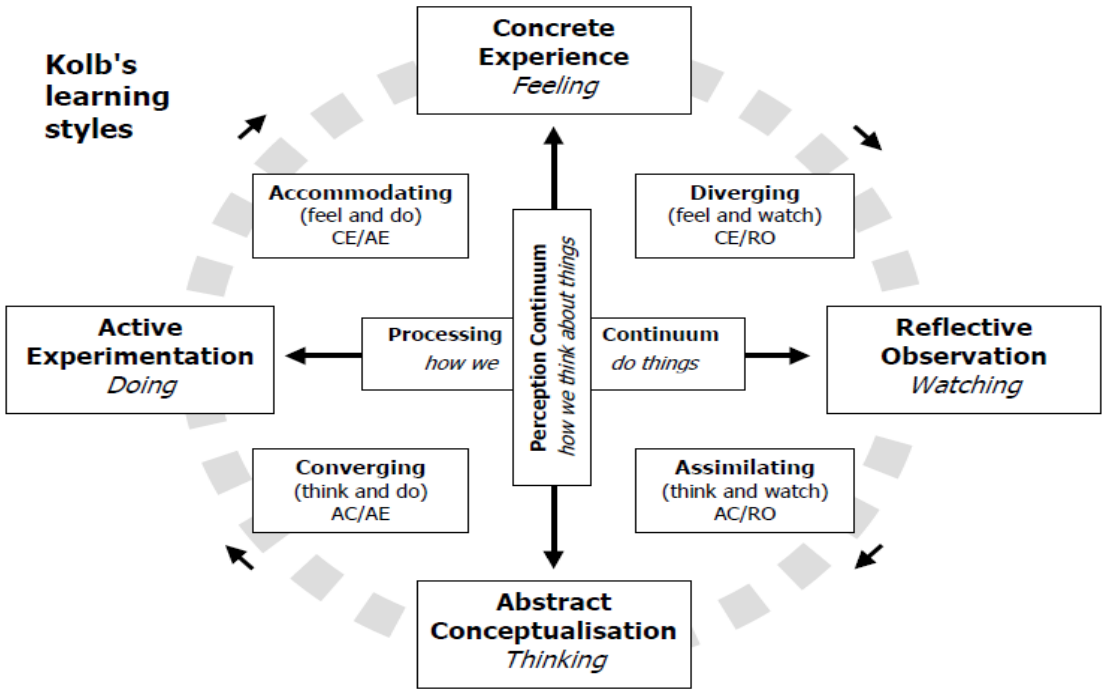


Figure 2.2 *Kolb's experiential learning theory (learning styles) model* (Source: www.businessballs.com/freepdfmaterials/kolblearningstylesdiagram.pdf *accessed on (09-07-2012)*

Decision-making in experiential learning

Experiential leaning if done regularly can support the farmers well in their decision-making process. Such type of learning leads farmers to identify their issues, assist them in collecting information on regular basis and finally can come up with informed and sound decisions. According to Leewuis and Ban, (2004) experiential learning usually requires energy, time, forms of equipment and infrastructure. Thus, even if an eagerness to learn exists, learning may be constrained by lack of resources.

Learning in social environment

Learning also takes place individually and collectively in social environment. Nevertheless, individual learning sometimes may be affected negatively by the social interest groups, community, culture, tradition and other organisation who act in 'open' and 'closed' way. For example, if people in a group or collectively see an idea which is not beneficial to their needs rather threatening to their interests, in such conditions, if an individual is open to new ideas and looks at its positive dimensions, may be discouraged to express his views and further develop them, however, if the situation is other way round the learning process may further be enhanced and accelerated.

Learning is socially embedded and developmental. It occurs over a lifetime rather than occurring solely in a training vacuum (Wenger, 1998). To make strategic and tactical changes in the farming system it is of the essence to know that how farmers are going through learning process. Whether the patterns they adopted are contemporary to their needs and requirements or in fact they are constraints for change and innovation processes. Learning occurs differently in different situations, e.g. learning at workplace differs from that of learning at home or school, and whereas, learning in a socially or culturally developed community is quite different from the rest. Each one of them is a significant contributor of learning. In the case of farmers as stated by Kilpatrick, (1996) most changes that farmers make to their practice are influenced by a number of learning sources, including advisers, other farmers and training events.

From learning to Social Learning

The word social in itself has many implications and can be used in different context such as, to know the perception of other stakeholders, the methodology where learning is stimulated be in a group, social network or any platform.

Social learning in the context of agriculture can be defined as farmers' agricultural knowledge whereby their understanding is challenged from merely passive recipients of knowledge and technology. From a top-down approach to a horizontal level where they demonstrate their competencies, skills, experience and knowledge in their own learning environment. Such learning is contrary to the traditional social learning that occurs in academic institutions, where social learning occurs by shaping the ideas of the passive participants (Bandura, 1997, cited in Margaret and PhD, 2006), whereas, according to Woodhill and Röling, 'stated in the same literature' social learning is a framework for thinking about the knowledge processes that underlie innovation. It is a

mode of knowing that integrates theory, practice and ethics in a holistic way so that the learning process becomes much more than mere understanding and communication.

However, in terms of sustainable development Milbrath (1989) was among the first to link the term ‘social learning’ to sustainable development. He used the expression ‘self-educating community’ to describe circumstances where people learn from each other and from the nature. The complexity of sustainable development requires new approaches to solving societal problems and that social learning might be the key to behavioural and eventually social change (Muro and Jeffrey, 2008).

The process of social learning leads to social change because it encompasses self-consciousness and self-reflective analysis of the beliefs and knowledge that someone possesses, while extending the pace of learning for social action. Social learning is increasingly cited as an essential component of sustainable natural resource management and the promotion of desirable behavioural change. Individuals on the other hand are seen both as products and producers of their own environments and of their social systems (Muro and Jeffrey, 2008).

Social learning does not occur by accident, it is rather a process which requires cognizant design and action that is based upon the knowledge domain. It is therefore, as pointed by Margaret M. Kroma (2006) includes both social structure, concerned with drawing attention to social forces. They mediate the learning and knowledge of groups, as well as with individual and group capacities to act. According to Sen, (2002) social learning is, ‘a move from multiple to collective or distributive cognition’. The idea of ‘distributive cognition recognises that stakeholders may well work together and engage in complementary (i.e. coherent) practices although significant differences in perception remain (Leewuis and Ban, 2004).

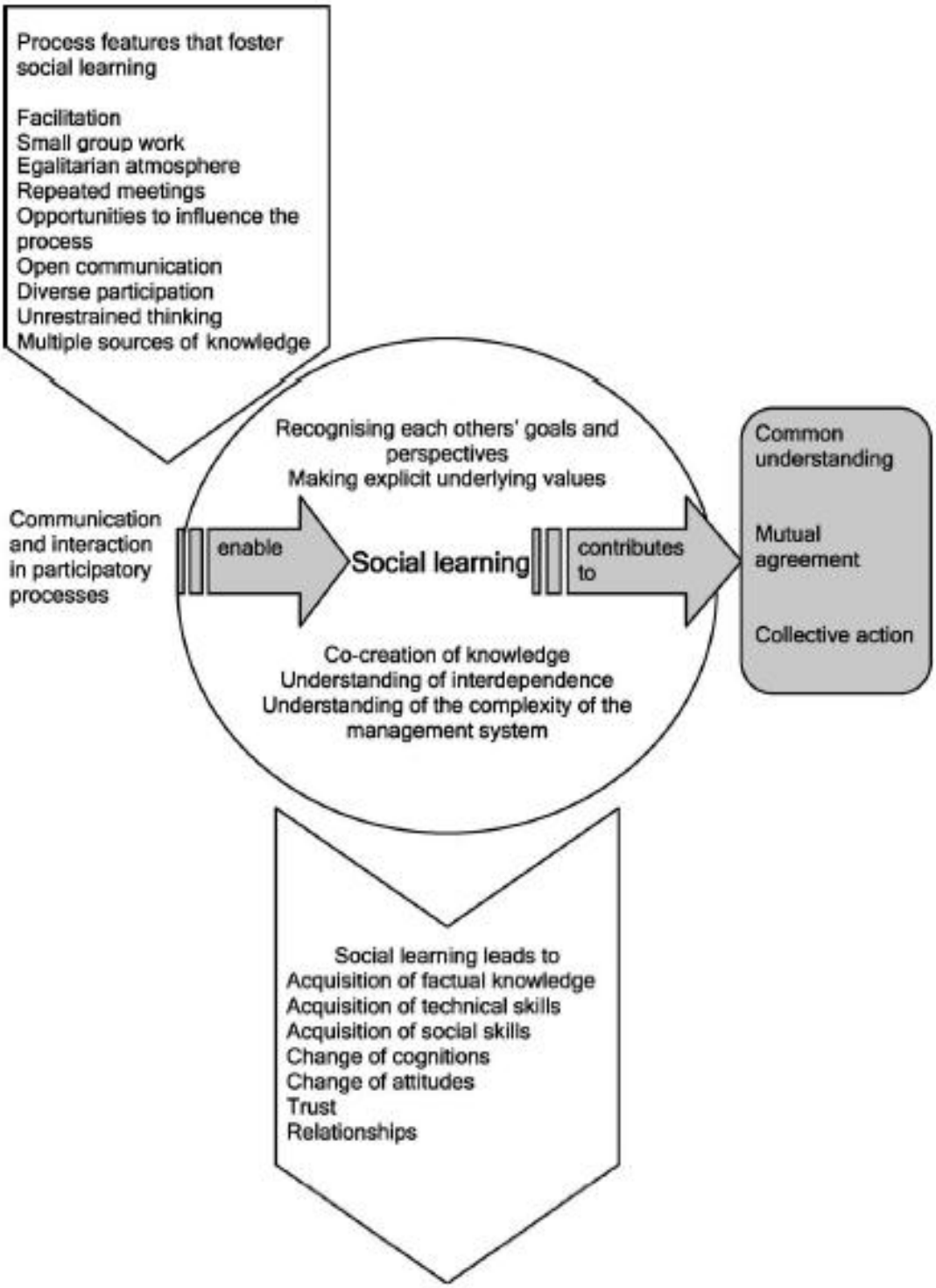


Figure 2.3 *Compound model of social learning adopted from literature*
Source: *(Muro and Jeffrey, 2008)*

Mostert et al., (2007) stress that social learning is a naturally occurring social process, which is intensified when stakeholders with different perceptions come together and engage with each other.

Social learning has been defined differently by different authors. From the literature review it seems that there is a unified opinion on social learning process which is based on interactive communication process in agricultural and rural setting. In the social outcomes it generates new knowledge, improvement of skills and enhancement of competencies. An atmosphere of trust and confidence is created for common understanding and collective actions.

There are a number of authors who frame social learning as an interactive approach to decision making and problem solving (Woodhill 2004 cited in Muro and Jeffrey, 2008). There is still a need to refine and improve understanding of social learning processes. It is difficult to derive from these numerous models and theories one definite answer to the questions posed at the start of this paragraph, there are no right or wrong learning theories, only different assumptions about the nature of learning.

2.4 Adult learning and Non-formal education (NFE)

Principles of adult learning

What is learning and how does it take place?

Principle 1: Learning is an experience that occurs inside the learner and is activated by the learner
Principle 2: Learning is the discovery of the personal meaning and relevance of ideas
Principle 3: Learning (behavioural change) is a consequence of experience
Principle 4: Learning is a co-operative and collaborative process
Principle 5: Learning is an evolutionary process
Principle 6: Learning is sometimes a painful process
Principle 7: One of the richest resources for learning is the learner him/herself
Principle 8: The process of learning is emotional as well as intellectual
Principle 9: The process of problem solving and learning is highly unique and individual

2.6 Adults face specific difficulties when learning. These include the following:

- Their knowledge may not be systematic
- They have little time
- Their awareness may be slow and they may be afraid of learning theory
- Their listening and observation skills may be weak
- They may be shy in group situations
- They may be highly conservative and often disregard the views of others
- They may lack self-confidence and want to avoid making mistakes
- Their attitude toward learning is affected by their past experiences, positively or negatively

2.7 Eight adult learning principles

i. Adults like to learn in a self-conscious way. By contrast, children learn something as requested by adults, even if the subject is not interesting. Adults decide what they want to learn for themselves.
ii. Adults learn best if the subject meets their needs.
iii. Adults learn best by doing. This idea is expressed in the proverb: “What I hear is what I forget; what I see is what I remember; what I do is what I understand”.
iv. Adults learn through experiences. When learning, adults bring along their own experiences. It is therefore necessary to respect and incorporate their experiences in the learning process.
v. Adults bring their own opinions to the learning environment. Those opinions affect their learning and awareness.
vi. Adults learn best in a non-formal atmosphere where they can feel accepted and supported by the trainers and other trainees.
vii. Adults learn by solving the problems relevant to their lives. Solutions must be based on their practical understanding and analysis drawing on in their experiences.
viii. Adults can easily adapt to different teaching methods. They prefer not to receive grades.

2.8 Learning Conditions

In summary, adult learning is most effective when it is based on experiences, reflection, addressing immediate needs, self-responsibility, participation, feedback, empathy and takes place in a safe and comfortable environment.

Experiences

The most effective learning is from shared experience, either by discussing participants’ past experiences or by developing new experiences through practical exercises in the field. Participants learn from each other and the facilitator often learns from the participants.

Reflection

Maximum learning from a particular experience occurs when a person takes the time to reflect back upon it, draws conclusions and derives principles for applying to similar experiences in the future.

Immediate needs

Motivation to learn is highest when the subject meets the immediate needs of the learner. FFS is a needs-oriented or learner centred training approach.

Self-responsibility

Adults are independent learners. They interpret information according to their personal values and experiences. They may appear to agree with something in order to complete training activity successfully, but the ultimate test of the training is whether they apply it in their life or work. Adults share full responsibility for their own learning. They know best what they need and want to learn.

Participation

Participation in the learning process is active not passive. Full participation and discussion among participants increases the dynamics and learning effects of a training activity.

Feedback

Effective learning requires feedback that is corrective but supportive.

Empathy

Mutual respect and trust between trainer and learner is essential for the learning process.

A safe atmosphere

A cheerful, relaxed person learns more easily than one who is fearful, embarrassed, nervous, or angry.

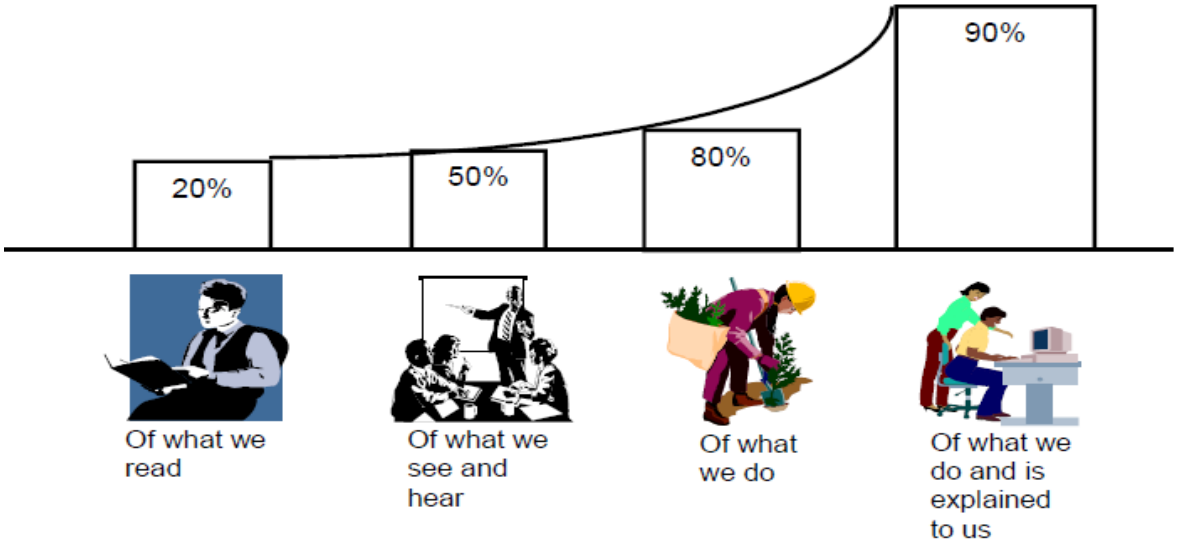
A comfortable environment

A person who is hungry, tired, cold, ill or otherwise physically uncomfortable cannot learn well.

Therefore, the key principles for effective FFS training are to:

- Facilitate the exchange of experiences among participants (e.g. through small working groups, group discussions)
- Create opportunities to gain new experiences through discovery learning exercises and simple experiments
- Reflect on experiences and what we can learn from them through reflection sessions and feedback

We remember…….

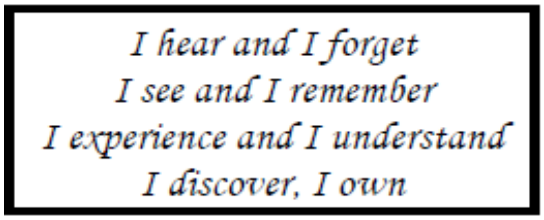


Source: *(David, et al., 2006)*

2.9 Rational for experiential learning: the principles of non-formal education

The basic educational concept of the FFS is drawn from adult non-formal education. Non-formal education is a training method based on the assumptions of adult learning. Adults differ from children in the way they learn. Adults already have a lot of experience, knowledge and skills. They have their own beliefs, values, convictions, and their own perceptions, biases and feelings. This makes adult learners a very rich resource in the learning process, and that is why it is important that the learning is participatory, so that each learner can input his/her "resources" into the training.

Farmers need opportunities to experiment with new (IPM) technologies, to learn how to evaluate different options systematically and to decide for themselves which are worthwhile. This realization can be found in the principles of adult education, which recognize that adults learn best from direct experience and when the topic they are studying is related to their everyday activities. Learning by doing adds to farmers' knowledge and experience, and improves their capacity as farm managers. Knowledge obtained this way is more easily internalized ("owned") and put into practice after the training is over. Passive exposure to more general extension messages is not as powerful as the discovery-based learning in FFS.
Some differences between formal and non-formal education from the viewpoint of the facilitator include:



Some differences between formal and non-formal education from the viewpoint of the facilitator include:

Formal education	**Non-formal education**
• Teacher, not facilitator • Trainees have to listen to the "teacher" • Information 'push' (teacher decides what trainees are being taught) • Hierarchy (teacher is the "boss") • Teacher has to prepare all sessions • Teacher forced into being 'expert' • Teacher lectures trainees. • Trainees are passive receivers of information • Usually restricted to literates	• Facilitator • Participants can give inputs • Information 'pull' (focus on actual information needs) • Learning objective is identified by group • Informal, open exchange; equal chance to participate • Active cooperation and collaboration from all participants • Facilitator is a group member • Facilitator can rely on inputs of the group

	• Questions from the group can be answered by the group (discussion/sharing of experiences, setting up experiments, inviting resource persons, etc.) • Working in small groups • Illiterates can learn

Source: Adopted from Facilitators' manual Regional IPM Programme in the Near East, 2005

Non-formal education can already become apparent in small things such as the setting of chairs for a meeting:

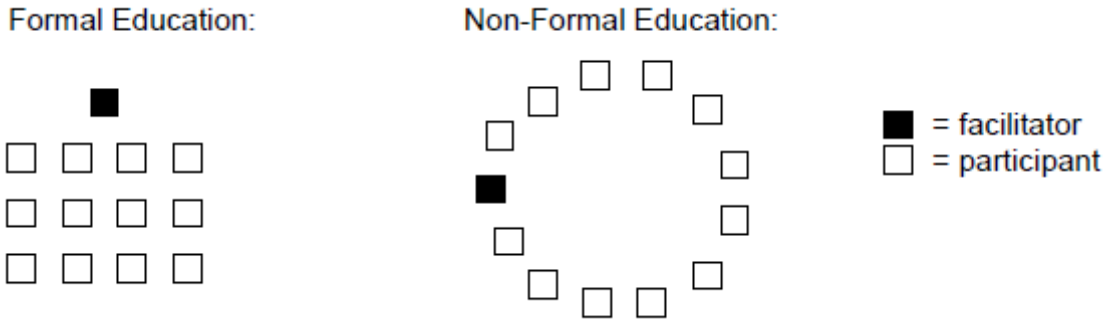


Figure 2.4
Source: *Facilitators' manual Regional IPM Programme in the Near East, 2005*

In formal education, only the teacher can be in touch with others (1 person facing 12 = 12 interactions) whereas in non-formal education, each participant can exchange experiences with all the others (13 people facing x12 others = 156 interactions) as visualized below.

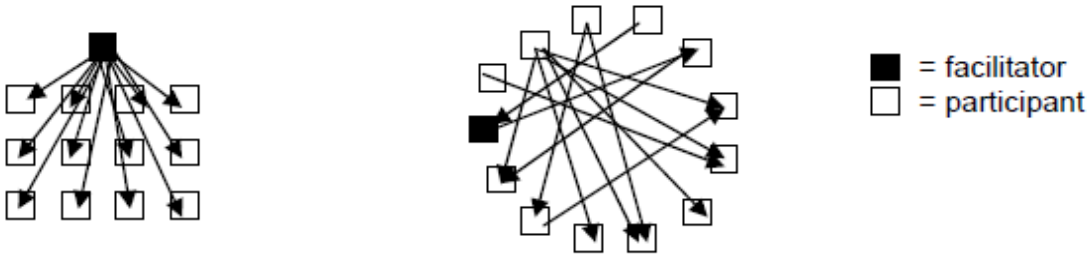


Figure 2.5
Source: *Facilitators' manual Regional IPM Programme in the Near East, 2005*

2.10 Innovation

There are multiple concepts regarding innovation and are prevailed in different parts of the world however they are defined differently in different contexts. The process of defining the concept of innovation will not stand-still rather go on changing; nevertheless, they are commonly defined as the successful exploitation of creative ideas. They can concern products, processes, markets, institutions; they can be technological, social, and organisational (Knickel et al., 2009). According to Hubert et al., (2005) innovation studies increasingly underline that innovation has a systemic nature. It is the outcome of collective action and depends on the social structure wherein innovators operate.

For the purpose of this research project 'innovation' is understood to be an outcome of collective and integrated efforts, sharing of novel ideas, encouraging indigenous knowledge and giving value to the concrete experience of the farmers. They learn from each other and come up with innovative ideas within the local community for social change in their specific socio-technical structure. Such innovation also depends upon the specific needs and requirements of the farmers and the regional community.

From the perspective of agriculture and rural development the intervention practices and theories have been changed extensively with the passage of time. The linear and top-down models are no more encouraged and replaced by active models of communicative intervention (Leewuis and Ban, 2004,p.131). Innovation is not something that happens overnight that everyone adopts it at the same time. Innovation in the process is taken by some in the very early stage, despite the fact others adopt them at later stage. There are some others who even don't adopt innovations for certain beliefs and reasons that don't attract them. Such non-adopters were named 'Laggards' (for an overview of different categories of adopters (Rogers, 1983). Such innovative process was named 'adoption for diffusion'.

There are also some misconceptions about the adoption of an innovation and it is presumed that such innovations are worthwhile and would prove to be productive for the farmers if they use them. Such presumption according to Rolling (1988) is called 'pro-innovation bias'. If examined critically, many innovations which are proposed make no sense for the farmers. Numerous studies on the other hand indicate that other explanations (e.g. inadequate innovations, structural limitation, conflicting interests, etc.) are at least equally valid (Leewuis and Ban, 2004, p.135).

2.11 The linear and Top-down model of innovation

Innovation often is still being seen as the result of a linear process from conception to adoption. Innovation strategies tend to follow the simplistic view of a 'linear' model, whereby innovation happens as a result of a flow of new knowledge originating in formalized ways in basic and applied research. This new knowledge is then applied to the production process and, if economically successful, diffused to other firms by

imitation or by active knowledge transfer initiatives (for a history of the linear models see for example Godin, 2006).

Among other innovation models linear and top-down models were considered worthwhile for famers and better agricultural production. The notion behind this type of model was that innovations are basically originated by the scientists. The extension workers were then used as a middle line source or intermediaries to transfer innovation to the farmers who are their real practitioner on the ground. This mode of thinking is called 'the linear model of innovation' (Kline and Rosenberg, 1986).

The linear model is quite obvious by its name as it shows unidirectional line from science to practice. The model further unravels the task division of different actors. As Leewuis and Ban, (2004) points out that some actors are supposed to specialise in the generation of innovation, others concentrate on their transfer, while the farmers' role is merely to apply innovations.

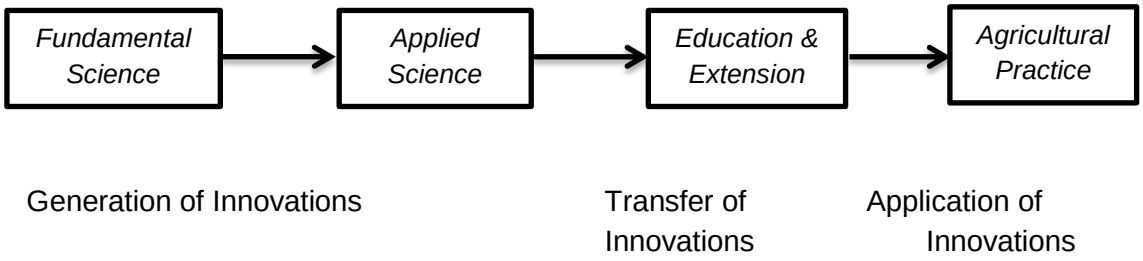


Figure 2.6 *The Linear model of innovation*
Source: *(Leewuis and Ban, 2004)*

It is of the essence to mention that many of the researchers got remarkable ideas from the farmers in the field during their research and scientists developed in packages to deliver them back to the farmers. In fact a number of innovations occurred in the field by the farmers rather than the intervention and involvement of the scientists in agricultural development. During the course of innovation process the role of the extension worker was not too much to transfer the knowledge of the scientists to the farmers. (Leeuwis, 1993 and Vijverberg, 1997 cited in Leewuis and Ban, 2004). From the above discussion it can be concluded that innovation occurs by mutual cooperation, generation and transfer of knowledge to its integration (Engel, 1995). Experience sharing among farmers and learning from each other also lead to innovation. According to Leewuis and Ban, (2004) innovation consists of a variety of new interdependent practices that may be implemented by a variety of people. Unfortunately, the active and vital role of the farmers has always been overlooked in past (Rolling 1988).

Innovation as a novel working whole

Innovation is often looked in a narrow sense of isolated manner or most often seen only from technological perspective, even though, it is far beyond than that if only we look at it in a wider sense. Changes never come alone, and often include both technical

and social-organisational elements ((Leewuis and Ban, 2004), technical and economic factors (Karlheinz Knickel et al. 2008).

The technical part of innovation can be related to, for example, soil, water, land and crop management, alternatively, the social part may be connected to the social life of the local inhabitants. It may have great impacts on their daily life in terms of labour division, employment, exchange of knowledge and experience. They may also have new arrangements for inputs and credits leading to a change in their institutional environment. By all means a successful or complete innovation can be termed when there is a coherence and sense of balance between technological devices and social arrangements. As pointed by Leewuis and Ban, (2004) innovation is a package of new social and technical arrangements and practices that imply new forms of co-ordination within network of interrelated actors as well as non-human áctants'. In line with this, Verkaik et al. (1997) puts forward that, innovation processes, 'knowledge and ideas' need to be translated into 'skills and technologies 'and subsequently into real socio-technical 'innovations'.

Second order innovation

Unforeseen and unexpected changes are occurring with in no time in agricultural domain and rural development. Particularly, regular changes with traditional knowledge are even more frequent even without much intervention of extension workers. There is however, a paradigm shift in the field of agriculture from the first order change i.e. (change within a system, normally aimed at adopting it), to the second order change or innovation i.e. an innovation based on new goals and new frames (Karlheinz Knickel et al. 2008). There is also a gap between the non-farmer actors, researchers and academic institutions and farmers' willingness which needs to be addressed by the advisory services and innovation agencies.

Agricultural knowledge information system

The idea of 'knowledge systems' was introduced for the first time by Nagel (1980). He was inspired by one of the American's institutional policy to put together agricultural research, education and extension as a one whole. Later in 1990s this idea was further developed and operationalized by the Netherlands' intellectuals Rolling and Engel in wageningen.

Among other authors, as stated by Leeuwis and van den Ban (2004), the concept was originated by an interventionist policy in agriculture. It was based on the idea to accelerate agricultural modernization and that innovation transfer should be strongly coordinated. The concept of agricultural knowledge information system has become widely known in international policy institutions e.g. the international service for agricultural research (ISNAR), the World Bank and Food Agriculture Organisation of the United Nations (FAO). The AKIS/RD by the World Bank and FAO has been described in the following words:

An Agriculture Knowledge and Information System for Rural Development link people and institutions to promote mutual learning and generate, share and utilize agriculture-

related technology, knowledge and information. The system integrates farmer, agricultural educators, researchers and extensions to harness knowledge and information from various sources for better farming and improved livelihoods (FAO & Wrold Bank, 2000:2).

This AKIS model as it is obvious from the above mentioned definition basically takes four main actors into consideration subject to agriculture and rural development. The actors consist of farmers, educators, researchers and extensionists. Rolling (1992) and Engel (1995) on the other hand would argue not to confine the definition to only four actors rather it may make a better sense if other actors are also included such as (policy makers, agro-industry, agribusiness, consumers etc.)

All of these domains, according to this model, act upon farmers' and rural actors' knowledge and, in this way, generate innovation (see Figure 1). The two-ways arrows from and to agricultural producers show that this model does not necessarily imply a top-down approach.

The model illustrates that how innovation takes place based on the mutual cooperation, interactive method and knowledge circulation of the farmers and rural actors. The two-ways arrows in the model from and agricultural producers explicitly indicate that it is contrary to the previously mentioned top-down model.

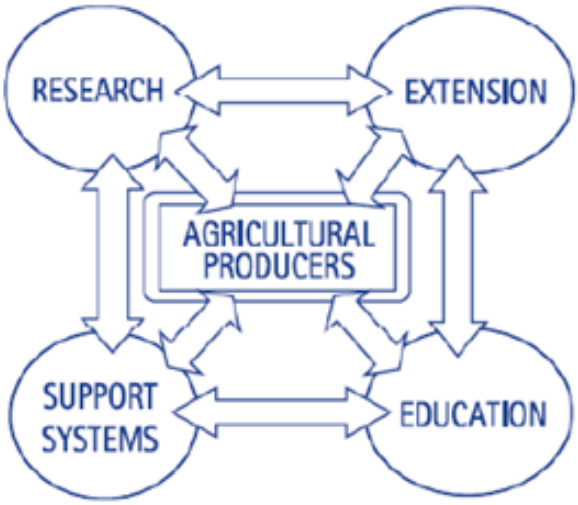


Figure 2.7 *An agricultural knowledge system model*
Source: *(Rivera et al., 2005)*

The perception regarding innovation has been changing with the passage of time. Innovation now does not merely depend on technology rather it involves strategies, marketing, organization, management, design etc. Farmers looking for alternatives to industrial agriculture don't necessarily apply 'new' technologies. Their novelties emerge as the outcome of 'different ways of thinking and different ways of doing things (Karlheinz Knickel et al. 2008).

From linear models to systemic approaches

In a simplistic way, the functioning of innovation can be seen as the result of a linear process from conception to adoption. Innovation processes, however, functions are increasingly conceptualized as the outcome of collaborative networks where information is ex-changed and learning processes happen. (Karlheinz Knickel et al. 2008).

Innovation, be any, brings a change in the socio-technical structure and in the regional community it emerges from. Such innovation may be a combination of human and non-human elements. However, if any successful innovation takes place in one region cannot be guaranteed to be successful in its nature in the same way in any other region. As the socio-technical configuration and regional environment may vary from place to place and the conditions of operation of a successful innovation cannot be replicated in different environment. It is in line with Brunori et al., (2008) innovation is more an evolutionary and learning process in agriculture.

CHAPTER 3

3.1 Fayoum: Area of research study and research methodology

Egypt is called the heart of the Arab world, and in many ways the cradle of the Arabic language, culture and history. It is the most populous Arab country, with approximately 85 million inhabitants, most of who live along a narrow strip of land on either side of the river Nile. Egypt borders the Gaza Strip, Sudan and Libya. It is a key member of both the Arab League and the African Union. Ninety per cent of the population in Egypt is Muslim and almost all of the remaining ten per cent are Christian. Egypt per capita income growth rate is 2.5 (HDR, 2011). An estimated 20 million Egyptians live at or below the level of poverty, and the economic situation is deteriorating. 66 % per cent of the population is illiterate and many live on less than US $ 50 per month.

Figure 3.1. *Map of Egypt showing Fayoum district*
Source: *Athena Review Image Archive (Google)*

3.2 Demography and Society of Al-Fayoum District

Fayoum is one of the 29 governorates of Egypt. It lies some 90 km south west of Cairo and has an area of 6,069 km2 (less than 1% of the total area of the country). The population was estimated to be 2.7 million in 2009, giving a population density of about 412 people per square kilometre. Was estimated in 2001 at 2.07% in the urban areas and 2.62% in the rural parts of the governorate, or 2.57% overall (MOLD, 2003: 39).

In 2006 average family size was reported to be 4.45 (El Shorbagi, 2008: 9). About 22.5% of the population are classified as living in urban areas with the rest in rural settlements. However, most of the rural areas are densely settled. Officially, there are six cities in the governorate, along with 61 main villages, 163 satellite villages and 1,879 hamlets (GOF, 2008: np). The governorate was divided into five marakez or districts, but a sixth, Youssef El Seddik, was added in 2002.

Society in Fayoum is experiencing the same rapid transitions as the rest of Egypt. Growth of Fayoum City and the larger towns and 'villages', together with an increasingly youthful age profile, have substantially altered lifestyles and aspirations for a growing proportion of the population. These demographic and social trends are slowed somewhat in Fayoum by continuing heavy dependence on irrigated agriculture, which keeps many of the young, as well as the older generations, closer to the land in smaller settlements. Migrant labour has exposed many male Fayoumis to life in Cairo. But the gender distribution of household, economic and governance roles is changing only gradually. Most women retain their traditional roles in the home, although steadily growing numbers are attaining better education and finding employment. Small numbers of women are now achieving public office in local governance structures. Islamic principles remain paramount in the lives of most Fayoumis and find expression in many aspects of their social structure, interpersonal relations and daily lives.

Figure 3.2. Map of Fayoum district (the study area)
Source: Athena Review Image Archive (Google

Natural environment

The governorate of Fayoum lies within the Fayoum depression, which until recent times received flood waters each year from the Nile to the east and, like almost all of Egypt, still depends entirely on that river. Nile flood water reaches the Fayoum depression through the Hawara (Lahun) gap, where the altitude is about 25m above sea level. The Bahr Youssef canal that feeds the entire irrigation and drinking water system of the governorate passes through this gap. Of the total 179,700 ha of the Fayoum depression, the irrigation system services 152,800 ha, including 136,000 ha of arable land (Euro consult/Darwish Consulting Engineers, 1992: 44)

Economy and poverty

The people of Fayoum depend largely on agriculture for their livelihoods, along with migrant earnings from elsewhere in Egypt and beyond. Farming in the governorate is intensive, with a cropping intensity of 170-200%. Common crops include wheat, beans, rice, maize, cotton and many fruit and vegetables for the huge nearby market of Cairo. Aromatic and medicinal plants are also grown for the domestic and international markets.

Other industries in Fayoum include cotton ginning, ceramics, animal feed processing and carpet production. Despite its high agricultural productivity, Fayoum is one of the poorest parts of Egypt. It offers little industrial employment. In 2004, 46% of its labour force (those aged 15 and above) were engaged in agriculture, 17% in industry and 37% in services, many of which support the agricultural sector (Institute of National Planning, 2005: 224). Its human development index (HDI) for 2004 was calculated as 0.61, ranking it 22nd of all governorates in the country down from 19th in 1998 (Institute of National Planning, n.d).

Other sources show an estimated national average GDP per capita in 2009 (based on purchasing power parity) of USD 6,044 (IMF, 2009).

Education

Literacy is one variable on which Fayoum scores particularly weakly in the HDI calculations. Literacy in Fayoum City in 2003 was 62.5% of those aged 15 and over, compared with governorate average of 47.6%. In the national 2005 Human Development Report, the average for the governorate was 47.8%, compared with an average for Upper Egypt of 56.5% and an average for all rural areas in Upper Egypt of 44.9% (Institute of National Planning, 2005: 215).

Government and institutions

Any development process in Egypt is framed by the complex contexts of national and local governance and bureaucracy, which combine strongly centralised authority with institutional and administrative frameworks that allow only the most gradual change. Formal authority structures are strongly respected and provide the means for the exercise of direct power, immediate resource allocation and the achievement of prompt action.

The governor is the apex of political power and administrative authority. As the personal representative of the President in the governorate Under Local Administration Law no. 145 of 1988, each rural governorate is divided into marakez (districts). Each district comprises a main town (its capital), which is divided into neighbourhoods, and a number of Local Units. Each Local Unit is made up of a ‘mother village’ – usually, in fact, a substantial town. The smallest settlements are known as ezbas or hamlets. The four levels of governance with which any development intervention for primary services must engage are therefore central government in Cairo, the governorate, the district, and the Local Unit.

Farmer Field Schools in Fayoum

Farmer Field Schools have been implemented in Fayoum for more than a decade, since January 1999. The first FFS were organised by the Fayoum Horticultural Development Project for female vegetable farmers using female 'trainers'. The Fayoum integrated Pest Management (IPM) pilot project started in the same year with FFS on different crops for male farmers as well as with FFS for women on non-agricultural topics. The IPM project involved both male and female trainers. Both the above mentioned project continued as the Fayoum IPM project, which terminated by the end of 2007.

In this long span of time a lot has been achieved and the FFS as an effective approach to reach the rural population has been widely recognised and accepted as the most successful approach in Fayoum. This can largely be attributed to the inputs and skills of the trainers. Trainers through, who are not conventional extension agents, but facilitators of the experiential learning process of the FFS participants.

FFSs are constantly evolving around new issue and spear points, depending on the needs of the participants and priorities of the donors. The Fayoum FFS project has broadened its scope to also include non-agricultural and more social- and community related topics. However, the experiential learning approach of the FFS remains the cornerstone of the work and with it the importance of skilled and capable facilitators

Experience with facilitators

Central to the success of FFS programs is appropriate methodological training of the people who organises and facilitate the field schools. To be a successful FFS trainer/facilitator, one must have skills in managing participatory, discovery-based learning as well as technical knowledge to guide the group's learning and action process. Without an adequate Training of Trainers (ToT) program the subsequent FFS program will fall far short of its potential.

The facilitator is the most important tool in the FFS. The success of the entire enterprise depends on having facilitators capable of and willing to position them in such a way as to encourage participants to direct their own learning processes. Proper training is therefore essential to equip the facilitator to enable of a dwelling to position themselves in such a way as to encourage participants to direct their own learning processes. Proper training is therefore essential to equip the facilitator to enable participants to carry out independent discover-based learning.

This last requirement is crucial if the FFS is to be truly effective, since those who discover knowledge for themselves tend to make use of it. While those are merely provided with information very often do not. Good knowledge of the technical side is of course equally essential to guide the group in productive directions and ensure a maximally rewarding learning experience. If the facilitators does not have command of the technical issues, the farmers sense that he/she does not know the material and

they become frustrated. Optimally, the farmers will actively lead the learning process in the directions they find useful and interesting.

However, facilitators should be ready to stimulate those who are unused to the freedom of self-direction, prevent domineering individuals taking over and sabotaging the process and find ways to support the less forceful to develop autonomously. Facilitators also need to know how to work in small groups in order to allow all of them to express themselves. This is particularly important to allow women a voice in mixed-sex schools. Therefore, ToTs need to equip facilitator to tackle a wide range of eventualities."

3.3 The Fayoum FFS Project

History

The support of the Netherlands Ministry for Foreign Affairs to the agriculture sector in Egypt has a long history. In the Governorate of Fayoum, the Fayoum Horticultural Development Project started in 1984 with research on tomato varieties. This was gradually extended to agricultural research in relation to participatory extension methods, in 1997, the concept of agricultural research in relation to participatory extension methods. In 1997, the concept of gender was introduced. In 1998, a start was made with Fayoum Integrated Pest Management project (FIPMP). The two projects merged into the FIPMP, running from 2001 – 2007.

The FIMP was applied through the FFS approach, which has shown many positive results all over the world. This approach was in Fayoum successful as well. Therefore, even though the new Fayoum Farmer Field Schools Project (FFFS) is no extension of FIPMP as such, it is building on the existing experience, knowledge and infrastructure of FIPMP and use FFS as an innovative, inexpensive and effective instrument for change at rural level in Egypt. The FIPMP mainly targeted the agricultural sector with the aim to reduce the use of and exposure to pesticides and to increase the income from crops, with health, literacy, women's rights and environment as extra subjects. The FFS project will however have different points of emphasis, of which gender is a very important one.

In the project, in line with the development priorities of the Netherlands assistance to Egypt. the FFS approach will be used to tackle abroad set of human development issues of direct relevance to the poor rural communities in Fayoum. Gender considerations will be reflected in the strategic goal and objectives of the project and in the activities and institutional set-up, to improve the poor status of women and contribute to closing existing gender gaps in the governorate of Fayoum.

Initially, the aim of FFS was to decrease the use of pesticides and increase awareness on environmental issues. These issues may still be a part of FFS, depending on the needs assessments and priority setting of the rural population and the villages the project will be working in as such, the FFS approach applied in demand driven, meaning that the participants are free to choose their topics of interest. The interest

may range from social topics (health, environment, literacy) to economic activities and agricultural information and constraints faced in daily life.

Even though training forms one of the main components of FFS, the project does not offer the participants a ready-made solution to their problems. The training is aimed at making the participants are able to recognise the problems they face and the information which the project gives, may facilitate the process of finding the path towards the solution or the organisation which may be helpful in resolving. Furthermore part of the FFS training will be targeted towards economic activity, and thus contributes to the income generation capacity of the participants. Both parts of the training contribute their share towards a better livelihood of the Fayoum population.

3.4 Methodology

Research methodology is a way to systematically solve the research problem. It might be understood as a scientific study of how research is done scientifically. Case study was adopted as a research methodolgy which can be considered a robust research method particularly when a holistic, in-depth investigation is required. According to Piet Verschuren and Hans Doorewaard (2010) case study is a research strategy in which the researcher tries to gain a profound and full insight into one or several objects or processes that are confined in time and space. Various steps, techniques/methods adopted for conducting the study will be explained in the following paragraphs:

Literature review:

The researcher unravelled the main concepts used for this research study in chapter two. Relevant literature pertinent to the study was used from various journals, different books, articles, project documents and certain other reports of NGOs. Likewise, the internet source also played a vital role in the collection of data.

Sampling design

Strategic sampling was purposely chosen to meet research objectives. Thirty farmers were selected in total from 3 different FFSs. They were divided in 3 units. The three units represented three different FFSs (male, female and mixed) located in different villages. Each unit consisted of 10 farmers, however, the mixed FFS consisted of 5 male and 5 female farmers to balance the gender equality. The selection of 10 farmers from each FFS was based on the desk study. Upon arrival at the area of the project staff was also consulted for further input to improve the process. Their suggestions were also considered.

The three facilitators, two male facilitators and one female facilitator from female FFS were also interviewed. These facilitators were responsible for running the sessions in the selected FFS. Informal talks and discussions also took place with facilitators to assess their in-depth knowledge regarding knowledge circulation and social learning. Apart from this, the District Coordinator (DC) was also interviewed to get more insight to the situation. He was responsible for administrative and management of the entire FFSs in Fayoum district.

In-depth interview

The process of in-depth interview began with planning, developing instruments and collection of secondary data An in-depth interview is a qualitative research technique that involves conducting intensive individual interviews with a small number of respondents to explore their perspectives on a particular idea, program, or situation (Boyce et al., 2006). Thirty 30 farmers 3 facilitators and one DC was interviewed. The interview ranged from 45 to 60 minutes. During the interview I asked open-ended questions to explore respondents' experiences to be faced, and standards to be met (Mears, 2012).

The interviews were conducted in Arabic language, the local language of the study area with an English translation. The purpose of the study to each respondent in the beginning of the interview was explained and the respondent were also asked at the end of the interview if he/she had any question to ask. Important notes were taken during the interview. In addition to that the interviews were also recorded by the voice recorder with the prior permission of the respondent, which was quite useful for data collection and the tape was played time and again to extract appropriate information. The key points were immediately summaried at the end of each interview for purposeful data collection.Tthe responses of the respondents were noted with the help of translator that were given with enthusiasm or the other way round as the translator was already informed to do so. The interviews were analysed by grouping the main theme of the respondents in a meaningful way.

Focus Group Discussion

(Translator taking notes during FGD in female FFS, 2012)

A focus group discussion is defined as a group of people brought together to participate in the discussion of an area of interest Boddy, (2005) to find out peoples, feeling, atti tude and opinion about a topic of interest (Susan Dawson and Lenore Manderson, 1993) and a group of individuals selected and assembled by researchers to discuss and comment on, from personal experience, the

topic that is the subject of the research (Powell and Single, 1996).

The FGD were planned to be conducted after the plenary round of interviews so that to get more and accurate information to the questions that were not clearly answered or were found ambiguous.

Focus Group Discussion were conducted with 10 farmers in each FFS. It was considered as a standard number of respondents for FGD, According to Boddy. C, (2005) this can vary between 4 and 12, whereas, Richard a. Powell and Helen M. Single (1996) points out the number between 6 and 10 participants. The discussion was held in Arabic language. The facilitator would steer the group discussion based on the translated provided checklist and the translator would note the points. The researcher remained passive and allowed himself to sit at the back to observe the entire process throughout the discussion. I keenly observed farmers' participation during the discussion, their body language and expressions, provision of equal opportunity by the facilitator, group dynamics, and the role of facilitator in particular. The FGD lasted for 2 hours.

Observation

That data collection must always be considered in context. One of the major concerns of qualitative analysis is the observation of opinion or behaviour within a 'natural' setting. From this perspective, meaning depends upon context, and the interpretation of action or opinion must take account of the setting in which it is produced. An observation cannot be fully understood without the context in which made. Certain observations were made during the interviews with farmers, in FGD and field visits in which individuals, situations, objects and processes were observed. The attitude, behaviour, expressions and body language was keenly observed in the natural context to verify the data collection process.

Primary data

Primary data was collected from the interviews of farmers, facilitators and DC. During the interviews checklist was used as a tool for generating data. In the same vein, the data was collected from FGD. In addition informal talks also took place with the respondents to know their perception and find out the root cause of the of the research problem

Secondary data

In addition to primary data, relevant secondary data was also used to meet the objectives of the study. The secondary data collection was from numerous sources such as, scientific journals, articles, books, research reports, project documents and reports and different websites by using key words of the research study. The collected information principally based on the key concepts of the research study. The information collected from the available published secondary sources were analysed and used in designing the field study.

Data analysis

Analysing qualitative data entails reading transcripts, looking for similarities or differences and subsequently finding themes and developing categories (Wong, 2008). Qualitative data are mainly unstructured text-based data. Data analysis started during the process of data collection. The data analysis constructed on interviews, FGD, field visits, observations, recording farmers' narrations, taking notes, meetings and informal talks. During the data collection period knowledge circulation and learning process was given due importancefor execution of FFS activities. The role of facilitators, participation of FFS members, attitude, and patterns of interaction was also observed for the promotion of FFS. Triangulation was used for the credibility of the data.

The date later on, was sorted and edited , furthermore, the data was analysed by using Microsoft Word and Excel. The data has been presented in in tables, figures, charts and text. Findings from the field data were compared with the literature for validation.

Checklist

A separate checklist was designed for interviewing farmers, facilitators and district coordinator. The questions in the checklist were derived from the research main and sub-questions to get specific data and research objectives. All the checklists were translated into Arabic language as well so that the translator could get more acquainted to the questions. The translated checklists also helped the respondents in understanding the questions better. Apart from the checklist the respondents were also put other relevant questions derived from the open-ended questions in the checklist.

Ethical aspect

An 'informed consent form' was developed for all the stakeholders and respondents. It explained the purpose of the interview and selection of the respondent. The expected duration of the interview was also mentioned which ranged from 45 to 60 minutes. The checklists were duly translated from English to Arabic language both for farmers, facilitators as well as District Coordinator to inform them of actual purpose of the interview and the research study. The checklist was also forwarded to the undersecretary for review and approval. But permission was not granted for getting them signed from the farmers, however, the consent form was read by the translator for the farmers.

Translation from Arabic to English

Translating interview transcripts and using it as data raises a number of questions. Does translation mean rewriting the data? Does it mean recreating it or does it mean that essentially the meaning remains the same? The comments of Rossman and Rallis, (1998) are sympathetic towards the researcher, they note that the workload of the researcher doubles if he or she chooses to translate the full interviews. Language is context based; some words carry a world of meaning within them and cannot be easily conveyed in another language and to another culture. Since it does not convey the right nuance of meaning, hence, some meaning is lost in translation. Replacing the words of one language exactly with the words of another is not possible. Strauss and

Corbin (1998) acknowledge the difficulty of translating interviews; it is very difficult to achieve accuracy, as each language is different.

Efforts were made to get the translation script correctly translated from Arabic to English by the translator working in the project as a translator for the last 8 years. She however, made efforts to make translations understandable for the general reader. Working in the project for long she was well aware of the FFS terminologies used in practice. The researcher if not fully but is satisfied to a greater extent with translation.

Validation meeting

Originally it was foreseen to conduct a validation meeting in Egypt, collectively with all the three types of FFSs to present the findings and validate the results obtained from interviews, FGDs and observation. This could not materialize in the given situation. The three FFSs located at different places were far from one another and didn't manage to gather at one place.

Nevertheless, an Egyptian team consisting of three officials of Fayoum district had an official visit to the Netherlands to attend a training course ''Research for Learning, Documentation and Action, enhancing rural livelihoods in Egypt'. In this context a validation meeting with the Egyptian team was arranged. During the meeting the findings were presented and Fayoum course participants were given the opportunity to confirm, clarify or deny some statements. The findings were confirmed and further clarified to some issues. According to them there are two village promoters in each FFS, whereas, it was told during the data collection process that there is one village promoter for each FFS. Furthermore, only one village promoter was found in mixed FFS. The team disagreed with this finding. However, according to them it might be an exceptional case in that particular village. In this way, the reliability of the data was assured.

Limitation of the study

- Extremely hot weather was a limitation for sparing more time in field with farmers.
- I couldn't get an opportunity to observe farmer groups during field visit of AESA and to see experimental plots.
- Due to enough distance among villages I couldn't gather farmers at one place to for validation meeting.
- The female farmers couldn't speak or participate more actively in the presence of the researcher and a translator as they were deemed outsiders.

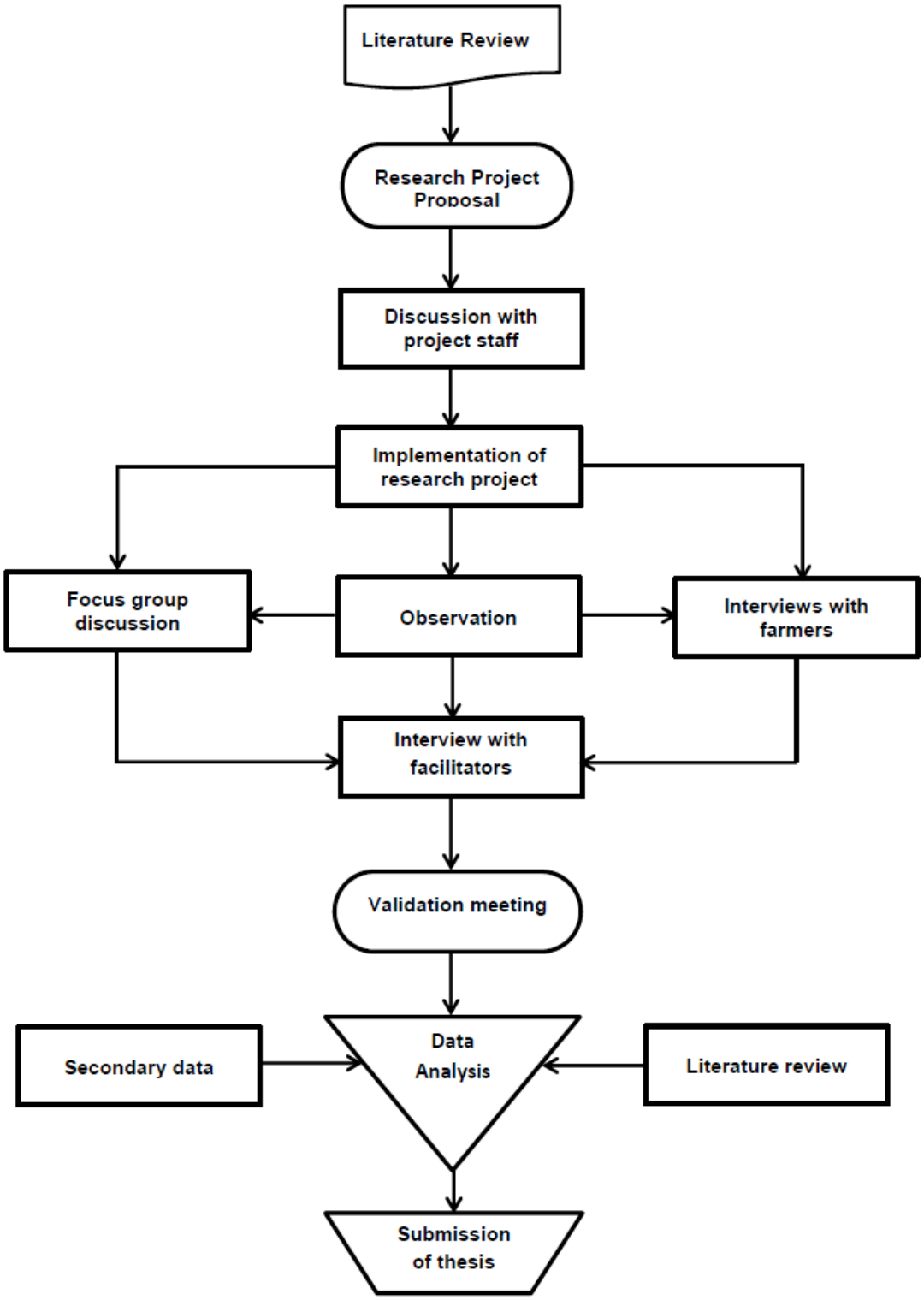


Figure 3.3. Research Strategy for FFSs
Source: Author, 2012

CHAPTER 4 FINDINGS

This chapter presents the results obtained from the field research conducted in three different types of FFS (male, female and mixed) and in three different villages of Fayoum district. The findings from the individual interviews of the farmers, facilitators, district officer and that of focus group discussion are presented as below:

Male, female and mixed FFSs members were interviewed in three different villages named Hussien Agha Silla, Bahnes and Sila respectively. Out of 30 respondents, 50% were male and 50% were female farmers. Ten male farmers were selected from male FFS and ten females were selected from female FFS whereas, 5 male and 5 female famers were selected from mixed FFS. Majority of the farmers ranged between 25 to 40 years of age. Many of the female farmers were young and married. However, culturally and traditionally in most cases, the decision making process was dominated by husbands or head of the family.

In addition to the above two male and one female facilitators were also interviewed for the data collection. They were responsible to facilitate the process within the same FFSs. They ranged between 40 to 53 years of age and had the same education level i.e. high schools certificate in agriculture. Furthermore, a district coordinator, responsible for all management and administration of FFSs in Fayoum district, was interviewed as well to get better insight of the research objectives.

The data indicates that female are with lower formal education from males which might have influence on females in terms of knowledge, learning skills and application of farming practices.

Most of the families depend upon agriculture as the main source of income. Some farmers, however, apart from agriculture, also generate income from small business they have developed through FFSs. The categories of small business vary such as poultry and chicken raising, selling tuna, making chees, sweets, biscuits and liquid soap. The farmers sell them in village as well as in the market. Female farmers produce embroidery items, handicrafts and different other traditional products. Thus it was quite obvious in the study area that women were involved in both agricultural and non-agricultural activities.

Farmer Field School session was conducted for two hours not only in the study area but also in other districts of Fayoum. In reply to a question Mr. Kurdi (District Coordinator) stated that,

"I know that normally FFS session is of 4 to 5 hours, I have been to Indonesian FFSs and observed that they conduct FFS session once in a month or once in two weeks. However, we have two hours weekly session but frequently. We adopted two hours session after consulting and taking farmers in confidence. Farmers are happy and satisfied with this pattern".

When the example of Indonesian FFSs regarding time frame was put before farmers as an option to be considered, lack of interest was found among the farmers regarding that pattern".

The entire number of FFSs in six districts of Fayoum governorate was 161 by June, 2011. In line with the plan these FFSs were to be taken by FAD using their own staff and resources. However, currently until this period (Aug 2012) there are 122 running FFSs in Fayoum governorate. Of these running FFSs, 32.7 % are male, 36 % female and 31 % mixed. The details have been mentioned in the following table.

Table 4.1 *Distribution of running Farmer Field Schools with in Fayoum district (Male, female & mixed) as of Aug 2012*

District	Male	Female	Mixed	Total
Fayoum	4	16	10	30
Sennouris	3	4	9	16
Tameya	0	10	10	20
Itsa	12	11	0	23
Ibshway	21	3	9	33

Source: Project document, 2012

Currently FFSs are run by facilitators that are government paid employees. The facilitators are gender based. They include both male and female. The female facilitators conduct the sessions within female FFS. Male facilitators mostly conduct the sessions in male and mixed FFSs; however, some of them also run female sessions rarely. The number of facilitators in Fayoum district is illustrated in the following table by gender.

Table 4.2 *Facilitators distribution by gender in Fayoum district*

No of Facilitators	District	Male	Female	Total
	Fayoum	6	7	13

Source: Project document, 2012

Currently in Fayoum district, there are 30 FFSs running as indicated above in table 4.1. However, the study was confined to only 3 villages and 3 different types of FFSs. Each FFS consisted of 25 members. The mixed FFS consisted of 15 female farmers and 10 male farmers. The research methodology was based on case study. After desk study, literature review and thorough consultation with the district and project team, 10 male farmers from the male FFS of village Sila, 10 female farmers from the female FFS of village Bahnes were selected, whereas, 5 male and 5 female farmers were selected from the mixed FFS of village Hussien Agha Silla. The research focused on 30 member farmers which consisted of 50% male and female farmers each. Below Table 4.3 provides the details about the farmers' composition in FFSs:

Table 4.3 *Composition of male, female and mixed farmers*

Description	Male FFS	Female FFS	Mixed FFS		Total
			Male	Female	
Village	Hussien Agha Sila	Bahnes	Silla		
No. of participants interviewed	10	10	5	5	30
No. of participants for Focus Group Discussion	10	10	5+5 = 10		30

Source: Field data, 2012

Knowledge Circulation in FFSs

It was recorded that most of the farmers attend FFS sessions regularly accept for few would go to the market in the morning and couldn't manage to arrive on time or remained busy in the field during harvesting period. It was observed and noticed that the farmers in the FFS were circulating the knowledge by sharing their experience and exchange of local knowledge with each other. They followed participatory dialogues and discussion upon field observation and putting questions to each other for further information and clarification. Another practical way of sharing their knowledge was AESA drawing. Most (17) of the farmers described that knowledge circulation within FFSs takes place by discussion and dialogues with each other. However, a few farmers (4) also expressed their perception that less knowledge is shared by the facilitators. An overview of knowledge circulation among farmers is described in the following figure.

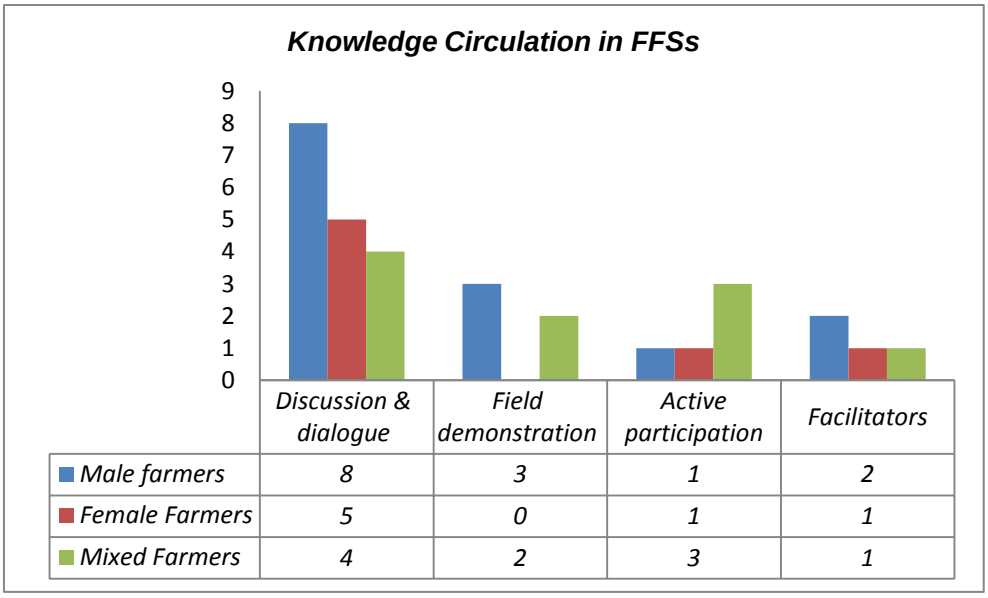
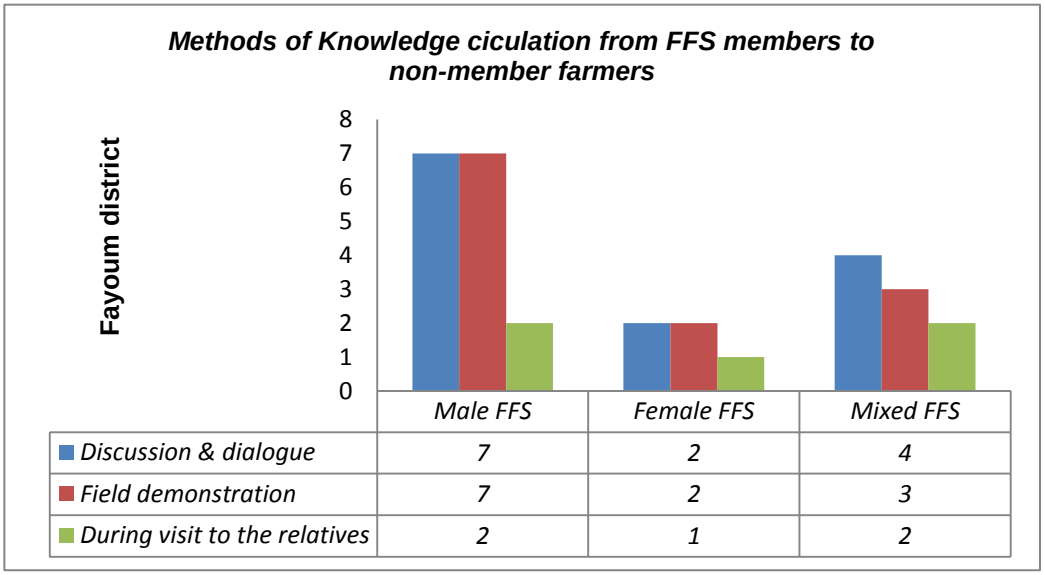


Figure. 4.1 *Farmers' perception about knowledge circulation in FFS*

Source: *Field data, 2012*

Methods of Knowledge circulation from FFS members to non-member farmers

The farmers share the knowledge and information gained in the FFS with their family members as well as to the non-member or neighbour farmers. Most of the farmers (13) stated that they share knowledge with their neighbours through dialogues and discussion when they meet each other in the field, mosque, and wedding parties, in the street or in any gathering. The farmers also take non-member farmers to the field to show them demonstrations conducted on the experimental plots. They explain, the way experiments are conducted, answer their questions and tell them advantages of such practices. Knowledge circulation methods from FFS members to non-member farmers are described below in Figure 4.2



	Male FFS	Female FFS	Mixed FFS
Discussion & dialogue	7	2	4
Field demonstration	7	2	3
During visit to the relatives	2	1	2

Figure 4.2 *Methods of Knowledge circulation with non-member farmers in the neighbourhood*

Source: *Field data, 2012*

Farmers' Field Experiments

The farmers conduct field experiments with different crops such as cotton, hybrid maize, and hybrid tomatoes. They intercropped, cotton with wheat, and onion with cotton, they also used hybrid corn, hybrid seeds, potassium phosphate and fertilization for increasing harvest. Most of the farmers reported that they had increased production and healthy crops. As a result they earned more income. They also stated that they learnt new techniques, knowledge, and have decreased the use of pesticides. Some of the farmers mentioned that they have lower animal mortality rate.

Majority of the farmers (22) confirmed that they have had field experiments on the experimental plots. The female farmers, particularly in the mixed FFS stated that they conducted field experiments with their male family members, however, some of the female farmers indicated that they couldn't do the field experiments after the end of the project as they didn't have their own lands. The following table describes the number of farmers' field experiments in more detail.

Table 4.4 *Field experiments on experimental plots by the farmer*

Source: Field data, 2012

Description	Male FFS	Female FFS	Mixed FFS		Total
			Male	Female	
No. of farmers conducted field experiments	10	3	5	4	22
No. of farmers didn't conduct field experiments	0	7	0	1	8

Issues affecting farmers' participation

Some of the male farmers described that their visits to the markets affects their participation as they couldn't manage to come on time for FFS sessions. Dominant character of some farmers was also mentioned as a factor affecting their participation. Moreover, some, particularly female farmers' participation was affected by domestic issues and house chores which was also one of the reasons that their husbands would prohibit them to attend FFS sessions. It was also, on the contrary, described by a notable number of the farmers that there was no issue affecting their participation.

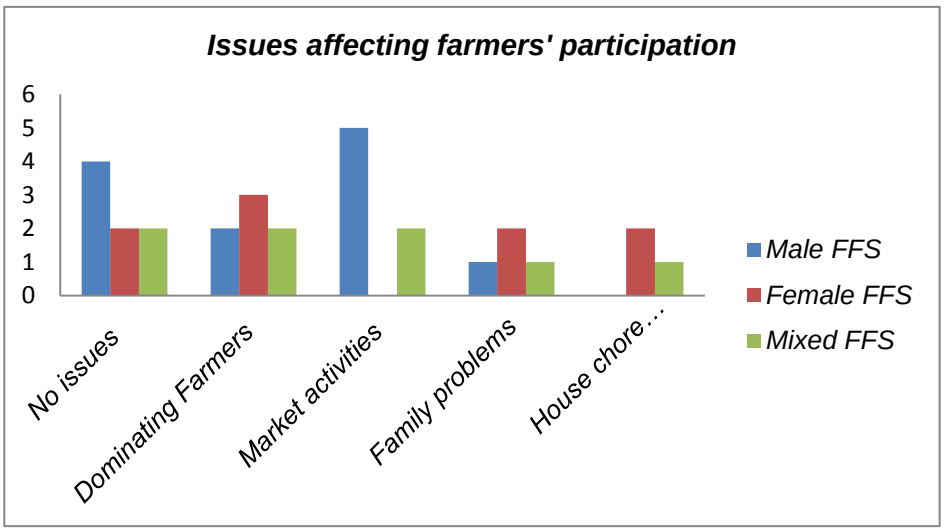


Figure 4.3 *Issues affecting farmer's participation*

Source: *Field data, 2012*

The role of facilitators

When the farmers were asked about the role of the facilitator so (90 %) farmers reported that facilitator has a vital and significant role in the FFS, whereas, the rest (10 %) farmers stated that they only attend the session because of the good character and nice attitude of the facilitator. Fifty (50 %) farmers reported that facilitators support the farmers, facilitate the process in a well-defined manner and simplify the information with the help of boards, charts, broachers, samples, models and certain other training materials particularly about the field samples. However, 30 % farmers reported that facilitators have lack of knowledge and don't have appropriate information, whereas, 20 % farmers stated that facilitators share and deliver good information about good farming practices. The following figure (4.3 will give an over of the issues affecting farmers' participation in the FFS:

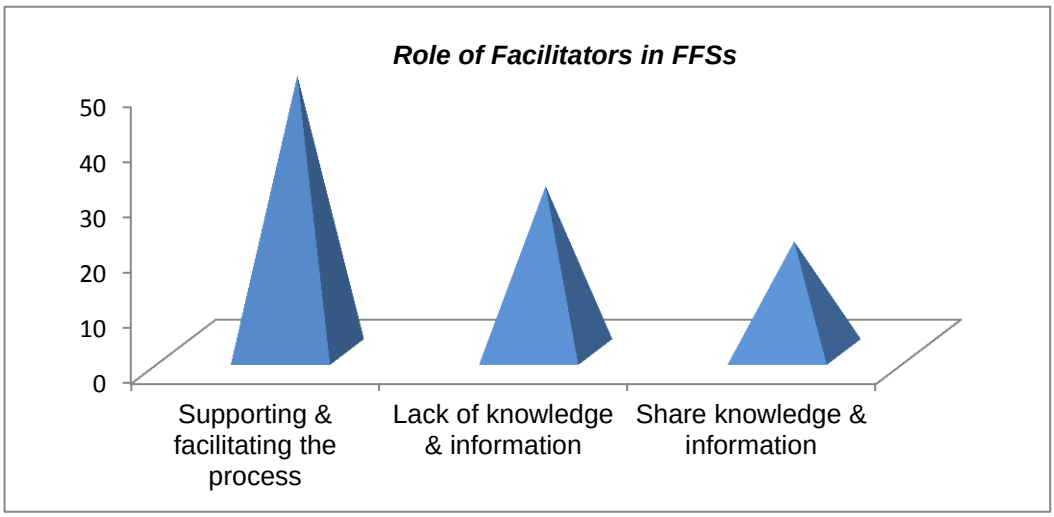


Figure 4.4 *Role of facilitators in Farmer Field Schools*
Source: *Field data, 2012*

Supporting factors in FFSs

Most of the farmers described 'experimental plots' as the most supporting factors for learning and innovation practices, whereas, to some farmers Agro-ecosystem Analysis was quite encouraging factor and the training materials such as boards, charts, sample of plants etc. Few farmers, though, mentioned learning of different products for example, making chees, liquid soap, biscuits and sweets, as the motivating and supporting factors. Supporting factors for learning and innovation are presented in the following figure:

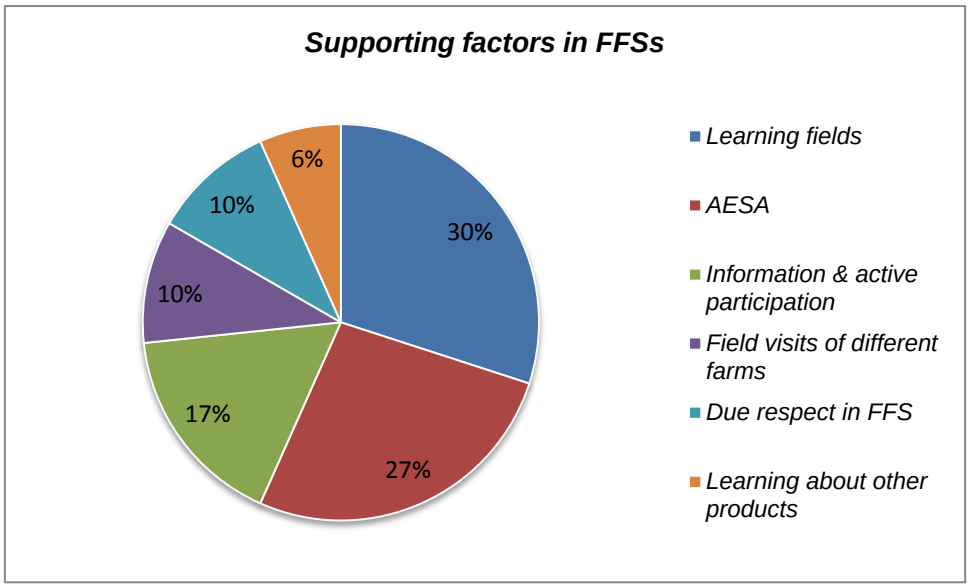


Figure 4.5 *Supporting factors for knowledge circulation, learning and innovation*
Source: *Field data, 2012*

Non-supporting factors in FFSs

Poor information and inefficiency of facilitators in terms of knowledge circulation were considered as the non-supporting factors for knowledge circulation and learning process. Lack of financial resources was also stated as the non-supporting factors , additionally, absence of experimental plots was stated to be non-supporting factors. According to the farmers they learnt a lot when there used to be an experimental plot which was funded and supported by the project. However, to a few of the farmer's dominant role of other farmers and family problems were non-supporting factors. Non-supporting factors are presented in the following figure.

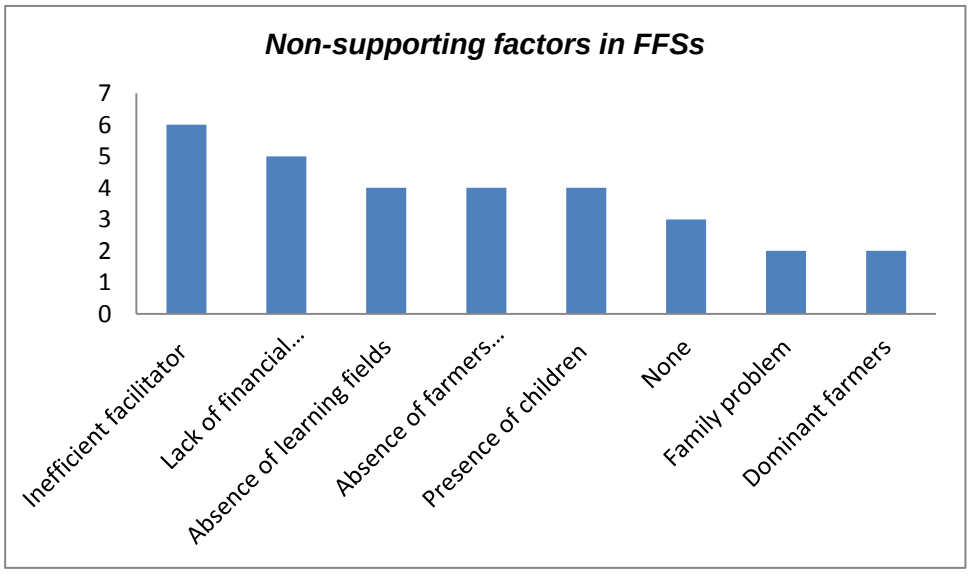


Figure 4.6 *Non-Supporting factors in FFSs*
Source: *Field data, 2012*

Comparative analysis of learning in the three types of FFSs

During the in-depth interviews and FGDs, most of the farmers narrated that more effective learning and knowledge circulation is taking place in mixed FFS. There is an environment of competition among them and they come up with new ideas. A social change was observed in their behaviour as they respect each other and talk more politely. They pay due respect to each other and had increased level of tolerance. a few of the farmers, however, found no difference among the three different FFSs. From the total sample (46.6 %) farmers stated that the least learning in terms of knowledge circulation and innovation is taking place in male FFS, (23.3 %) farmers reported that knowledge is circulated equally in all types FFSs (16.6 %) farmers mentioned that the least learning occurs in female FFS, whereas, (3.3%) farmers mentioned about mixed FFS.. The following figure will provide an overview of the effective learning and knowledge circulation among all the FFSs.

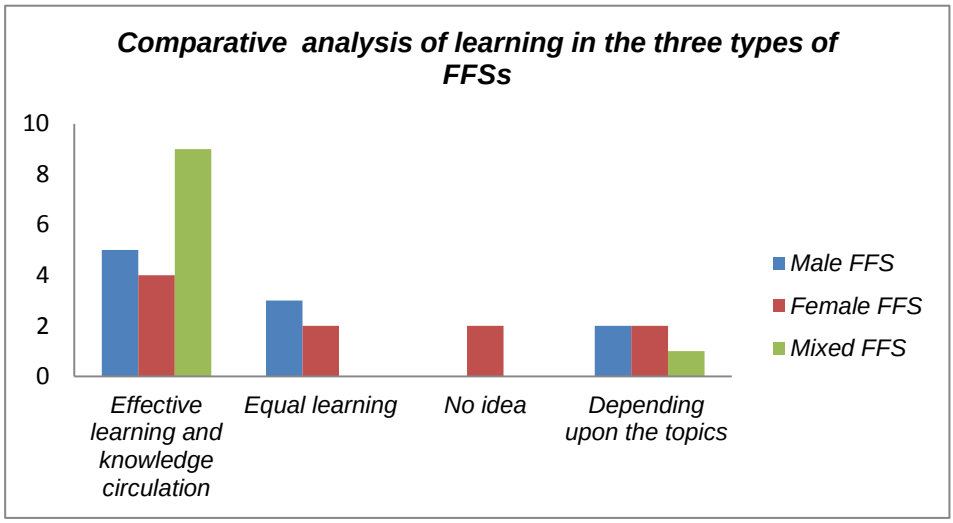


Figure 4.7 *More effective learning and knowledge circulation in FFSs*
Source: *Field data, 2012*

CHAPTER 5 DISCUSSION

5.1 Introduction

In the research area of Fayoum district, male, female and mixed FFSs members were interviewed in three different villages named Hussien Agha Silla, Bahnes and Sila respectively. Out of 30 respondents, male and female were 50% each. Ten male farmers were selected from male FFS and ten females were selected from female FFS, whereas, 5 male and 5 female famers were selected from mixed FFS. Majority of the farmers ranged between 25 to 40 years of age. Many of the female farmers were young and married. In most cases, culturally and traditionally, however, the decision making process was dominated by husbands or head of the family.

5.2 Knowledge circulation among farmers

The knowledge is circulated through discussion and dialogues among farmers. In such adopted method, farmers ask complicated issues of their common interest and ask un-answered questions. They listen, recognize each other's opinion and then accept or criticise to open further discussion. For knowledge circulation, such communicative and interactive process is very important. For farmers, field experiment is another way of knowledge sharing, discovered in the study, where farmers experiment different varieties of seeds on different methods, try different technologies and techniques. The farmers through this 'trial and error' process come up with innovation. They rectify their mistakes during the process and come up with new ideas, e.g. as narrated by a facilitator that,

> *"We asked the farmers to grow maize in11 lines for better production but a farmer came up with a new idea and made 12 lines. He later came and told other farmers as well, that he tried this idea on his field and he had even more production than others".*

Farmers share their knowledge and experience through active participation in FFS. This active participation keeps the discussion lively and moving. During discussion, they generate new knowledge and make recommendations for better agricultural practices. Based on circulated knowledge and information farmers now select the best variety of seeds and apply them on suitable time. They also make best choices for beneficial fertilizer and less use of pesticides. The study also shows that the facilitator supports and facilitates the whole process of knowledge circulation and also adds their knowledge and experience for more learning. According to a facilitator, the farmers share their knowledge in a different way e.g., he stated that,

> *"A farmer brings an infected plant from his field and asks the other farmers including facilitators if they know the remedy to the infected plant. If no one gives answer then he answers himself, and tells other farmers the solution to that particular disease or infection".*

Many of the female farmers don't have land. They hire a piece of land or help their husbands in the lands. In this way, female farmers have joint venture and help their partners to increase production and livelihood. Female farmers also share their knowledge with husbands they gain in FFS e.g. a farmers' wife suggested her husband to get the cow for treatment as during milking her nipples get hot. She had learnt in FFS that in such condition the cow should be treated as cows are infected by a disease transferred from mouse to cow through fodder. Apart from agriculture and livestock, there are also some non-agriculture learning activities conducted particularly in female FFS. Female farmers are interested to learn making different things. They learn different skills such as suing clothes, embroidery and handicrafts. In this way, they want to contribute and support their husbands or families.

Additionally, female farmers learnt that a balance diet with higher proteins should be consumed. Similarly, they also learnt about the food to be given for children for their good health and better growth. A female farmer mentioned that she now does not give too much spicy food to her children for school. Because she has learnt in the FFS that spicy food affects the digestive system of the children. She now gives fruit, vegetable and salad to her children. The female farmers are also now aware what to eat and what to avoid during pregnancy.

Apart from this, a literacy program was launched in female FFS. As a result now they can read and write. The female farmers also teach their children at home what they learn in the FFS sessions. Knowing the importance of such programs they now prefer education for their children and admit them in schools. The literacy program also helped them in reading the instructions mentioned on the use of pesticides. *(A Session of Literacy Program in Female FFS)*

The discussion and dialogues among farmers indicate that they are willing to share their knowledge and learn with each other and from each other. It also indicates that they ask, inquire and listen to each other views on certain topics. Such fruitful discussions increase tolerance and builds trust among farmers which are significant elements for co-existing in the communities. According to Kayes (2005) learning in FFS is carried out through group discussion, comments, suggestions and criticism. In similar vein Ndoye (2003) points out that farmers who discuss seek more information than those who use passive learning models. There seems to be consensus that social learning requires the communication and interaction of different actors in a participatory setting which is believed to result in a set of social outcomes, such as the generation of new knowledge, the acquisition of technical and social skills as well as the development of trust (Muro and Jeffrey, 2008).

5.3 Effective learning among three types of FFSs

The study found that more effective learning is taking place in mixed FFS (see figure 4.6). This is because they remain in competition and try to surpass each other. Both male and female farmers come up with new ideas during discussion. They are more open to listen and present their own point of view. As stated by a facilitator that,

"In the male FFS they most often discuss agriculture related topics, in the female FFS along with agriculture they discuss different other topics on kitchen, embroidery, children, health and hygiene, pregnancy, environment a lot other women related topics. However, in the mixed FFS they discuss variety of topics on agriculture, livestock and social topic such as the role of husband and wife. They also respect each other and are from the same locality; many of them are relatives".

As it was reported by one of the facilitators that a wife requested for a piece of land from her husband to experiment the crop in a new fashion she had learnt in the FFS. In this case, she didn't own the land and her husband was not a FFS member. After getting the land and applying new methods she had more production of the crop than her husband had on his land. Such an experiential learning inspired the husband and he also became a FFS member. This indicates that a social change is also taking place, where it is building trust and confidence between husband and wife, the empowerment of women farmers in decision making process.

(Female Farmer Explaing Infected Plant to the Researcher & Translator in Mixed FFS)

It is a vital change in the Egyptian cultural context where, a husband is encouraged to learn by his wife. The husband recognises and gives value to the opinion of his spouse and offers his full support. Such a collective coordination of male and female leads them for better production and innovation. Socially, a change occurs in their behaviour and get increased level of tolerance. As a consequence of this approach, there are indications from recently published literature that some of these mixed farmer groups improve intra-household gender equity, women empowerment and overall well-being (Pandolfelli et al., 2007).

Since most of them are relatives in the mixed FFS, thus they collectively support each other. The female farmers not having their lands support their husbands in their fields. They also support their families with the skills they have learnt in the FFS.

5.4 The role of facilitators

The study explores that FFSs are still conducted by two facilitators. One facilitator initiates the session with main topic whereas; the second leads the session with sub-topics or supports his colleague with main topic. Such a procedure was adopted in the beginning of the previous project to organise the farmers in effective sub groups. It was to shift to one facilitator after they have acquired enough experience. However, with the end of the project there were an increase number of facilitators with less number of FFSs. Many of the FFSs closed down due to the lack of financial resources.

The role of facilitator is acknowledged by all farmers. Facilitator is considered to be the backbone of FFS. The study reveals that the facilitators support and facilitate the farmers through the entire process in a well-defined manner. It further indicates that they have acquired such skills and competencies through trainings. The facilitators discuss with them variety of topics which meet their requirements. The facilitator also divides the farmers in groups and groups among themselves select a group leader. The groups and group leaders do not remain always in the same groups. They keep changing over time. On the observation it was found that only two groups are made for AESA and both of the facilitators accompany with each group. When the facilitator was asked, that why he makes two groups only? Whereas, normally 4 to 5 groups are made for effective group learning, so his answer was that,

"We make 2 or 3 groups. This is because; FFS session is for 2 hours only. If we make more groups, we will not be able to listen the findings and observation of all groups in such a short period of time. Such a discussion takes much time and the farmers are not ready to spare more than 2 hours for a session".

The findings also indicate less knowledge is shared by the facilitators. The findings however cannot be ignored due to less number of the farmers as their views should equally be considered as well. The reason that facilitators share less knowledge or have little information about the topic is that they are not highly educated or degree holders in agriculture. They have had high school certificates in agriculture. The acquired level of education of the facilitators is not satisfactory to meet day to day

challenges in the field. On the other hand, they might still require more appropriate training upon specific agricultural topics to improve their knowledge. ToT trainings in Fayoum training centre are encouraging and will enhance their competencies and skills regarding the particular topics they discuss in the FFSs. It is also in line with Luther G.C et.al., (2005) that, to be a successful FFS trainer/facilitator, one must have skills in managing participatory, discovery-based learning as well as technical knowledge to guide the groups' learning and action process.

It however, cannot be denied that the facilitators have vast experience of almost 10 year in FFS. It was observed that they could better distinguish between the previous extension methods and current participatory approach, applied in the FFSs. It was also confirmed by the farmers. The farmers reported that the previous linear top-down approach has not been applied any more, where the extension worker would come with a message in hand and would direct the farmers to apply certain techniques in farming. This shows that the top-down approach is not appreciated any more by the farmers. In such approach they would feel inferior and their local knowledge was not encouraged.
During this study, it was told that there is a village promoter in each FFS. Contrary to that it was discovered in the field visits and data collection process that there was only one village promoter in the mixed FFS. No vital or supporting role of the village promoter was experienced. According to the project report (June, 2011), the village promoters sometimes referred to as "Farmer Facilitators" continued to receive once monthly training on diverse range of subjects. It was found difficult for the village promoter to run sessions as already two facilitators were conducting sessions regularly. He didn't have the opportunity. He can perform this task when given responsibility. In addition, the facilitators or district team can observe their performance during follow up visits. Village promoter is more accepted and trustworthy to the farmers as he is from their own community and known to everyone. The farmers better understand him and as an insider he is more trusted. Village promoters are also important for sustainable FFSs.

(Village Promter Showing Infected Cotton Plant in the field)

5.5 Non-supporting factors

The study shows that in-efficient facilitators affected the participation. The in-efficiency might lack on the provision of equal opportunities to all farmers. On observation during field visit and FGDs some of the members had less participation particularly in female FFS. Male farmers were found dominant during the sessions and dominant character in general was reported to be effecting farmers' participation. This indicates that group dynamic activities were lacking on the part of facilitator. The facilitators require more specific trainings where they learn to overcome such conditions during the sessions.

The farmers sometimes doubt the knowledge, information and experience of the facilitators. They often put the facilitators under test, even though they know the answer themselves in advance. As one of the facilitators during his interview mentioned that he was asked by one of the farmers during the session that does this plant have quick growth if planted. Even though the farmer new the answer that it didn't. The facilitator said that if for example he had given the incorrect answer so the farmer would blame him for not having knowledge and information and he then would have lost his credibility in front of them.

Lack of financial resource was one of the significant non-supporting factor. Most of the farmers were poor and they couldn't afford to buy the required material and instruments for better and improved agricultural practices. They heavily depended on agriculture. Best quality seeds and fertilizer were expensive. In the same way those who didn't have the land for experiential learning couldn't do experiments on their own farms. The economic conditions of the farmers didn't allow them to rent the land for implementation of new practices. The farmers also lacked government support in this regard. As, reported by District Coordinator that, government is not in a position due to political turmoil in the country to devise strategies for farmers. Secondly, it doesn't have enough budgets for agricultural activities". On the other hand the project has also ended which would support farmers with experimental plots.

According to District Coordinator, FFSs are in different parts of Fayoum due to lack of financial resources they cannot approach them as there is no budget for monitoring or supervision of the running FFSs. It costs much on logistics and transportations. Because of these reasons he couldn't confirm if there is any village promoter still serving as 'Farmer facilitator' in the FFSs. It was found during different meetings with farmers that they were quite enthusiastic and had great interest in learning plot. The experiments done on the experimental plots were appreciated by most of the farmers. It was also stated by the District Coordinator that the famers don't believe as much in facilitators as in experiments on the experimental plots. When they observe successful experiments, they are very much motivated to apply the same techniques and methods on their own fields. In the presence of experimental plots the farmers were have had experiments on their plots and would make more production and more money.

The study further indicates that some female farmers were prohibited to attend the FFSs by their husbands. It was because female farmers had dual responsibilities. They were busy in house chores, preparing children for schools and making breakfast for

entire family in the morning. It was however, not quite often. The family issues were also reported as influencing factors of participation; nevertheless, they were not discussed openly.

It was exposed that children were also a barrier for conducting successful FFS sessions. It shows that the presence of children disturbs the entire session as they make noise and play around. In connection to this statement It was also observed that the presence of children in the FFS during the session and FGD particularly in female and mixed FFS. Upon a question on the presence of children a female responded that she couldn't leave the breast feeding child at home or else she won't be able to attend the session, however, children ranging from 4 to 7 were also found.

5.6 Circulation of knowledge among non-member farmers

It was explored during field study that knowledge to a great extent is shared with non-member farmers through communication and discussion. The non-members don't attend the FFS sessions, however, when they are inspired by any field experiment or new technologies then they attend the session as visitors. They even as visitors ask questions to the facilitators for the problems the face with their crops or field. Sometimes they apply for membership or registration in the FFS. They are given membership if number of farmers is less than 25. Some non-member farmers if demand for the establishment of new FFS, so they are told to complete the number required for establishment of FFS which is 25 normally in FFFSs.

Circulation of knowledge is very important among FFS farmers themselves and the non-member farmers, as knowledge circulation leads towards social learning and innovation. Knowledge can also be shared through demonstration as in the case of FFFS farmers. The famers take the non-member farmers to the field, show the demonstrations and their results. It is also in line with Ndoye (2003) that farmers can learn effectively through watching and observing the practices of other farmers. However the farmers feel fear and don't take risk for the experiments on their fields unless they see such experiments taking place on the experimental plots. It was observed that experimental plots are not only important for farmer school members rather for non-members as well. As, they believe easily what they see and observe. Thus, they then apply the same techniques and technology on their own field.

The FFS members share knowledge and information with their relatives and in the vicinity with other non-member farmers also. For example, the appropriate use of Combos, as one of the farmers narrated that,

"Previously I was using fresh manure which was not good for the crops for being too hot. And I also didn't know that it contains a lot of germs and diseases which are transferred to the soil. I learnt in the FFS that if the Combos is preserved and covered for 3 to 6 months it will decrease the heat and will not be harmful for the crops and soil rather it will benefit the land. After getting this knowledge I used the Combos in the appropriate way for my land. The neighbour farmers inquired me of why I was using Combos. Then I told them the reasons I had learnt in FFS, and later they also applied the same method for their land".

Currently the farmers don't do field experiments any more as there are no experimental plots and the farmers are not ready to take risk on their own fields. The farmers, apart from crops and animals also learnt a lot of non-agricultural things in the FFS, such as making biscuits, sweets, and liquid soap. Female farmers also learnt suing, embroidery and were making handicrafts. This shows that FFS is not an extension approach based only on the transfer of agricultural technology. It on the other hand, also confirms that FFS is based on participatory approach where many of other things are also learnt apart from agriculture.

CHAPTER 6 CONCLUSION AND RECOMMENDATIONS

This chapter concludes the outcome of the case study conducted in three different male, female and mixed FFSs of Fayoum district, Egypt. The conclusion is drawn and recommendations are made after presenting the findings in chapter 4 followed by a thorough discussion in chapter 5. The study will help to know the actual situation of knowledge circulation and learning for social change and innovation.

This study reveals that knowledge circulates among male, female and mixed farmers. Knowledge, however, circulates in different ways such as discussion, dialogues, communicative interactions, field experiments and active participation. The accepted and established role of facilitators in this regard cannot be ignored. Facilitators also contribute on the part of knowledge circulation, however, their performance was found unsatisfactory in terms of information and knowledge delivery. Knowledge is also shared with non-member farmers through discussion, communication and by showing them field experiments.

The study shows that more learning and knowledge circulation is taking place in mixed FFS. There is a sense of competition among mixed farmers and they come up with new ideas. They also respect each other's views and have increased level of tolerance. Both male and female with their collective coordination lead towards innovation and social change. They also have more production by using their different strengths and skills.

The study found that field experiments, AESA, visits to research centre and model fields of other districts were supporting factors which helped them in learning. There was a growing demand by the farmers for experimental plots and field visits to other districts, however, these activities were not exercised due to lack of financial resources. Dominance of some farmers both in female and mixed FFSs affected farmers' participation. Group dynamic activities were also not conducted which is however, considered difficult, in the Egyptian cultural context. Presence of children and absence of male farmers due to market activities affected farmers' participation. In case of female farmers, they have dual responsibility of domestic works as well as farming. Family problems in general and house chore activities by female farmers particular affected their participation.

The study also reveals in-efficiency and the role of facilitators as unsatisfactory in terms of knowledge and information delivery. The facilitators are getting training on weakly basis; however, the training seems to be in appropriate. They have vast experience, nonetheless, the required level of education for better agricultural objectives is lacking. The facilitators also depended on two groups of the FFS members rather to make 4 or 5 groups as a standard for field observation. On observation, there was two facilitators in each FFS and one village promoter in mixed FFS. The village promoter required opportunities to take over the responsibility from facilitators and run FFS on his own.

Despite the fact that agriculture is the major source of income, the study exposes that farmers also generate income by making chees, sweets, liquid soap, biscuits etc. which are learnt in FFSs. The female farmers in particular generate money by handicrafts, embroidery and suing clothes to support their husbands or families. Such an approach explores that FFS is contrary to that of extension methods used in past as liner top-down approach. It is, as also confirmed by farmers, a participatory approach where both farmers and facilitators carry out their activities on horizontal level.

6.1 Recommendations

Based on empirical findings and discussions the researcher suggests the following recommendations:

Farmers

- Options for visiting farms of other districts, nurseries, research centres and food processing could be considered to enhance farmer's knowledge and competencies.

- Options to further enhance networking among farmers might find a place in the activities of the CE.

Facilitator

- Qualified facilitators if appointed might contribute better for the provision of information and knowledge delivery.
- A strategy could be devised and considered for facilitators to get refresher course trainings that might further enhance their competencies on certain topics.
- Options could be considered to provide opportunities for village promoters to run FFS sessions on their own. Furthermore, a plan might be devised for their capacity building and follow up activities.

Local government

- Opportunities for mediated knowledge circulation could be availed through regional TV and radio stations programs where farming issues could be addressed.

- Awareness might be created to establish an increase number of mixed FFS, where more effective learning and knowledge circulation is taking place.

- A strategy for arrangement of experimental plots might contribute to the livelihood and increase production.

- A network among NGOs, FFS, research centre, agriculture educational institutes, fertilizer companies and local government bodies might contribute to good farming practices in the region.

REFERENCES

ALI, A. & SHARIF, M. 2012. Impact of farmer field schools on adoption of integrated pest management practices among cotton farmers in Pakistan. Journal of the Asia Pacific Economy, 17**,** 498-513.

ANSELM, S. & CORBIN, J. 1998. Basics of Qualitative Research. Techniques and Procedures for Developing Grounded Theory. SAGE Publications, Thousand Oaks, USA.

ARCE, A. & LONG, N. 1992. The dynamics of knowledge. Battlefields of knowledge: The.

BARNES, B. 1974. Scientific knowledge and sociological theory, Routledge & Kegan Paul London.

BLAIKIE, P., BROWN, K., STOCKING, M., TANG, L., DIXON, P. & SILLITOE, P. 1997. Knowledge in action: local knowledge as a development resource and barriers to its incorporation in natural resource research and development. Agricultural Systems, 55**,** 217-237.

BODDY, C. 2005. A rose by any other name may smell as sweet but "group discussion" is not another name for a "focus group" nor should it be. Qualitative Market Research: An International Journal, 8**,** 248-255.

BOYCE, C., NEALE, P. & INTERNATIONAL, P. 2006. Conducting in-depth interviews: A guide for designing and conducting in-depth interviews for evaluation input, Pathfinder International.

BRAUN, A., JIGGINS, J., RÖLING, N., VAN DEN BERG, H. & SNIJDERS, P. 2006. A global survey and review of farmer field school experiences. Report prepared for the International Livestock Research Institute (ILRI), Nairobi, Kenya.

DILTS, R. 2001. Scaling up the IPM movement. LEISA Magazine, 17**,** 18-21.

ENGEL, P. G. H. 1995. Facilitating innovation. An action-oriented and participatory methodology to improve innovative social practice in agriculture. Published doctoral dissertation.

FAKIH, M. 2003. Community Integrated Pest Management in Indonesia: Institutionalising participation and people centred approaches, Iied.

FAO & World Bank, (2000) Agricultural Knowledge and Information System for Rural Development (AKISIRD). Strategic Vision and Gu9iding Principles. FAO, Rome and World Bank, Washington.

FRIIS-HANSEN, E., DUVESKOG, D. & TAYLOR, E. W. 2012. Less noise in the household: the impact of Farmer Field Schools on Gender Relations.

GALLAGHER, K. 2003. Fundamental elements of a farmer field school. LEISA-LEUSDEN-, 19**,** 5-6.

GODIN, B. 2006. The linear model of innovation. Science, Technology & Human Values, 31**,** 639-667.

HAINES, A. & CASSELS, A. 2004. Can the millennium development goals be attained? Bmj, 329**,** 394-397.

HUBERT, B., AVELANGE, I., PROOST, M., ISON, R. & BLACKMORE, C. 2005. LEARNing in European Agricultural and Rural Networks: institutions, networks and governance. Final Report. Contract no. HPSE-CT-2002-60059. INRA Paris.

JACOBSON, W. 1996. Learning, culture, and learning culture. *Adult Education Quarterly,* 47**,** 15-28.

JARVIS, P. 1987. Adult learning in the social context, Taylor & Francis.

KAYES, D. C. 2005. Internal validity and reliability of Kolb's learning style inventory version 3 (1999). Journal of Business and Psychology, 20**,** 249-257.

KILPATRICK, S. 1996. Change, training and farm profitability.

KLINE, S. J. & ROSENBERG, N. 1986. An overview of innovation. The positive sum strategy: Harnessing technology for economic growth, 275**,** 305.

KNICKEL, K., BRUNORI, G., RAND, S. & PROOST, J. 2009. Towards a better conceptual framework for innovation processes in agriculture and rural development: from linear models to systemic approaches. Journal of Agricultural Education and Extension, 15**,** 131-146.

KOLB, D. A. 1984. Experiential learning: Experience as the source of learning and development, Prentice-Hall Englewood Cliffs, NJ.

LEEUWIS, C. & BAN, A. 2004. Communication for rural innovation, Wiley Online Library.

LUTHER, G. C., HARRIS, C., SHERWOOD, S., GALLAGHER, K., MANGAN, J. & GAMBY, K. T. 2005. Developments and innovations in Farmer Field Schools and the training of trainers. Globalizing Integrated Pest Management**,** 159-190.

MARGARET, M. & PHD, K. 2006. Organic farmer networks: facilitating learning and innovation for sustainable agriculture. Journal of Sustainable Agriculture, 28**,** 5-28.

MEARS, C. L. 2012. Reclaiming School in the Aftermath of Trauma: Advice Based on Experience. Palgrave Macmillan.

MILBRATH, L. W. 1989. Envisioning a sustainable society: Learning our way out, State Univ of New York Pr.

MOSTERT, E., PAHL-WOSTL, C., REES, Y., SEARLE, B., TÀBARA, D. & TIPPETT, J. 2007. Social learning in European river-basin management: barriers and fostering mechanisms from 10 river basins. Ecology and Society, 12**,** 19.

MURO, M. & JEFFREY, P. 2008. A critical review of the theory and application of social learning in participatory natural resource management processes. Journal of Environmental Planning and Management, 51**,** 325-344.

NAGEL, U. J. 1980. Institutionalization of knowledge flows: an analysis of the extension role of two agricultural universities in India.

NDOYE, A. 2003. Experiential learning, self-beliefs and adult performance in Senegal. International Journal of Lifelong Education, 22**,** 353-366.

OKALI, C., SUMBERG, J. & REDDY, K. 1994. Unpacking a technical package: flexible messages for dynamic situations. Experimental Agriculture, 30**,** 299-310.

PANDOLFELLI, L., MEINZEN-DICK, R. S. & DOHRN, S. 2007. Gender and collective action: A conceptual framework for analysis. CAPRi working papers.

PONTIUS, J., DILTS, R. & BARTLETT, A. 2002. From farmer field school to community IPM: ten years of IPM training in Asia, FAO Community IPM Programme, Food

and Agricuture Organization of the United Nations, Regional Office for Asia and the Pacific.
POWELL, R. A. & SINGLE, H. M. 1996. Focus groups. International journal for quality in health care, 8**,** 499-504.
RACE, P. 2001. Using feedback to help students learn. The Higher Education Academy.
RALLIS, S. F. & ROSSMAN, G. B. 2011. Learning in the field: An introduction to qualitative research, Sage Publications, Inc.
Rogers, E.M (1983) Diffusion of innovations, 3rd edn. Rree Press, New York.

SEN, A. 2002. Rolling tachyon. Journal of High Energy Physics, 2002**,** No pp. given.
SILLITOE, P. 1998. The development of indigenous knowledge. Current Anthropology, 39**,** 223-252.
SINCLAIR, J. M., WILKES, G. A., KREBS, W. A. & TREFFRY, D. 2000. Collins English Dictionary, HarperCollins.
TAYLOR, E. W. 2007. An update of transformative learning theory: A critical review of the empirical research (1999–2005). International Journal of Lifelong Education, 26**,** 173-191.
VAN DE FLIERT, E., DUNG, N. T., HENRIKSEN, O. & DALSGAARD, J. P. T. 2007. From collectives to collective decision-making and action: Farmer field schools in Vietnam. Journal of Agricultural Education and Extension, 13**,** 245-256.
VAN DE POL, J. 2003. The Egyptian experience with FFS. LEISA-LEUSDEN-, 19**,** 22-23.
VAN DE POL, J. & AWAD, S. M. S. The FFS approach in the Arab world: the Egyptian experience. 2002. 21-25.
VAN DEN BERG, H. & JIGGINS, J. 2007. Investing in farmers—the impacts of farmer field schools in relation to integrated pest management. World Development, 35**,** 663-686.
VAN VLIET, H. Spinning the Wheel: Organizing Knowledge Circulation.
WENGER, E. 1998. Communities of practice: Learning, meaning, and identity, Cambridge Univ Pr.
WESTERMANN, O., ASHBY, J. & PRETTY, J. 2005. Gender and social capital: The importance of gender differences for the maturity and effectiveness of natural resource management groups. World Development, 33**,** 1783-1799.
WONG, L. 2008. Data analysis in qualitative research: a brief guide to using NVivo. Malaysian Family Physician, 3**,** 14-20.

ANNEXS

ANNEX – 1 Informed Consent Form

Fayoum Farmer Field School, Fayoum.

Informed Consent Form

I would like to thank you for giving your valuable time for this interview. My name is Muhammad Hashim Durrani and I am a master student at Van Hall Larenstein University, Wageningen, Netherlands. I am here on my research to explore how knowledge circulation, learning for social change and innovation is taking place in Fayoum Farmer Field School. I am assessing the effectiveness of the sessions in relation to the research topic so that to capture lessons that can be used in future interventions to improve the sessions further in FFFS.

You have been selected as a possible participant for this interview by the district team because of your experience in Fayoum FFS. The interview will be specifically about the above mentioned research topic. The interview will take time between 45 min to 60. I will be taking some notes during the session. All responses will be kept confidential. This means that your interview responses will only be shared with VHL University and research team members and we will ensure that any information we include in our report does not identify you as the respondent.

Remember, you don't have to talk about anything you don't want to, during the observation of fast you may feel inconvenient, however, you may end the interview at any time. Are there any questions about what I have just explained? Are you willing to participate in this interview?

Thank you

You are making a decision whether or not to participate. Your signature indicates that you have read the information provided above and have decided to participate. You may withdraw at any time without penalty or loss of benefits to which you may be entitled after signing this form should you choose to discontinue participation in this study.

Signature and Date:

Signature of Witness /Signature of Interviewer

ANNEX -2 Checklist for farmers

Name of the respondent:
Age:
Sex:
Marital Status:
Date of interview:
District:
Village:

Exploring knowledge circulation and learning for social change

To obtain a general overview:

1. How are the sessions in FFS organised and announced?
2. What kinds of topics are discussed in weekly session in FFS? Can you give example for each one?
3. How do these sessions differ during the year?
4. Can you describe a session you attended?
5. How do you learn and circulate the knowledge among yourselves in the FFS?

To assess the impact:

6. What are the main results of the weekly session?
7. How do you transfer and share knowledge you learnt at FFS to your neighbour farmers?
8. Do you conduct field experiments and how does a field experiment benefit you?
9. What new changes and innovations have taken place on your farms and how did it happen?

To know about farmers' participation:

10. What issues are affecting your participation in FFS and how do they affect?
11. Are you always present and equally participate in the discussion during the sessions in the FFS?

Identifying factors that influence knowledge circulation, learning and innovation

To explore the role of facilitators and farmers:

12. What do facilitators do in the context of FFS regarding:
    a. Facilitating the sessions in FFS
    b. Supporting innovation and social change
    c. Circulating knowledge among famers

13. How significant is the role of facilitator in the FFS?

To assess the learning session- barriers to learning, knowledge circulation:

14. What are the supporting factors that help to encourage learning, innovation and knowledge circulation among you?
15. What are the non-supporting factors that inhibit learning, innovation and knowledge circulation among you?
16. What problems do you come up with during the session and how are they solved?
17. What training materials are used in FFS which improve your performance on learning, field experiments and innovation?
18. What training materials do you lack in FFS which influence your performance on learning, field experiments and innovation?

To compare the FFS for diverse compositions:

19. In your view, what are the similarities among (male, female and mixed) FFSs in terms of knowledge, learning, change & innovation?
20. In your view, what are the differences among (male, female and mixed) FFSs? And in which FFS more learning and knowledge is taking place? Can you give an example of any change or innovation that has taken place?
21. In your view, in which FFS more effective learning, innovation and knowledge circulation is taking place? And why?
22. In your view, among the three FFSs (male, female and mixed) in which FFS less learning, innovation and knowledge circulation is taking place? And why? Could you please describe the factors?

To assess the impacts of policies:

23. Has any social change occurred as a result of learning and knowledge sharing in your community? Can you give any example?
24. What do you recommend to enhance the improvement of learning and knowledge circulation in FFS?

ANNEX – 3 ***Checklist for Facilitators***

Name of the respondent:
Age:
Sex:
Date of interview:
District:
Village:

1) For how long have you been serving as a Facilitator? What difference do you feel b/w Facilitator and Extension worker?
2) In how many FFSs do you conduct sessions?
3) What is the curriculum of FFS and who develops it? How this curriculum is made operational?
4) How do you come to know that farmers are learning and how do you evaluate/assess their learning process? (Description & example)
5) How do farmers share their knowledge among themselves and with non-participant farmers of FFS? (Any example)
6) As a result of their learning and knowledge sharing what changes/new ideas and innovations have taken place? And how? (Examples of innovation)
7) What social change has occurred in the villages as a result of their knowledge sharing and learning? (e.g. change in behaviour, different way of thinking, acceptance of external inputs)?
8) In which FFS more effective learning, innovation and knowledge circulation is taking place? And why? (explanation and example)
9) In which FFS less learning, innovation and knowledge circulation is taking place? And why? Could you please describe the factors?
10) Can you please explain that how the topics are different in female FFS than that of male and mixed FFSs?
11) What issues are affecting farmers' participation in FFS, how do they effect and how their issues are addressed?
12) What are the main issues of female FFS participants and how they are solved?
13) Can female farmers solve their problems by themselves? Any example?
14) What are the supporting factors that help to encourage learning, innovation and knowledge circulation among farmers?
15) What are the non-supporting factors that inhibit learning, innovation and knowledge circulation among you?
16) What social topics are discussed? Why they are discussed and what are their impacts?
17) What kind of trainings do you get in the training centre?
18) How do you apply this training in the FFS and what are their results?
19) Why farmers are divided in two groups for AESA /field visit, whereas internationally they are divided in 4 and 5 groups?
20) Why FFS sessions are for two hours only?

21) What training materials are used in FFS which improve farmers' performance on learning, field experiments and innovation process?
22) What training materials do you lack for FFS sessions which influence your performance on sessions?
23) What are the local, regional or national policies affecting learning, innovation and social change in FFS?
24) What do you recommend to enhance the improvement of learning and knowledge circulation in FFS?

ANNEX – 4 ***Checklist for District Coordinator***

Name of the respondent:
Age:
Sex:
Date of interview:
District:

1) For how long have you been serving as a Facilitator? What difference do you feel b/w Facilitator and Extension worker?
2) In how many FFSs do you conduct sessions?
3) What is the curriculum of FFS and who develops it? How this curriculum is made operational?
4) How do you come to know that farmers are learning and how do you evaluate/assess their learning process? (Description & example)
5) How do farmers share their knowledge among themselves and with non-participant farmers of FFS? (Any example)
6) As a result of their learning and knowledge sharing what changes/new ideas and innovations have taken place? And how? (Examples of innovation)
7) What social change has occurred in the villages as a result of their knowledge sharing and learning? (e.g. change in behaviour, different way of thinking, acceptance of external inputs)?
8) What are the reasons of forming three types of FFSs? And how each FFS is different from the other? (in terms of learning, exchange of knowledge, change & innovation)
9) In which FFS more effective learning, innovation and knowledge circulation is taking place? And why? (explanation)
10) In which FFS less learning, innovation and knowledge circulation is taking place? And why? Could you please describe the factors?
11) What issues are affecting farmers' participation in FFS, how do they effect and how their issues are addressed?
12) What are the supporting factors that help to encourage learning, innovation and knowledge circulation among farmers?
13) What are the non-supporting factors that inhibit learning, innovation and knowledge circulation among you?
14) What educational standard do facilitators have and do you think this educational level is enough for facilitators?
15) What trainings do facilitators get in the training centre and how do you evaluate or assess their learning/outcomes of the training?
16) How do facilitators apply this training in the FFS and what are their results?

17) Why still there are two facilitators for one FFS and how many village promoters have come out through the process?

18) Why farmers are divided in two groups for AESA /field visit, whereas internationally they are divided in 4 and 5 groups?
19) Why FFS sessions are for two hours only?
20) Why government doesn't continue the practices carried out on learning plots?
21) What are the local, regional or national policies affecting learning, innovation and social change in FFS?
22) What do you recommend to enhance the improvement of learning and knowledge circulation in FFS?
23) Do the agricultural researchers try to impose their knowledge or consider their knowledge better than that of the local knowledge of farmers?
24) How is the gape bridged between the local knowledge of farmers and scientific knowledge of agricultural experts/researchers?

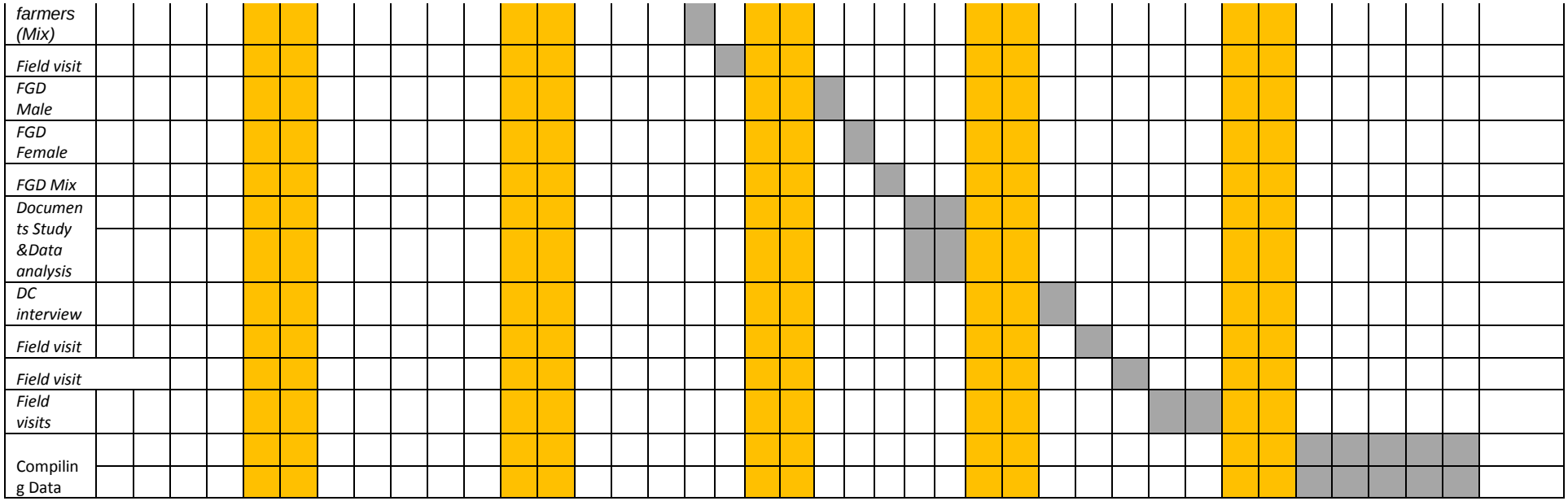
ANNEX – 5 Workplan for Field Work

Six Weeks WorkPlan for Field work
Farmer Field School, Fayoum District, Egypt

Date: 19-07-2012

Hashim Durrani

Activities	1st Week				W-end		2nd Week					W-end		3rd Week					W-end		4th Week					W-end		5th Week					W-end		6 Week					Departure
	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Introduction																																								
Study of Project docs & Work Plan																																								
Workplan submission																																								
Checklist Translation																																								
Documents Study																																								
Male farmers interview																																								
Facilitators' Interviews (3)																																								
Female farmers Interv																																								
Male farmers (Mix FFS)																																								
Female																																								


farmers (Mix)
Field visit
FGD Male
FGD Female
FGD Mix
Documents Study &Data analysis
DC interview
Field visit
Field visit
Field visits
Compiling Data