

## Article

# The Rise of Emergent Corporate Sustainability: A Self-Organised View

Roger Maitland <sup>1,\*</sup>  and Walter Baets <sup>1,2,3</sup> 

<sup>1</sup> Graduate School of Business, University of Cape Town, Portwood Road, Green Point, Cape Town 8001, South Africa; W.R.J.Baets@hr.nl

<sup>2</sup> Rotterdam Business School, Rotterdam University of Applied Sciences, Kralingse Zoom 91, 3063ND Rotterdam, The Netherlands

<sup>3</sup> Eindhoven Engine, Horsten 1, 5612AX Eindhoven, The Netherlands

\* Correspondence: roger.maitland@alumni.uct.ac.za

**Abstract:** Escalating climate crisis activism highlights the potential of self-organised approaches in sustainability to address the disconnect between corporate sustainability activities and globally declining ecological systems. This paper argues that corporate sustainability is a co-evolutionary process of emergence which may enable organisations to address this disconnect by creating a context supportive of emergence within the organisation rather than reacting to pressures from outside. An exploratory mixed-methods case study was used to explore how corporate sustainability emerged in two financial services institutions. This article develops the idea of corporate sustainability as a co-evolutionary process of emergence and presents a framework to assist organisations to cultivate sustainability. It adopts a complexity view and posits that reductionism associated with Newtonian thinking has contributed to the sustainability issues faced by humanity. This study suggests that the paradigmatic assumptions that have contributed to the sustainability crisis must be interrogated to create an environment which is conducive to the emergence of corporate sustainability. Through examining corporate sustainability as an emergent process, this paper sheds light on how businesses can foster conditions in which a self-organised response to sustainability challenges is distributed across the organisation whilst being embedded in the containing system.

**Keywords:** emergence; coherence; corporate sustainability; complex adaptive systems; complexity; sustainability; systemic coaching



**Citation:** Maitland, R.; Baets, W. The Rise of Emergent Corporate Sustainability: A Self-Organised View. *Systems* **2021**, *9*, 35. <https://doi.org/10.3390/systems9020035>

Academic Editor: Stefano Armenia

Received: 6 March 2021

Accepted: 19 April 2021

Published: 13 May 2021

**Publisher's Note:** MDPI stays neutral with regard to jurisdictional claims in published maps and institutional affiliations.



**Copyright:** © 2021 by the authors. Licensee MDPI, Basel, Switzerland. This article is an open access article distributed under the terms and conditions of the Creative Commons Attribution (CC BY) license (<https://creativecommons.org/licenses/by/4.0/>).

## 1. Introduction

The exponential rise in climate activism has seen sustainability enter mainstream discourse. In 2018, the Intergovernmental Panel on Climate Change (IPCC) warned that humanity had 12 years to avert an ecological catastrophe [1]. Calls to “mobilize to save civilization” ([2], p. 261) have since strengthened into movements such as the global school climate strike, leading to a public declaration by “Scientists for the Future” which has over 12,000 signatories [3]. This intergenerational pressure has broadened into the global extinction rebellion, which too has attracted support from prominent scientific bodies [4]. Whilst there has been a recent intensification, the wider sustainability movement has been described as the largest movement in history, a vast and decentralised movement which “coheres into a values system but not a belief system” ([5], p. 176).

The transition to a sustainable future is complex, transdisciplinary and vast in scope. Whilst this transition has been referred to as a great transformation [6,7], it can be seen as a series of interconnected transitions [8]. It is inconceivable that the magnitude of this transition can be addressed by anything other than system-wide self-organised processes. This paper argues that corporate sustainability, when viewed as an emergent process, provides a potentially useful approach to engage system-wide self-organising processes.

It is important to consider corporate sustainability as organisations are crucial stakeholders in working towards the achievement of the sustainable development goals set out in the 2030 Agenda for Sustainable Development [9]. In particular, the financial services sector is important due to its ability to influence environmental and sustainability impacts of financed projects and investments [10,11], yet the financial services sector performance has been criticised for performing poorly in sustainability and corporate social responsibility [12]. The importance of the role of this sector is highlighted by the recent United Nations Environment Programme Finance Initiative Collective Commitment to Climate Action with 38 signatories across six continents, banks representing in excess of USD 15 trillion in assets to align their strategies with the temperature goals of the Paris Agreement [13]. In this way, “banks signal to all stakeholders that this change [low-carbon transition] is both necessary and feasible” ([13], p. 9).

Corporate sustainability is defined as the “inclusion of social and environmental concerns in business operations and interactions with stakeholders” ([14], p. 107). Despite its proliferation in academic research, corporate sustainability has been criticised for being insufficiently integrated into business models [15] strategic imperatives [16], and culture [17].

Prior research focused on the integration of corporate sustainability into specific disciplines such as strategic management [18,19], management control and reporting [20], knowledge management and innovation [21], and project management [22]. These approaches, however, do not address sustainability as a fundamental change in the functioning of an organisation to create a better fit between the organisation and the environment [23]. This fit is achieved by understanding corporate sustainability as an emergent process rather than integrating or embedding sustainability in particular business disciplines [24,25].

A holistic paradigm is needed to counter the fragmented approach which has resulted in an enduring disconnect between corporate sustainability initiatives and the declining environment [26,27]. Since the sustainable development goals and targets are “integrated and indivisible, global in nature and universally applicable” ([9], p.13), organisations need to carefully consider trade-offs and synergies associated with the complex inter-dependence between the goals and targets [28]. This necessitates a holistic approach to corporate sustainability. Whilst the assessment of sustainability in business has often been top-down, these standardised policy-driven approaches at times exclude important contextual issues. Bottom-up approaches have the advantage of ensuring that sustainability initiatives are contextually relevant, but they may lack commensurability [29]. Approaches such as the Economy for the Common Good model (ECG) and B-Corps are considered bottom-up as they invite voluntary membership and assessment. The ECG model focuses on business contribution to the common good, acknowledging economic growth as a means to achieve human welfare rather than an end in itself [30]. Companies are assessed using a matrix and their contribution is made transparent in a common good balance sheet, with products receiving a ECG label and common good score enabling informed consumer choices. Similarly, B-Corps are for-profit yet socially obligated corporate forms holding membership of a voluntary association subject to independent assessment standards. [31]. The B-Impact assessment results are visible to consumers thereby encouraging informed decision making. These approaches provide practical mechanisms to support the use bottom-up assessment as organisations work towards the sustainable development goals. However, to implement these voluntary bottom-up approaches it is important to understand corporate sustainability as a self-organised emergent process.

Approaching corporate sustainability from a complexity paradigm is useful in achieving a more holistic grasp of the transition [32,33]. This paper explores the emergence of corporate sustainability within two financial services organisations in Southern Africa and considers the paths of coherence through which it has emerged. This exploratory case study used a mixed-methods explanatory sequential design [34]. The Cassandra survey, a holistic organisational measure [35], was implemented in the quantitative strand. The data were organised into clusters using self-organising maps [36], and narrative interviews

were conducted in the subsequent qualitative strand. The qualitative data were analysed using narrative analysis [37] and used to explain the quantitative results.

This study positions corporate sustainability as a self-organised emergent process and makes three contributions to theory. First, the modes by which corporate sustainability is enacted are proposed. Second, our understanding of the process of emergence is enriched by showing how zones of coherence develop and support emergence. Third, the conditions associated with the emergence of sustainability are identified which helps to explain how the shift to corporate sustainability occurs. Practical implications are explored and collaborative and decentralised approaches such as systemic coaching and facilitation are suggested to support the cultivation of patterns of self-organisation rather than attempting to control the process of change.

The article begins with a review of the literature on emergence and coherence in corporate sustainability, which is followed by a discussion of the methods employed. The quantitative and qualitative strands of the results are then presented. Finally, theoretical and practical implications of the research are discussed, and conclusions drawn.

## 2. Corporate Sustainability as an Emergent Process

A complexity approach is useful in corporate sustainability, as it avoids “the danger of examining shifts in business paradigm in isolation without properly appreciating the interconnectedness of the private sector with a number of agents in a complex adaptive system” ([38], p. 441). Complex adaptive systems are open systems consisting of parts which are themselves whole systems operating according to their own intentions and rules. The parts interact with and adapt to one another; this over time results in order in the system [39]. Whilst it is useful to approach organisations as complex adaptive systems [40,41], conceptualising corporate sustainability requires that “organisations recognise their agent status amongst a much wider and highly complex array of interconnected, dynamic economic, environmental and social systems” ([23], p. 195).

The problems associated with sustainable development are often wicked, involving multiple interacting systems, replete with uncertainties occurring at both institutional and social levels, and often lacking definitive formulation [42]. Characterised as symptoms of other problems, wicked problems are interconnected, meaning that solutions are partial and can be seen as better or worse, rather than right or wrong [43]. These features make it difficult to address wicked problems using linear and centralised approaches to change.

Wicked problems require networks of diverse agents to work collaboratively in sense-making and designing solutions to address complex and transdisciplinary issues. The partiality and reductionism present in the perspectives of any agent or group of agents means that hierarchical and linear approaches to change are insufficient. It is more useful for organisations to create conditions in which emergence is likely to occur. Emergence is defined as “the arising of novel and coherent structures, patterns and properties during the process of self-organisation in complex systems” ([44], p. 49). Agents interact at a local level in complex adaptive systems according to simple rules that govern local interactions. This interaction results in complex patterns in the system [45], which in turn affect the ongoing interaction of agents at a local level. Emergent self-organisation has been described as the “anchor point phenomenon” of complexity theory ([46], p. 502).

These patterns of emergence have already shown promise in the escalating climate activism. Emergence theory has been successfully applied to monitoring sustainability [47], and sustainable enterprise [48], yet application of emergence theory in corporate sustainability is still nascent, perhaps because “the gap between complexity theory and the language of management sometimes limits our awareness of emergence” ([48], p. 22).

Emergence is a dynamic property that arises from the interaction of many agents at a local level and should not be conflated with planned change or “a force that someone can operate” ([41], p. 81). An emergent approach to corporate sustainability can be seen as “an emergent quality that occurs when the interactions within the system, and between

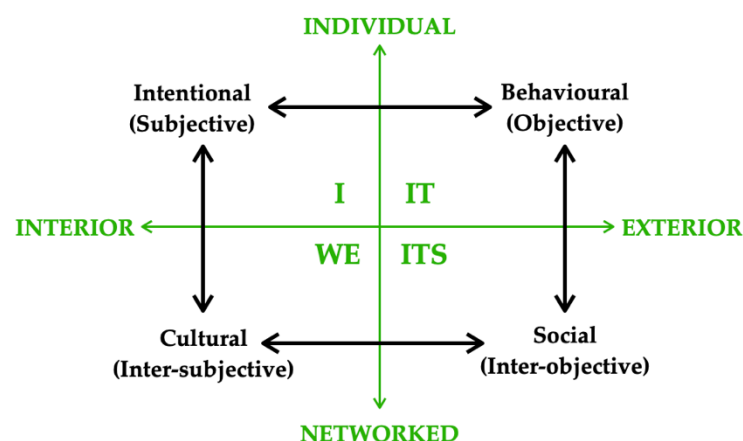
the system and its environment are nourishing” ([47], p. 1). Of grave concern is that interactions between organisation and environment remain far from nourishing.

### 3. Coherence in Emergent Corporate Sustainability

Developing nourishing interactions between organisation and environment requires the cultivation of coherence within and across multiple levels of system [49,50]. Whilst it is more common for firms to use mechanistic metaphors such as “alignment” within a system of hierarchical control, the rigid application of autocratic management results in the degeneration of a system [51].

Coherence is defined as “the degree of order, harmony, and stability in various rhythmic activities, which reflects the regulation of interconnected biological, social, and environmental networks” ([52], p. 2). Whilst coherence takes different forms and can occur at different scales, it is characterised as “long range order in space or time” ([53], p. 157). At an organisational level it can be defined as global coherence amongst synchronised subsystems [54]. This involves the freedom to self-organise whilst simultaneously maintaining a coherent strategic orientation. It is through coherence of structures, patterns and properties of the complex adaptive systems that emergence arises [44].

When considering coherence it is important to do so within a holistic view of the organisation, which is helpful in ascertaining the extent to which interactions between agents, system and environment are nourishing [47]. The integral quadrants model [55], displayed in Figure 1, provides a holistic conceptualisation of a firm. The model is built from two dichotomies, namely exterior-interior and individual-networked (collective), which together create four quadrants that describe the intentional, behavioural, cultural and social domains of reality. All too often the emphasis in corporate sustainability is on exterior domains; however, the interior domains are also required to enable sustainability to be enacted [56]. The exterior emphasis is typically seen as, for example, a focus on driving sustainability through targets and compliance, whereas a more holistic approach is achieved through broadening the focus to include interior domains. This can be implemented, for example, by asking all employees to link their roles to the sustainable development goals and fostering a culture in which sustainability is valued, thereby encouraging self-organisation whilst cultivating coherence. Coherence can be considered as the “balanced, long-term ‘coevolution’ of these four quadrants” ([57], p. 176). Conceptualised in this way, organisational coherence allows us to “consider multiple and incommensurable logics to be an essential ingredient of social realities” ([58], p. 8).



**Figure 1.** Emergence as integral process (Adapted with permission from [59], Copyright 2014 Springer.)

### 4. The Ontology of Complexity and Emergent Spacetime

The intractability of problems such as corporate sustainability, sustainable development and climate change challenge the viability of assumptions and paradigms within

which these problems were created. The challenges associated with sustainable development can be seen to be partly a consequence of the Newtonian paradigm [24,32,33,60], in which reality is understood through analysis of its components. Periods of “revolutionary science”, Kuhn [61] argues, are needed to disrupt “normal science” by challenging the conceptual frameworks or scientific paradigms underpinning scientific theories, thereby avoiding being “caged by the paradigms within which we currently operate” ([62], p. 98). A complexity paradigm is increasingly recognised in the sustainability [32,33,62–64] and corporate sustainability literature [24,65–68].

Shifting from a Newtonian to a complexity paradigm invites the perceiver to move from viewing external reality as substantial [32] to seeing it as being composed of immaterial connections [69]. Reality appears as process rather than as things [32]; this can be conceptualised as “relatively stabilized relational configurations that have evolved as actualities out of an infinite number of possibilities” ([70], p. 282). Process metaphysics, as opposed to particle metaphysics forms a useful basis for ontological emergence [71]. Following the analogy of the Greek philosopher Heraclitus, you cannot step into the same river twice, as the waters are ever changing. “Process metaphysics accordingly stresses the need to regard physical things—material objects—as being no more than stability-waves in a sea of process” ([72], p. 53). Process metaphysics is consistent with quantum field theory, which has displaced the classical notion of particles, where quantum fields can be understood as processes [71].

Acknowledging the emergent nature of reality thus requires a shift in ontological position: reality is no longer perceived as a pre-existing container, but as an emerging and unified spacetime [62,69,71]. This represents a radical shift from managing change to a creative participation in emergence at different scales, which Chapman ([32], p. 112) suggests can be visualised as a fourth dimension of a flattened three-dimensional Newtonian view of reality:

*“Grasping reality as emerging rather than changing requires a logical jump in how we think about time. Instead of thinking about time and space as separate entities (as per Newtonian classical mechanics), one must think of them as being unified in the fourth dimension as spacetime (as per Einstein’s special relativity). In other words, it requires that we see time as integrated with space into a flow of events, rather than as a separate unrelated dimension”.*

A unified spacetime has important implications for corporate sustainability: the focus is no longer on managing change or adapting to the environment, but rather on an ongoing co-evolutionary process in which the corporate form functions in coherence with its environment. This ongoing process of emergence moves through retroactive encounters between order, disorder and organisation [73]. The interaction of the parts, systems and environment gives rise to the emergent behaviour of the system [51]. Approached in this way, corporate sustainability is ongoing and emerges as self-organising agents enact constructive ecological perspectives within networks of agents operating at a local level. This is, however, problematic: complex phenomena such as climate change can be difficult to perceive as they are ontologically plural and epistemologically distant [74]. Agents run the risk of not recognising or acknowledging environmental thresholds [27,75]. As an ontologically plural phenomenon, climate change is a multiplicity of interacting phenomena. A climatologist comparing tree rings perceives cycles of drought, whereas a banker may see a declining property market as partly due to a regional drought [76]. The framing of the problem and methodology employed to interact with reality affect what is perceived.

Epistemological distance represents another challenge in corporate sustainability. The rich interconnections associated with complex problems create cascades of non-linear effects whereby some environmental problems “speak louder” than other problems [74,77]. Epistemological distance is the extent to which a phenomenon can be perceived. Whereas first order states such as an oil spill are readily seen, second order states such as dioxin in the environment can only be detected with the use of instruments, and third order states



such as climate change can only be grasped through multiple indicators [74,76]. Corporate sustainability thus requires multiple methodologies to be enacted [74]. Observers within a complexity paradigm are participants who co-create an interconnected material world; cognition becomes an active process of relating between organism and environment [32], rather than a Newtonian conceptualisation of observers processing information. This requires a co-constructivist epistemology in which the construction of reality is co-determined by the people and the world they inhabit, as well as their socio-cultural and paradigmatic context [73]. Seen from within a complexity paradigm, cognition is embodied [78], and enacted [79].

Embodiment suggests that “cognition is situated in the interaction of body and world . . . and assumes cognition evolved for action, and because of this, perception and actions are not separate systems, but are inextricably linked to each other and to cognition” ([80], p. 428). From this perspective, thinking emerges from the interaction of brain, body and environment, and is often metaphoric, occurring beneath conscious awareness [78]. Whilst this is well suited to phenomena which can be perceived directly, the epistemological distance of abstract concepts relating to climate change and corporate sustainability are less likely to be coherent with metaphors that have been embodied through direct experience, such as the growth metaphor which is central to economic thinking yet at odds with sustainable development [24,27,81]. Embodiment is helpful in illuminating and addressing this decoherence and thus is potentially useful in emergence in corporate sustainability.

Varela, Thompson and Rosch [79] expand the embodiment perspective usefully to incorporate both sensorimotor capacities within the body and the embedding of these capacities in biological, psychological and cultural contexts. The poet Antonio Machado expresses this clearly: an agent “lays down a path in walking” [79] through embodied action. This ontological enactment of reality acknowledges a circularity between self and world [79]. Emergent corporate sustainability thus needs to be considered across multiple levels, namely how sustainability is embedded in the environment, embodied in the agents and enacted in the world; it is through the triad between these levels that sustainability emerges through co-evolutionary self-organisation.

## 5. Materials and Methods

This exploratory case study used a mixed-methods explanatory sequential design [34]. Methodological pluralism is useful in research design when studying complex phenomena [42,74]. Two financial institutions operating in Southern Africa that were actively addressing sustainability initiatives were identified. Case A is a large Namibian financial services group with subsidiaries, at the time of data collection, in Botswana and Zambia, whereas Case B is a Namibian subsidiary of a large South African financial services group with a regional footprint. Both groups operate in wholesale and retail banking, insurance, asset management and wealth management. Case A was selected as it had introduced complexity-based methods in strategic and culture initiatives, whilst Case B had been recognised as an exemplar for corporate sustainability.

A case study research strategy was used to explore corporate sustainability in its real-world context as this approach is useful when boundaries between the phenomenon and context are unclear [82]. Corporate sustainability is associated with a wide set of variables and open system boundaries [83].

The Cassandra survey, a holistic organisational measure [35], built on the integral quadrants model [55], was used in the initial quantitative strand of the research. The Cassandra survey (Appendix A) measures eight axes, namely, (i) diversity, (ii) complexity, (iii) personal wellbeing, (iv) leadership and teamwork, (v) financial performance, (vi) innovation potential, (vii) sustainable development and social responsibility, and (viii) knowledge and learning. An artificial neural network analysis was conducted using self-organising maps to organise the data into clusters [36]. The subsequent qualitative strand used narrative interviews to explain the quantitative results [84]. A narrative approach to the qualitative data analysis prioritises the holistic and emergent properties of the

data [85]. The interview data were explored to develop a framework that explained the quantitative data.

## 6. Quantitative Strand

### 6.1. Contextualisation of the Cassandra Survey

Minor revisions were made to the instrument to enhance comprehension by the target population, since the use of technical or unfamiliar terms can reduce the reliability of the measure [86]. This was important as it was the first time the instrument had been implemented in Namibia, Botswana and Zambia. Despite adjustments being minor, additional background testing was conducted to ensure the theoretical structure had been retained in the target population. A sample of 10 recognised experts across different functional disciplines and levels of seniority were identified using purposive sampling. After having completed the online survey, respondents participated in a semi-structured interview to ascertain whether their understanding of the revised items was consistent with the original wording. These data were used to further refine the language used in the instrument. The survey was fully implemented as the revisions were minor and the instrument had previously been validated [87].

### 6.2. Further Testing of Validity and Reliability of the Cassandra Survey

Although revisions were minor, background tests were implemented to monitor the performance of the Cassandra survey within the target population to ensure that the theoretical structure was maintained. The instrument was tested for internal consistency using Cronbach's alpha, and the values are displayed in Table 1. The values all exceed the 0.7 threshold used in social science research [88]. The results showed an acceptable level of reliability with an overall average across both cases of 0.9013.

**Table 1.** Cronbach's alpha.

Axis	Case A: Cronbach's Alpha	Case B: Cronbach's Alpha	No. of Items
Diversity	0.8776	0.9171	9
Complexity	0.8829	0.9095	7
Personal wellbeing	0.8928	0.9129	9
Leadership and teamwork	0.8949	0.8985	9
Financial performance	0.9189	0.8767	5
Innovation potential	0.9081	0.9102	7
Sustainability and social responsibility	0.9090	0.9231	15
Knowledge and learning	0.8921	0.8968	11
Total scale	0.8970	0.9056	72

A confirmatory factor analysis (CFA) was conducted to determine whether the structure in the data fitted with the theoretical structure of the instrument. The CFA was implemented for each case in R using the Lavaan package. A full information robust maximum likelihood estimator (MLR), a method of estimating parameters of a statistical model with respect to observations, was used as it allows for inclusion of missing data and is robust to non-normality in the data [89]. Since the Cassandra survey had already been construct validated, a confirmatory approach was used to assess the revised model for goodness of fit. It should be noted that the Cassandra instrument, being based on a complexity paradigm, does not fit with the statistical conditions of a reductionist approach [24], and a factor analysis is based on the assumption of a "linear relationship between the factors and the variables when computing the correlations" ([90], p. 80). This is not the case with complex systems which have non-linear interactions between elements [32,33,51].

Despite this and the prior construct validation of the instrument [87], a cautious approach was adopted to ensure the instrument performed in the target population.

A sample size of 300 or more is recommended for CFA [91]. Case A has 434 observations which is well beyond the minimum sample size, but it should be noted that Case B is smaller with 177 observations. The maximum likelihood factor extraction technique was implemented. The differences between the observed and estimated covariance matrices were evaluated for goodness of fit. An absolute fit index was used, which shows how well an a priori model reproduces the sample data [92]. Absolute fit measures provide “the most fundamental indication of how the proposed theory fits the data” ([93], p. 53); this was the aim of the re-testing of the instrument.

Due to the complexity of the instrument and sample size, the root mean squared error of approximation index (RMSEA) was selected: it tests the null hypothesis for a “close fit” rather than an exact fit [94], thereby making allowances to some extent for the dynamic interconnected nature of complex adaptive systems. Whilst RMSEA values of  $\leq 0.05$  can be considered a good fit, values between 0.05 and 0.08 can be considered an adequate fit [94]. Case A, RMSEA = 0.043 [90% CI = 0.041, 0.044] can be considered a good fit, whilst Case B, RMSEA = 0.070 [90% CI = 0.067, 0.073] can be considered an adequate fit. Both higher values of the 90% confidence interval are below the 0.80 limit [95] and the lower value of Case A is below the 0.05 limit [95]. The instrument performed well with respect to both reliability and construct validity, particularly given the complexity of an integrally informed model that attempts to provide a holistic assessment of a complex adaptive system.

### 6.3. Quantitative Procedures

The entire population of employees from supervisory level and above in each of the two cases were selected. Junior employees were excluded due to the complexity of the Cassandra survey and anticipated difficulties in completing the survey because of a lack of access to information. Case A included responses from Namibia, Botswana and Zambia, whilst Case B included responses from Namibia. The response rate for each case is displayed in Table 2. The overall response rate of 44.45% was considered very strong given the length of the instrument.

**Table 2.** Response rate.

Operation	Total Population	Number of Responses	Percentage Response
Case A	1370	434	31.67%
Case B	311	178	57.23%
Overall	1681	612	44.45%

Due to the complexity of the instrument it was decided to provide an “I do not know” response option. To be included, respondents had to have completed all items on axes for a minimum of 50% of the axes. Composite scores were derived and the Supersom function on the Kohonen package on R was implemented. In these cases, distances were normalised using:

$$\frac{n}{n - nNA} \quad (1)$$

Axes that had missing data were excluded from the analysis. This approach to handling missing data was selected to preserve the size of the dataset. The final dataset included 508 responses, which represented an average of 84.87% of the dataset being included.

The self-organising map (SOM) analysis was implemented in R, using the Kohonen package. Packages sit within RStudio and extend the functionalities of the programme. The SOM was used to conduct an exploratory segmentation of the data. A sequential learning algorithm, the default option in the Kohonen package, was used. This is an online



stochastic learning algorithm. The training process was set at 10,000 epochs. Convergence was reached just beyond 8000 interactions in Case A and just before 8000 interactions in Case B.

Different size maps were investigated in determining the size of the grid. A  $10 \times 10$  grid was the best representation of the data in Case A with a similar number of objects assigned to each node. In Case B, an  $8 \times 8$  grid was selected due to the small variance in the number of objects mapped to each node. A hierarchical cluster analysis with Euclidean distances, using complete linkages, was conducted to determine the number of clusters for each case. Clusters were identified and heatmaps were generated and analysed for each case.

#### 6.4. Quantitative Results

The cluster means are displayed for Case A in Figure 2 and Case B in Figure 3. The mean scores for each cluster are displayed in solid lines whilst the overall mean per case is displayed with a dotted line. The cluster weights for both cases are depicted in Figure 4. The results in Figures 2 and 3 are presented on a scale of 1–6, where 1 indicates strongly disagree and 6 indicates strongly agree to positively phrased statements. A very similar rating pattern can be seen in the mean scores in each case, with Case A performing marginally better than Case B across all axes. Sustainability can be seen to be emerging alongside innovation and diversity.

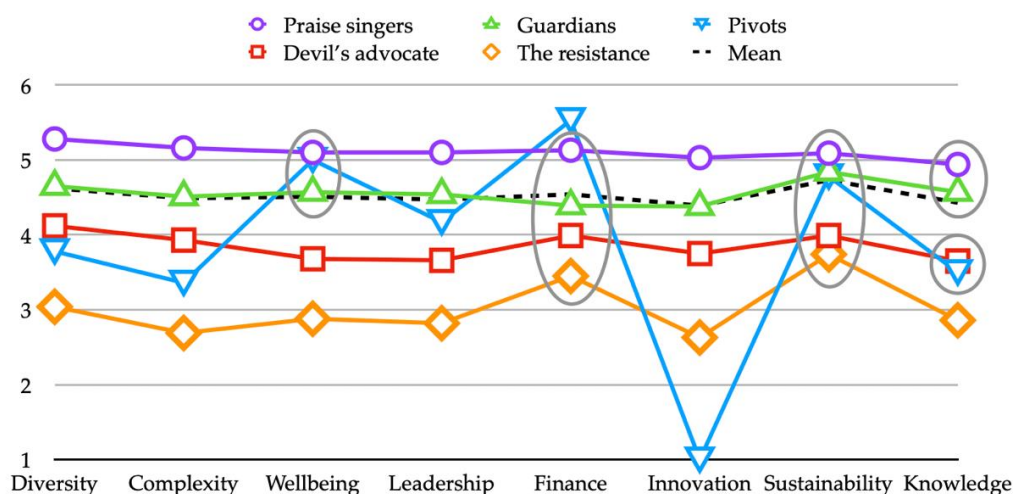


Figure 2. Case A cluster means.

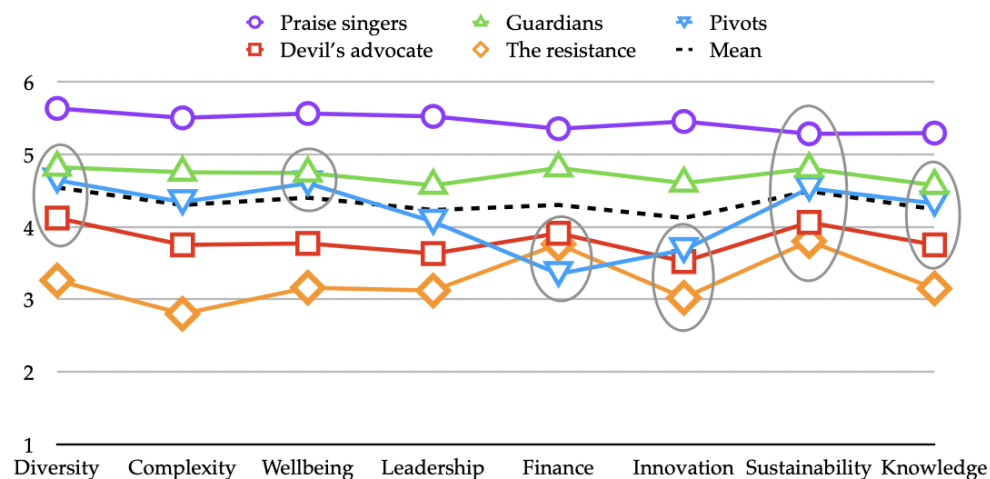
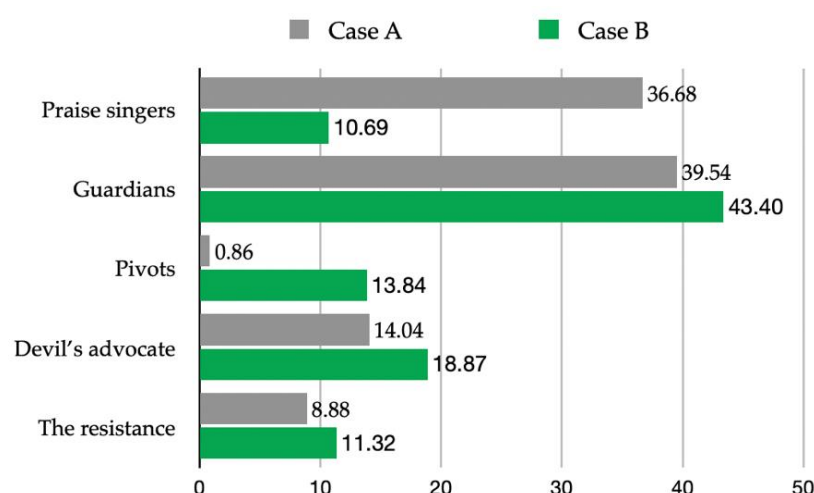


Figure 3. Case B cluster means.



**Figure 4.** Cluster weights (%).

Each cluster was analysed using rating and demographic data and named accordingly. The first cluster was named praise singers as the cluster had very high and undifferentiated ratings. The praise singer role in Southern African cultures traditionally reminds communities of their history and legacy. This cluster had lower levels of education and higher representation from junior management levels and the branch network than the head office. This cluster was more prominent in Case A than Case B. A high prominence of this cluster is likely to represent an over-optimistic view of the organisation. The guardians cluster is the mainstream voice in organisations; it protects and nurtures the status quo. The cluster had slightly higher representation from the branch network and from female respondents. A largely undifferentiated view runs the risk of supporting the status quo without critical consideration. The devil's advocate cluster had a critical view of the mainstream. The moderately critical view shows a similar rating pattern to the mainstream. The devil's advocate stimulates debate by countering a point of view without committing to the opposing point of view. This role can be seen to be characteristic of this cluster, which had a slightly higher representation of male respondents. The pivots cluster had the most differentiated view across both cases and were well established in Case B, whilst an outlier in Case A. The high level of differentiation with partial similarities to several other clusters highlights the potential of this cluster to pivot between different views, which holds the possibility for different interest groups to find common ground. This is more pronounced in Case B with a higher cluster weighting but is a very challenging view in Case A given the strong stance on the lack of innovation potential. Outliers in complex systems hold the potential to nudge complex adaptive systems, which are most likely to evolve at the boundary between order and chaos [96]. This heightened diversity of views had a higher representation from head office and from respondents holding a degree.

The resistance cluster had the most critical view, with a more differentiated rating pattern. Respondents from this cluster tended to have higher levels of education, longer tenure and middle to senior management positions. Whilst adopting a critical view, respondents from this cluster in both cases acknowledged progress towards sustainability. This cluster holds the potential to exert intellectual resistance and influence the organisation whilst highlighting key concerns.

The guardians, across both cases, can be seen in Figure 4 to represent the mainstream view (42%) which is largely supportive and undifferentiated, similar to the even more optimistic praise singers (24%). This leaves the remaining 34% of respondents to disturb the status quo. Whilst the more supportive clusters play an important role in stabilising progress through mainstream support, it is unlikely that these clusters will actively perturb and shift the system.

The level of coherence increases as the cluster means converge. Zones of coherence are marked with grey ellipses in Figures 2 and 3, and indicate where views of different clusters

converge. Whilst there is a low level of coherence across all axes, the means of all the clusters are the most similar in the sustainability and finance axes across both cases. Some zones of coherence are spread across an entire axis (sustainability in both cases, finance in Case A), whilst others are localised across two or three clusters.

## 7. Qualitative Strand

### 7.1. Qualitative Procedures

In an explanatory sequential research design, qualitative data are used to explain the quantitative results [34]. Purposive sampling was implemented in order to select information-rich cases in which interviewees were informed about sustainability [84,97]. A wide spectrum of interviewees was selected to ensure a range of experiences and perspectives on the phenomenon [97].

Interviews were conducted with 30 managers from the Namibia ( $N = 18$ ) and Botswana ( $N = 12$ ) businesses in Case A, and 14 interviews were conducted with managers from the Namibia business in Case B. Whilst it was not possible to include interviewees from the Zambia business in Case A, several interviewees had recent working experience in the business. Across both cases, 34 interviewees were based in the head office structure, whilst 10 interviewees were based in the branch network. Each interview was transcribed verbatim and uploaded onto Dedoose, a computer assisted qualitative data analysis software. Demographic fields were linked to the transcripts to enhance flexibility of data analysis. The data were analysed for patterns of emergence and coherence. Codes were created to analyse embedded sustainability, embodied sustainability and conditions that enabled the emergence of sustainability. The data were analysed using the cross-case procedure proposed by Stake [98]. This involved collating and rating themes across each dataset and building a matrix to cross tabulate themes and findings.

Strategies were devised and implemented to increase the trustworthiness and rigour of this study [99] applying the quality criteria proposed by Shenton [100], namely credibility, transferability, dependability and confirmability. Interview data were triangulated with data from supporting documents and research journal reflections. Member checks were conducted with organisational stakeholders to establish the credibility of findings. Transferability was enhanced through the consideration of background contextual data on each case; the self-organising map analysis offered a clear indication of the organisational context across all integral quadrants. Care was taken to situate methods in a research paradigm to enhance dependability and confirmability.

### 7.2. Qualitative Results

Understanding the process of emergence in corporate sustainability requires modelling of the interaction of self-organised agents across a complex adaptive system. A holistic approach is needed to create the necessary conditions for self-organisation, as well as to focus on dimensions that support coherence between agents and across multiple levels of system. This involves consideration of embodied and embedded dimensions that enable the modes of emergent corporate sustainability to be enacted. A cross-case procedure was used to analyse how emergent corporate sustainability functioned within each integral quadrant [55], thereby providing a more specific application of the model. The collated themes with a high utility rating were inspected per integral quadrant and reduced to obtain a clear domain description which was then discussed with reference to the literature.

Modes and conditions that supported corporate sustainability were identified in the qualitative data and are presented per integral quadrant. This is followed by the embedded and embodied dimensions of coherence that were found per integral quadrant. The full emergent corporate sustainability framework is then presented and discussed.

### 7.3. Modes and Conditions of Emergence

Four conditions that enable emergent corporate sustainability and the modes by which they are expressed were identified in the research through the cross-case analysis. Themes

with a high utility rating from the interview data were analysed to identify and define the conditions and modes.

Since emergence is not a force that can be operated [41], it is important that we consider conditions that can be cultivated to support emergent self-organisation. The metaphor of cultivation, used by interviewees, is useful when considering emergence, as a gardener can neither force plants to grow nor control the weather, but can create a supportive context and respond to dynamic interaction in the system. If there is a lack of rain, the gardener can water; the gardener can fertilise as the soil becomes degraded. As an executive who had successfully developed and implemented a group-wide corporate sustainability strategy expressed it:

*“Planting the seed (sustainability in the business) is not like building a house; it’s more like cultivating a garden. When you build a house, you can build according to that plan. Cultivation of new ideas doesn’t work like that. You need to be dynamic and patient, working with people’s thinking”.*

An approach based on cultivation focuses on creating conditions that allow for emergent self-organisation which works at an enacted level. The conditions and modes identified per integral domain are presented.

### 7.3.1. Networked-Interior Domain

The networked (collective)-interior domain was found to be associated across both cases with a values orientation towards corporate sustainability. In the context of emergent corporate sustainability, the domain is referred to as the axiological development domain. Axiology is the system of values that enables agents in an organisation to work together coherently. Axiological development is conceptualised as nested hierarchies of values that act as shared resources between agents in a system. Allen and Varga [101] point out that values emerge through evolution to direct actions through our knowledge; they also change our epistemologies. This conceptualisation requires that value systems are seen as continuously negotiated and revised as part of the ongoing process in which an organisation co-evolves within its containing system. The emergent corporate sustainability condition and mode identified in the networked-interior integral domain are displayed in Table 3.

**Table 3.** Axiological development conditions and modes of emergence.

Integral Domain	Corporate Sustainability Domain	Condition	Mode
Networked-Interior	Axiological Development	Axiological Frame: An axiological frame is a shared perceptual lens which constitutes what is perceived as valuable.	Axiological Coalition: A coalition of agents who enact sustainability via the activation of a shared axiological frame.

Establishing an axiological frame was found to be a condition of emergent corporate sustainability. An axiological frame is a condition of emergence that enables an axiological coalition of agents to enact sustainability through shared perceptual lenses which establish a shared sense of what is regarded as valuable. This condition was particularly evident in its absence when, in one case, the reluctance of employees to “own” the sustainability portfolio within their functional area inhibited self-organisation: “It’s (sustainability) not owned by one person or one department. There’s push back around that to say that we don’t feel that we should own it”.

Forming axiological coalitions enabled the agents to nudge their organisations towards sustainability. These coalitions are informal interest groups that coalesce around a values-based vision of the future. Over time they can be developed to exert substantial influence. An executive from one of the financial services institutions in the research described

how an axiological coalition played an important role in placing sustainability on the strategic agenda:

*“I think what started to form was a coalition of senior people that felt we needed to bring sustainability to the fore and that there needed to be more dialogue around it. Now that continued throughout 2013 and in 2014 there was a sufficient critical mass of senior executives”.*

### 7.3.2. Individual-Interior Domain

The individual-interior domain was found to be associated across both cases with the agent’s meaning-making process. In the context of emergent corporate sustainability, the domain is referred to as the semiotic development domain. Semiotic refers to a system of meaning-making (signs) that an agent uses to make sense of his or her world; the interpretant translates the relation between the sign and its object [102]. This personal meaning-making system, which can itself be considered a complex system [51], is conceptualised as nested hierarchies of personal meaning. The personal semiotic system of an agent should be seen in contrast to the axiological system which is collective and supports coherent action across multiple agents in the organisation. These two systems interact as agents negotiate how meaning is constructed in their work, that is to say, what is deemed to be of value in the organisation. The emergent corporate sustainability condition and mode identified in the individual-interior integral domain are displayed in Table 4.

**Table 4.** Semiotic development conditions and modes of emergence.

Integral Domain	Corporate Sustainability Domain	Condition	Mode
Individual-Interior	Semiotic Development	Semiotic Intention: Semiotic intention is the extent to which active engagement in sustainability is driven by a sense of personal meaningfulness.	Semiotic Refraction: Perceiving a differentiated view of a multiple object using a sign.

The semiotic domain considers the extent to which active engagement in sustainability is personally meaningful to agents. Semiotic intention was found to be a condition of emergent corporate sustainability. Semiotic intention leaves an agent ready to identify opportunities to enact sustainability. A respondent expressed the lack of semiotic intention associated with denial of the problem: “I think it’s easier for people to put their heads in the sand as long as their lives and their position are safe; they’re just too comfortable to want to change”.

Agents participate in the emergence of sustainability through the mode of semiotic refraction, in which an expanded view of sustainability is perceived through the process of transforming aspects of their personal or professional context. As a complex and multifaceted phenomenon, sustainability is often difficult to perceive. Metaphorically, this mode can be understood by the concept of refraction in which perception is deflected against reality, resulting in the enrichment of the perceptual frames being employed. This can be experienced as a moment of insight resulting in a differentiated and expanded view. A senior manager expressed it in the following way: “Initially I was thinking of sustainability as in environment and renewable energy. But I then realised it was much more comprehensive”.

### 7.3.3. Individual-Exterior Domain

The individual-exterior domain was found to be associated across both cases with agents acting in ways that create value for the organisation, stakeholders and environment. In the context of emergent corporate sustainability, this is referred to as the co-evolutionary



performance domain. In this domain the agent acts based on an interplay between what is perceived as personally meaningful (semiotic) and as being of value to the organisation (axiological). Addressing the disjuncture between firms and the natural environment [103] involves more than the organisation adapting to the containing system [23]. It is a co-evolutionary process involving both influencing and responding to dynamics of the environment [104]. Co-evolutionary performance occurs when these actions simultaneously create value for the organisation, stakeholders and the containing system. The emergent corporate sustainability condition and mode identified in the individual-exterior integral domain are displayed in Table 5.

**Table 5.** Co-Evolutionary performance conditions and modes of emergence.

Integral Domain	Corporate Sustainability Domain	Condition	Mode
Individual-Exterior	Co-Evolutionary Performance	Co-Evolutionary Scope: Co-evolutionary scope is a condition in which agents have a clear mandate within which to self-organise.	Co-Evolutionary Self-Organisation: The active contribution of agents towards co-evolutionary outcomes.

Co-evolutionary scope is a condition in which agents have a clear mandate within which to self-organise towards corporate sustainability outcomes. This is characterised by boundaries within which agents are empowered to self-organise. It can be understood as bounded flexibility which was expressed by a respondent with reference to role definitions: “It doesn’t touch my heart as it would have if I knew that the role that I now do contributes to the overall sustainability agenda. So that’s the sort of line we must be drawing”.

Agents contribute towards co-evolutionary outcomes through the mode of co-evolutionary self-organisation. This involves agents actively addressing sustainability in their decision-making and actions. Co-evolutionary self-organisation, according to a respondent, requires “changing people’s mindset from just sitting back” by simultaneous activation with the other modes of corporate sustainability. A respondent expressed the difficulty of this since sustainability “hasn’t been embedded to the point where people apply sustainable practices on a daily basis”.

#### 7.3.4. Networked-Exterior Domain

The networked (collective)-exterior domain was found to be associated across both cases with a broadening of knowledge allowing for the enactment of sustainability. In the context of emergent corporate sustainability, it is referred to as the epistemological performance domain. In order to determine whether performance is co-evolutionary in nature, it is essential for an organisation to be informed by knowledge of relevant aspects of the systems in which it is embedded. The transdisciplinary nature of sustainability, as well as the epistemological distance and ontological plurality, requires that agents employ multiple methodologies [74]. Since sustainability cuts across disciplines and levels of system, the range of knowledge (episteme) is expanded; and in many cases, access to relevant data has to be carefully considered to obtain a clear picture of the extent to which the organisation is acting in a co-evolutionary manner. The emergent corporate sustainability condition and mode identified in the networked-exterior integral domain are displayed in Table 6.

**Table 6.** Epistemological performance conditions and modes of emergence.

Integral Domain	Corporate Sustainability Domain	Condition	Mode
Networked-Exterior	Epistemological Performance	Epistemological Contact: Epistemological contact is the extent to which relevant data needed for co-evolution is accessible to agents.	Epistemological Extension: Knowledge of co-evolution is extended through the enactment of sustainability.

The epistemological performance domain is essential for agents to determine the extent to which actions are sustainable in a particular context. Since sustainability is a dynamic process, epistemological contact is needed for agents to determine the viability of sustainability actions. Epistemological contact means that relevant data needed to guide sustainability actions is accessible and understandable to agents. One respondent commented on what he perceived to be over-optimistic ratings in several clusters of respondents in the dataset: “There’s a bit of a skewed view on what they think sustainability is about”. Such a view could potentially further increase epistemological distance as agents are likely to be reluctant to engage critically about pertinent issues facing the business.

The mode of epistemological extension describes the broadening of knowledge that occurs when sustainability is enacted. This mode can relate to a widened scope or integration of knowledge. An essential aspect of epistemological extension in emergent corporate sustainability is broadening the temporal range of investigation. This is in contrast to what one respondent perceived in the business: “The over-riding concerns are the here-and-now so if that long-term thinking isn’t there then sustainability is continuing to draw the short straw”.

Emergent corporate sustainability can therefore be seen to be cultivated through developing four conditions. This goes beyond a linear change or compliance-driven change to enable emergent self-organisation in the system. These conditions support the enactment of sustainability through four associated modes. The modes illustrate how corporate sustainability emerges.

#### 7.4. Dimensions of Coherence

Emergence arises through local interaction of many agents across a system [41,44]. This requires coherence in structures, patterns and properties of a complex adaptive system [44], and coherence in this study was shown to operate at an embedded and embodied level in the system. Four dimensions of coherence were identified by analysing themes with high utility ratings in the cross-case analysis. The four dimensions of coherence were associated with the embedded and embodied levels of emergent corporate sustainability. The dimensions of coherence per integral domain are presented at the embedded and embodied levels.

##### 7.4.1. Networked-Interior Domain

The networked (collective)-interior domain was associated across both cases with a values orientation towards corporate sustainability, and is referred to as the axiological development domain. Dimensions of coherence were found at both embedded and embodied levels and are displayed in Table 7.

**Table 7.** Axiological development dimensions of coherence.

Integral Domain	Corporate Sustainability Domain	Embedded Dimension	Embodied Dimension
Networked-Exterior	Axiological Development	Axiological Signification: The extent to which co-evolutionary axiological direction is compelling to stakeholders.	Axiological Resonance: The extent to which the axiological framework is embedded in the physiology, mindset and metaphoric structures of the agent.

In the axiological development domain, an axiological frame allows for a shared approach to develop between agents. Thus, cultivation of emergent sustainability requires stakeholder interaction to develop an axiological (values) system. When the values system is compelling to stakeholders (axiological signification) and resonates with the agent (axiological resonance), acting towards sustainability becomes self-organised and habitual. An executive illustrated this:

*“It’s (sustainability) not just being done as a tick-box exercise—it’s part of our ethos; it’s who we are. It’s interesting because our values and our behaviours all talk to sustainability”.*

#### 7.4.2. Individual-Interior Domain

The individual-interior domain was associated across both cases with the agents’ meaning-making process, and is referred to as the axiological development domain. Dimensions of coherence were found at both embedded and embodied levels and are displayed in Table 8.

**Table 8.** Semiotic development dimensions of coherence.

Integral Domain	Corporate Sustainability Domain	Embedded Dimension	Embodied Dimension
Individual-Interior	Semiotic Development	Semiotic Symbiosis: The extent to which what is considered personally meaningful is enriched by symbiotic interaction with the containing system.	Semiotic Embodiment: The extent to which sustainability is personally meaningful and implicit.

The semiotic domain considers personal meaning associated with engagement in sustainability, which is important when considering corporate sustainability as an emergent self-organising process. Semiotic symbiosis occurs when the ongoing process of construction and reconstruction of meaning is informed by interaction with the containing system. Semiotic embodiment is achieved when sustainability is implicit and personally meaningful, infused in the habits and practices of agents. Engagement with sustainability, as a respondent noted, is not about teaching but “starts with the basic practices of caring about the environment . . . It starts with that and once that takes root in the individual, then sustainability becomes real throughout the whole organisation”.

Distinguishing between the axiological and semiotic domains is important to avoid the reductionism inherent in the imposition of values or excessive focus on values alignment. There is an ongoing interaction between the shared organisational system of values (axiological system) and the personal system of meaning-making (semiotic system). Whilst these systems can never be more than partially or temporarily aligned, zones of coherence between the systems can be developed. It is the ongoing interaction between these systems that contribute to co-evolutionary self-organisation.

### 7.4.3. Individual-Exterior Domain

The individual-exterior domain was associated across both cases with value creation by agents which extended beyond the organisation to stakeholders and environment, referred to as the domain of co-evolutionary performance. Dimensions of coherence were found at both embedded and embodied levels and are displayed in Table 9.

**Table 9.** Co-Evolutionary performance dimensions of coherence.

Integral Domain	Corporate Sustainability Domain	Embedded Dimension	Embodied Dimension
Individual-Exterior	Co-Evolutionary Performance	Co-Evolutionary Value: The extent to which value is simultaneously created for the organisation, stakeholders and containing system.	Co-Evolutionary Practice: The extent to which co-evolutionary activities are embedded in the agents' regular business practices.

The co-evolutionary performance domain at an embedded level considers the extent to which value is simultaneously created for the organisation, stakeholders and environment. Agents engage within a particular mandate (co-evolutionary scope) as they work to incorporate sustainability into the ongoing business and personal mindset and routines, thereby embodying co-evolutionary practice. A respondent emphasised the active engagement between the business and containing system:

*“The whole sustainability issue is a lot wider than just a company, we can do a lot of things but if you’re sitting here as an island, as a one-man show in the corporate world, you’re not going to survive. It takes everybody to move towards that goal”.*

As a complex and continuously changing phenomenon, the epistemological domain is vital in determining to what extent actions are sustainable in a given context. Widening the epistemological range is important due to the complexity of sustainability challenges which is such that they often require the use of multiple methodologies.

### 7.4.4. Networked-Exterior Domain

The networked (collective)-exterior domain was associated across both cases with a broadening of knowledge allowing for the enactment of sustainability, referred to as the domain of epistemological performance. Dimensions of coherence were found at both embedded and embodied levels and are displayed in Table 10.

**Table 10.** Epistemological performance dimensions of coherence.

Integral Domain	Corporate Sustainability Domain	Embedded Dimension	Embodied Dimension
Networked-Exterior	Epistemological Performance	Epistemological Range: The extent to which the organisation is informed by knowledge of relevant aspects of the systems in which it is embedded.	Epistemological Network Density: The extent to which the epistemological network has rich interconnections.

Whilst epistemological contact enables agents to determine the viability of sustainability actions, to be of use, knowledge needs to be developed into a richly interconnected network (epistemological network density) so that relevant data can be effectively accessed. A widened epistemological range enables effective co-evolution with the containing system. One of the respondents emphasised the need to extend beyond sustainability targets to grasp “the big picture . . . to get all the information before you take a decision”. Sustainability can be cultivated by developing the organisation using the dimensions

described in this framework. Coherence develops across these dimensions; this supports emergent sustainability.

### 7.5. Emergent Corporate Sustainability Framework

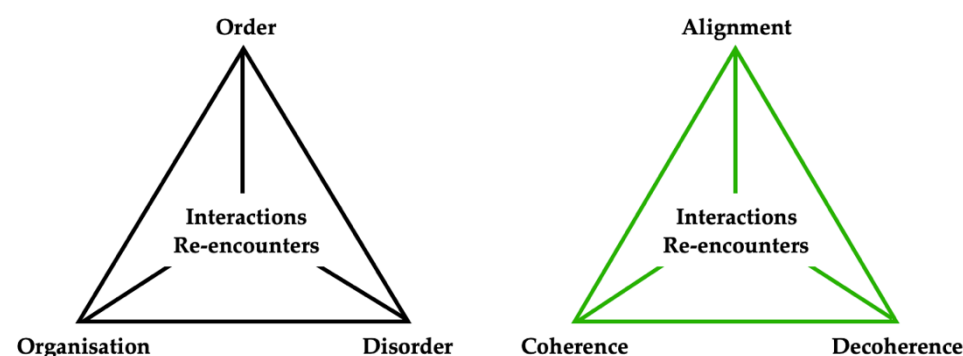
The emergent corporate sustainability framework, displayed in Table 11, illustrates the conditions that support emergent self-organisation and the modes through which corporate sustainability is enacted. Rather than attempting to drive corporate sustainability change, this framework shows how it emerges as a self-organised co-evolutionary process. The conditions and modes are thus areas that sustainability leaders and practitioners can support.

**Table 11.** Emergent corporate sustainability framework.

	Axiological Development	Semiotic Development	Co-Evolutionary Performance	Epistemological Performance
<b>Embedded Dimensions</b>	Axiological signification	Semiotic symbiosis	Co-evolutionary value	Epistemological range
<b>Embodied Dimensions</b>	Axiological resonance	Semiotic embodiment	Co-evolutionary practices	Epistemologically networked
<b>Enactive Conditions</b>	Axiological frame	Semiotic intention	Co-evolutionary scope	Epistemological contact
<b>Mode Of Enactment</b>	Axiological coalition	Semiotic refraction	Co-evolutionary self-organisation	Epistemological extension

The framework also identifies dimensions of coherence at embedded and embodied levels. The development of zones of coherence is associated with the emergence of organisation and re-organisation in corporate sustainability. The embedded dimensions support coherence between the organisation and containing system whilst the embodied dimensions support coherence between agent and organisation.

Morin [73] pointed out that the interaction between order and disorder is at the core of organisation. There is a complex relationship between order, disorder and organisation [105]. The results of this study extend this concept by illustrating the value of coherence as a means to re-organise through the development of zones of coherence. The extended model is displayed in Figure 5.



**Figure 5.** Retroactive re-encounters (left) (Adapted with permission from [105], Copyright 2006 Emerald) and associated experiential states (right).

The resultant increased orderliness allows for execution through alignment. Entropy gradually increases disorder and results in zones of decoherence emerging. This increased decoherence opens the potential for creativity and re-organisation which result in the emergence of zones of coherence. These retroactive re-encounters represent the reality that sustainability leaders and change agents must work with to support emergent corporate sustainability. This is in contrast to the prioritisation of alignment to a singular



sustainability agenda. The emergent corporate sustainability framework makes the complexity of emergent self-organisation in corporate sustainability explicit by showing how the embedded and embodied levels are enacted.

## 8. Discussion

Despite researchers having called for over two decades for a paradigm shift in which economic domains are balanced with social and environmental domains [65,66,106], there is an enduring disconnect between corporate sustainability activities and the ongoing decline in the global environment and society [26,27]. To advance, a better functional fit is required between organisations and their containing systems [23], yet there are insufficient empirical studies extending our understanding of how the shift to corporate sustainability takes place [68]. This study aimed to contribute to understanding the emergence of corporate sustainability in organisations operating in the financial services sector in Southern Africa. A complexity paradigm was applied to ensure this study embraced complexity and countered reductionism [23–25,33,62,64,73,74,107].

### 8.1. Theoretical Implications

This study makes three contributions to theory whilst positioning the shift to sustainability as a self-organised process of emergence. First, four modes by which corporate sustainability is enacted are proposed. The shift to corporate sustainability was shown to emerge through axiological coalitions as they develop a critical mass towards co-evolutionary self-organisation. Through semiotic refraction (an enriched view of sustainability) and epistemological extension (the development of knowledge) corporate sustainability is enacted. More critical clusters supported emergence as they had a more holistic grasp of the organisation which contributed to a more differentiated view. Greater coherence in the diversity axis supported this through dialogue between opinion groups. This finding responds to the call by Valente [68] to address how the shift to corporate sustainability takes place by introducing four modes which advance our understanding of how this shift emerges.

Second, this study shows how zones of coherence develop and support emergence, thereby extending our understanding of the process of emergence. Four dimensions of coherence were identified at both embedded (coherence between organisation and containing system) and embodied (coherence between agent and organisation) levels of system. Zones of coherence were most pronounced in the sustainability and finance axes across both cases. The conceptualisation of zones of coherence extends Morin's [73] retroactive principle illustrating how zones of coherence form, expand and dissipate as the co-evolutionary process moves dynamically through recursive re-encounters between order, disorder and organisation.

Third, this study identifies conditions associated with the emergence of corporate sustainability which arise from the ongoing process of recursive re-encounters, which is crucial to addressing the knowledge gap of how the shift to corporate sustainability occurs. The four conditions cover all of the integral quadrants and suggest the need to "cultivate" sustainability rather than to drive it or integrate it as a change process. This finding supports the call by Putnik [56] to include interior quadrants alongside exterior quadrants in corporate sustainability. A comprehensive emergent corporate sustainability framework was presented; it shows how these conditions emerge from the interaction between the embedded and embodied dimensions and shape the enaction of corporate sustainability through four modes.

These contributions enhance the integral literature on corporate sustainability, extending Edwards's [25] framework whilst applying an ontology of complexity. This enables us to address Esbjörn-Hargens's [74] observation that complex phenomena such as climate change and corporate sustainability are ontologically plural and epistemologically distant. The emergent corporate sustainability framework expands our understanding of the operationalisation of existing complexity frameworks [33] by repositioning corporate

sustainability as an emergent process, rather than something to be added to, or integrated into, the business.

### 8.2. Practical Implications

The transition to a more sustainable future is immense and requires a fundamental change in the functioning of organisations towards co-evolutionary self-organisation. As this is a co-evolutionary process in emergent spacetime, it is dynamic in nature and not a force that can be controlled. Since this way of construing departs from a more mainstream Newtonian view, it is challenging for sustainability practitioners to implement.

A key implication for sustainability practitioners is to seek to cultivate patterns of self-organisation within the system as opposed to attempting to manage or control a process of change. This requires a holistic approach that prioritises interior aspects of development such as developing a mindset and culture that enhance sustainability alongside exterior aspects such as behaviours, processes and systems that support sustainability.

Since the transition to a sustainable future is a wicked problem, a key implication for sustainability practitioners is to work collaboratively in anticipating and co-creating the future. Adopting the role of a systemic coach will likely be fruitful for leaders and sustainability practitioners, since a systemic coaching role focuses on self-organisation and the process of emergence. Coaches should support collaborative exploration of emergent patterns in stakeholder dialogue to enable collaborative action (axiological coalitions). Care should be taken to ensure that actions are co-evolutionary and sustainable by collecting relevant data from the containing system (epistemological range).

It is important to focus on self-organisation where a sense of coherence with values and personal meaningfulness is established. Coaches and facilitators should encourage decentralised approaches that allow co-evolution with local conditions and constraints whilst encouraging a coherent approach across the organisation. The coach needs to be able to work across different levels of system, working with individuals and stakeholder groups in a fluid and interconnected manner with the aim of establishing zones of coherence across different levels of system. This should result in an ongoing process of learning from experiences for both individuals and groups.

An emergent approach to corporate sustainability includes all integral quadrants and provides specific ways in which a systemic coach can cultivate emergent self-organisation. A systemic coach working with the emergent process does this through dialogue and sensemaking at multiple levels of system. An example of this was a group of executive and senior managers who were coached through a structured process which started with a narrative method that anchored sustainability in a personally meaningful way (semiotic intention). The coach then broadened the dialogue whereby the agents discussed what sustainability meant for the organisation (axiological frame and coalition are established through negotiation). As the group thought through the implications for action, they discussed each other's roles and responsibilities (negotiating co-evolutionary scope).

In order to adjust their approach to respond to ongoing fluctuations in the organisation and containing system, the group explored how they could monitor their effectiveness whilst learning through the process (epistemological contact and extension). The coach, in future interactions, then worked to support the creation of conditions that encourage emergent self-organisation whilst fostering zones of coherence in the organisation through facilitating conversations that enable sustainability to be embodied and embedded. In contrast to a more linear approach, a coach focused on emergent corporate sustainability works with the dynamic process of learning and uses the emergent corporate sustainability framework to inform the learning process. This means that the structure of the coaching follows the emergent process. For example, a coach will elect to work with stakeholders (axiological coalitions) who are interested to participate or where opportunities for impact emerge rather than following a rigid project plan.

### 8.3. Limitations and Future Directions

Whilst this study has numerous methodological strengths, the findings should be considered with reference to the limitations of this study. A key limitation of this study was that respondents from the containing system were not included. This means that broader patterns of emergence spanning the containing system may be less in focus. Addressing this in future research could be useful in shedding light on how coherence develops between organisations and the environment in which they are embedded.

As this study is based on two case studies, statistical generalisation is not possible. Analytic generalisation can be used in case studies to advance existing theoretical concepts or to identify new concepts based on findings [82,108]. In this respect the emergent corporate sustainability framework can be used to structure research and to support the formulation of guidelines for corporate sustainability practices in financial services organisations. Future research could enhance generalisability by examining the applicability of the emergent corporate sustainability framework across a range of industries.

## 9. Conclusions

With increasing environmental, economic and social challenges, humanity faces a potential existential threat. Despite calls for a paradigm shift to balance social and environmental spheres [65,66,106], an enduring disconnect remains between declining environment and corporate sustainability initiatives [26,27]. This study sought to address this disconnect by exploring sustainability holistically [24,57] rather than something to be added to or integrated into organisations.

This research positioned sustainability as a co-evolutionary process of emergence. Dimensions were identified that describe the level of coherence between agents, the organisation and the containing system. The dimensions at the embedded level form the basis for coherence between the organisation and containing system. The dimensions of axiological signification, semiotic symbiosis, co-evolutionary value and epistemological range were identified, covering all integral quadrants. The dimensions at the embodied level form the basis for coherence between the agents and organisation. The dimensions of axiological resonance, semiotic intention, co-evolutionary practice and epistemological network density were identified, spanning all integral quadrants.

This research offers a consideration of corporate sustainability as an emergent process which holds the potential to create system-wide engagement in sustainability. The resultant emergent corporate sustainability framework extends the understanding of existing integral [57] and complexity frameworks [33] by framing corporate sustainability as an emergent process and addressing ontological plurality and epistemological distance of complex phenomena such as climate change and sustainability [74].

Corporate sustainability requires a fundamental redefinition of the way we interact with each other and our containing systems towards an emergent co-evolutionary path. This requires more than technological fixes, it requires the cultivation of a sense of meaningfulness (semiotic intent) within an axiological frame that supports emergence. By supporting the co-evolutionary actions of agents with feedback that allows epistemological contact, organisations can support humanity in charting a new course. The challenges ahead are immense, and we will need all hands on deck if we are to navigate the complexities of this transition and shift the trajectory of human history.

**Author Contributions:** Conceptualization, R.M. and W.B.; methodology, R.M. and W.B.; software, R.M.; validation, R.M. and W.B.; formal analysis, R.M.; writing—original draft preparation, R.M.; writing—review and editing, R.M. and W.B.; visualization, R.M.; supervision, W.B. All authors have read and agreed to the published version of the manuscript.

**Funding:** This research received no external funding.

**Data Availability Statement:** Restrictions apply to the availability of these data. Data was collected at two financial services companies and are available from the corresponding author with the permission of the companies selected as cases.

**Conflicts of Interest:** Both of the authors of this study declare that they have no conflict of interest.

## **Appendix A. Cassandra Survey Items**

### *Appendix A.1. Axis 1: Diversity*

- 1.1. Actions, in our organisation, are based on an ethical code.
- 1.2. Anti-discrimination policies are effectively implemented in our organisation.
- 1.3. Our organisation maintains dialogue with all stakeholders.
- 1.4. Our organisation assesses the work environment as the basis for ongoing improvement.
- 1.5. Talent retention is actively supported by our organisation.
- 1.6. Our organisation values and solicits a variety of opinions in decision-making.
- 1.7. Internal communication is effective in our organisation.
- 1.8. Our leaders are strongly committed to the vision and values of the organisation.
- 1.9. We have active interest groups in this organisation whose recommendations are considered in management decisions.

### *Appendix A.2. Axis 2: Complexity*

- 2.1. Our organisation pushes boundaries and moves beyond the status quo.
- 2.2. Our organisation discontinues outdated practices in a timely manner.
- 2.3. Our organisation encourages diverse stakeholders to participate in decision-making forums.
- 2.4. Our organisation deals with unpredictability in the business environment creatively.
- 2.5. Employees are encouraged to self-organise in our organisation.
- 2.6. Employees regularly contribute new ideas and solutions in the organisation.
- 2.7. Employees are encouraged to take initiative in our organisation.

### *Appendix A.3. Axis 3: Personal Wellbeing*

- 3.1. Our organisation actively supports the development of employees.
- 3.2. Our organisation values time spent on work activities that are not immediately productive.
- 3.3. Our organisation encourages employees to investigate underlying causes when issues arise.
- 3.4. Our organisation actively supports a joyful work environment.
- 3.5. I feel valued in our organisation.
- 3.6. Managers in our organisation have real responsibility and autonomy within parameters.
- 3.7. There is space for the realisation of my aspirations in my function.
- 3.8. Managers are valued for taking courageous decisions in our organisation.
- 3.9. I feel that I am contributing through my role to a larger purpose.

### *Appendix A.4. Axis 4: Leadership and Teamwork*

- 4.1. Employees in our organisation are well trained for their roles.
- 4.2. Leaders in our organisation are valued for being aware of their environment.
- 4.3. Our organisation has dynamic networks of communication.
- 4.4. The purpose of the organisation is clear to employees.
- 4.5. Leaders in our organisation make space for employees to contribute rather than controlling them.
- 4.6. Our leaders focus more on projecting a vision than correcting what happened in the past.
- 4.7. Leaders in our organisation are open to being challenged.
- 4.8. Communication is clear in our organisation.
- 4.9. We have a meaningful external focus in our organisation.

### *Appendix A.5. Axis 5: Financial Performance*

- 5.1. The profit margin in our organisation is above average in our industry.

- 5.2. The return on capital employed is above average in our industry.
- 5.3. Our liquidity position is above average in our industry.
- 5.4. Our organisation generates enough cashflow to self-fund our activities and growth.
- 5.5. The cash flow in our organisation is above average in our industry.

#### *Appendix A.6. Axis 6: Innovation Potential*

- 6.1. Our organisation has a distinct process for developing new ideas.
- 6.2. We are able to identify creative solutions on demand in our organisation.
- 6.3. Idea generation is regarded as a key business practice in our organisation.
- 6.4. I regularly develop new ideas for our organisation.
- 6.5. The leadership of our organisation encourages innovative thinking.
- 6.6. Our organisation has a structured process for refining new ideas.
- 6.7. The refinement of new ideas is valued in our organizational culture.

#### *Appendix A.7. Axis 7: Sustainable Development and Social Responsibility*

- 7.1. Our organisation balances social, economic and environmental concerns.
- 7.2. Our organisation goes beyond legal compliance in addressing sustainability.
- 7.3. Our organisation values sustainability as a way of developing the organisation.
- 7.4. Our organisation values sustainability as a way of developing its supply chain.
- 7.5. Our organisation actively supports community development.
- 7.6. There is a good fit between our organisation and the social initiatives it supports.
- 7.7. When our organisation supports different social initiatives, our organisation benefits more than the cause (reversed).
- 7.8. It's important to me that our organisation support social initiatives.
- 7.9. Responsibility is valued by our organisation.
- 7.10. Our organisation values integrity.
- 7.11. Our organisation values humility.
- 7.12. Our organisation encourages employees to be aware of their impact on others.
- 7.13. Authentic communication is valued by our organisation.
- 7.14. Our organisation values constructive negotiation.
- 7.15. Our organisation values effective coordination of activities.

#### *Appendix A.8. Axis 8: Knowledge and Learning*

- 8.1. Projects in our organisation are measured using both financial and non-financial measures.
- 8.2. The rigidity of processes in our organisation gives people very little possibility for correction (reversed).
- 8.3. Our organisation encourages harmony between people.
- 8.4. Confidence and control are seen in our organisation as both contrary but necessary.
- 8.5. Managers in our organisation are encouraged to exchange ideas.
- 8.6. Our organisation builds the confidence of its employees.
- 8.7. Decisions in our organisation are informed by evidence.
- 8.8. There is a culture of learning in our organisation.
- 8.9. The working environment at our organisation is well organised.
- 8.10. There are sufficient opportunities for me to interact with colleagues across the organisation.
- 8.11. Issues between members of groups are effectively addressed in our organisation.

## References

1. Roberts, D.; Pidcock, R.; Chen, Y.; Connors, S.; Tignor, M. *Global Warming of 1.5 °C: An IPCC Special Report on the Impacts of Global Warming of 1.5 °C above Pre-Industrial Levels and Related Global Greenhouse Gas Emission Pathways, in the Context of Strengthening the Global Response to the Threat of Climate Change*; IPCC: Geneva, Switzerland, 2018.
2. Brown, L. *Plan B 4.0: Mobilizing to Save Civilisation*; Norton: New York, NY, USA, 2009.



3. Hagedorn, G.; Loew, T.; Seneviratne, S.I.; Lucht, W.; Beck, M.-L.; Hesse, J.; Knutti, R.; Quaschnig, V.; Schleimer, J.-H.; Mattauch, L.; et al. The Concerns of the Young Protesters Are Justified: A Statement by Scientists for Future Concerning the Protests for More Climate Protection. *GAIA Ecol. Perspect. Sci. Soc.* **2019**, *28*, 79–87. [CrossRef]
4. Horton, R. Offline: Extinction or Rebellion? *Lancet* **2019**, *394*, 1216. [CrossRef]
5. Hawken, P. *Blessed Unrest: How the Largest Social Movement in History Is Restoring Grace, Justice, and Beauty to the World*; Penguin Books: New York, NY, USA, 2007.
6. Leggewie, C.; Welzer, H. Another “Great Transformation”? Social and Cultural Consequences of Climate Change. *J. Renew. Sustain. Energy* **2010**, *2*, 1–12. [CrossRef]
7. Polanyi, K. *The Great Transformation*, 2nd ed.; Beacon Press: Boston, MA, USA, 2001.
8. Gell-Mann, M. Transformations of the twenty-first century: Transitions to greater sustainability. In *Global Sustainability: A Nobel Cause*; Schellnhuber, H.-J., Molina, M., Stern, N., Huber, V., Kadner, S., Eds.; Cambridge University Press: Cambridge, UK, 2010; ISBN 9780521769341.
9. Transforming Our World: The 2030 Agenda for Sustainable Development. A/RES/70/1 (25 September 2015). Available online: [https://www.un.org/ga/search/view\\_doc.asp?symbol=A/RES/70/1&Lang=E](https://www.un.org/ga/search/view_doc.asp?symbol=A/RES/70/1&Lang=E) (accessed on 18 September 2020).
10. Baranes, A. Towards Sustainable and Ethical Finance. *Development* **2009**, *52*, 416–420. [CrossRef]
11. Thompson, P.; Cowton, C.J. Bringing the Environment into Bank Lending: Implication for Environmental Reporting. *Br. Account. Rev.* **2004**, *36*, 197–218. [CrossRef]
12. Weber, O.; Diaz, M.; Schwegler, R. Corporate Social Responsibility of the Financial Sector—Strengths, Weaknesses and the Impact on Sustainable Development. *Sustain. Dev.* **2014**, *22*, 321–335. [CrossRef]
13. Mulder, I.; Su, M.; Dedessus le Moutier, R. *Collective Commitment to Climate Action: Year One in Review*; UNEP Finance Initiative: Geneva, Switzerland, 2020. Available online: [https://www.unepfi.org/ccca\\_year-one-in-review\\_december-2020/](https://www.unepfi.org/ccca_year-one-in-review_december-2020/) (accessed on 15 December 2020).
14. van Marrewijk, M.; Werre, M. Multiple Levels of Corporate Sustainability. *J. Bus. Ethics* **2003**, *44*, 107–119. [CrossRef]
15. Valente, M. Business Sustainability Embeddedness as a Strategic Imperative: A Process Framework. *Bus. Soc.* **2015**, *54*, 126–142. [CrossRef]
16. Mosher, M.; Smith, L. *Sustainability Incorporated: Integrating Sustainability into Business: A Guide for Sustainability Practitioners*; Sustainability: London, UK, 2015.
17. Bertels, S.; Papania, L.; Papania, D. *Embedding Sustainability in Organisational Culture: A Systematic Review of the Body of Knowledge*; Network for Business Sustainability: London, ON, Canada, 2010.
18. Engert, S.; Rauter, R.; Baumgartner, R.J. Exploring the Integration of Corporate Sustainability into Strategic Management: A Literature Review. *J. Clean. Prod.* **2016**, *112*, 2833–2850. [CrossRef]
19. Lloret, A. Modeling Corporate Sustainability Strategy. *J. Bus. Res.* **2016**, *69*, 418–425. [CrossRef]
20. De Villiers, C.; Rouse, P.; Kerr, J. A New Conceptual Model of Influences Driving Sustainability Based on Case Evidence of the Integration of Corporate Sustainability Management Control and Reporting. *J. Clean. Prod.* **2014**, *136*, 78–85. [CrossRef]
21. Lopes, C.M.; Scavarda, A.; Hofmeister, L.F.; Thomé, A.M.T.; Vaccaro, G.L.R. An Analysis of the Interplay between Organisational Sustainability, Knowledge Management, and Open Innovation. *J. Clean. Prod.* **2017**, *142*, 476–488. [CrossRef]
22. Ebbesen, J.B.; Hope, A. Re-Imagining the Iron Triangle: Embedding Sustainability into Project Constraints. *PM World J.* **2013**, *2*, 1–13. [CrossRef]
23. Metcalf, L.; Benn, S. The Corporation Is Ailing Social Technology: Creating a ‘Fit for Purpose’ Design for Sustainability. *J. Bus. Ethics* **2012**, *111*, 195–210. [CrossRef]
24. Baets, W.; Oldenboom, E. *Rethinking Growth: Social Intrapreneurship for Sustainable Performance*; Palgrave Macmillan: Basingstoke, UK, 2009.
25. Edwards, M.G. An Integrative Metatheory for Organisational Learning and Sustainability in Turbulent Times. *Learn. Organ.* **2009**, *16*, 189–207. [CrossRef]
26. Dyllick, T.; Muff, K. Clarifying the Meaning of Sustainable Business: Introducing a Typology from Business-as-Usual to True Business Sustainability. *Organ. Environ.* **2016**, *29*, 156–174. [CrossRef]
27. von Weizsaecker, E.; Wijkman, A. *Come on! Capitalism, Short-Termism, Population and the Destruction of the Planet*; Springer: New York, NY, USA, 2017; ISBN 978-1-4939-7419-1.
28. Neumann, K.; Anderson, C.; Denich, M. Participatory, Explorative, Qualitative Modeling: Application of the IMODELER Software to Assess Trade-Offs among the SDGs. *Econ. Open-Assess. E-J.* **2018**. [CrossRef]
29. Magee, L.; Scerri, A.; James, P.; Thom, J.A.; Padgham, L.; Hickmott, S.; Deng, H.; Cahill, F. Reframing Social Sustainability Reporting: Towards an Engaged Approach. *Environ. Dev. Sustain.* **2013**, *15*, 225–243. [CrossRef]
30. Felber, C.; Campos, V.; Sanchis, J.R. The Common Good Balance Sheet, an Adequate Tool to Capture Non-Financials? *Sustainability* **2019**, *11*, 3791. [CrossRef]
31. Stubbs, W. Characterising B Corps as a Sustainable Business Model: An Exploratory Study of B Corps in Australia. *J. Clean. Prod.* **2017**, *144*, 299–312. [CrossRef]
32. Chapman, K. *Complexity and Creative Capacity: Rethinking Knowledge Transfer, Adaptive Management and Wicked Environmental Problems*; Routledge: Abingdon, UK, 2016.
33. Wells, J. *Complexity and Sustainability*; Routledge: London, UK, 2013.

34. Creswell, J. *A Concise Introduction to Mixed Methods Research*; Sage: Los Angeles, CA, USA, 2015.
35. Baets, W.; Oldenboom, E. *Values Based Leadership in Business Innovation*; Bookboon: London, UK, 2013. Available online: <https://www.Bookboon.com> (accessed on 3 March 2014).
36. Kohonen, T. *Self-Organizing Maps*, 2nd ed.; Springer: Berlin/Heidelberg, Germany, 1997; ISBN 3540586008.
37. Josselson, R. Narrative research: Constructing, deconstructing, and reconstructing story. In *Five Ways of Doing Qualitative Analysis: Phenomenological Psychology, Grounded Theory, Discourse Analysis, Narrative Research, and Intuitive Inquiry*; Wertz, F., Charmaz, K., McMullen, L., Josselson, R., Anderson, R., McSpadden, E., Eds.; Guilford Publications: New York, NY, USA, 2014; pp. 224–242, ISBN 9780761947769.
38. Valente, M. Demystifying the Struggles of Private Sector Paradigmatic Change: Business as an Agent in a Complex Adaptive System. *Bus. Soc.* **2010**, *49*, 439–476. [[CrossRef](#)]
39. Cavanagh, M. Coaching from a Systemic Perspective: A Complex Adaptive Conversation. In *Evidence Based Coaching Handbook: Putting Best Practice Practices to Work for Your Clients*; Strober, D., Grant, A., Eds.; John Wiley & Sons: Hoboken, NJ, USA, 2006; pp. 313–354.
40. Holland, J.H. *Complexity: A Very Short Introduction*; Oxford University Press: Oxford, UK, 2014.
41. Stacey, R. *Complexity and Organisational Reality: Uncertainty and the Need to Rethink Management after the Collapse of Investment Capitalism*, 2nd ed.; Routledge: London, UK, 2010.
42. Mertens, D.M. Mixed Methods and Wicked Problems. *J. Mix. Methods Res.* **2015**, *9*, 3–6. [[CrossRef](#)]
43. Rittel, H.W.; Webber, M.M. Dilemmas in a General Theory of Planning. *Policy Sci.* **1973**, *4*, 155–169. [[CrossRef](#)]
44. Goldstein, J. Emergence as a Construct: History and Issues. *Emerg. Complex. Organ.* **1999**, *1*, 49–72. [[CrossRef](#)]
45. Holland, J.H. Emergence. *Philosophica* **1997**, *59*, 11–40.
46. Chiles, T.H.; Meyer, A.D.; Hench, T.J. Organizational Emergence: The Origin and Transformation of Branson, Missouri's Musical Theaters. *Organ. Sci.* **2004**, *15*, 499–519. [[CrossRef](#)]
47. Bender, H.; Judith, K. Does Sustainability Emerge from between the Scales? *Emerg. Complex. Organ.* **2015**, *17*, 1–11. [[CrossRef](#)]
48. Twomey, D.F. Designed Emergence as a Path to Enterprise Sustainability. *Emerg. Complex. Organ.* **2006**, *8*, 12–23.
49. Lissack, M.R.; Letiche, H. Complexity, Emergence, Resilience, and Coherence: Gaining Perspective on Organisations and Their Study. *Emergence* **2002**, *4*, 72–94. [[CrossRef](#)]
50. McCraty, R. *Science of the Heart: Exploring the Role of the Heart in Human Performance: Volume 2*; HeartMath Institute: Boulder Creek, IN, USA, 2015.
51. Cilliers, P. *Complexity and Postmodernism: Understanding Complex Systems*; Routledge: London, UK, 1998.
52. McCraty, R. New Frontiers in Heart Rate Variability and Social Coherence Research: Techniques, Technologies, and Implications for Improving Group Dynamics and Outcomes. *Front. Public Health* **2017**, *5*, 1–13. [[CrossRef](#)] [[PubMed](#)]
53. Arecchi, F.T. Coherence, Cognitive Acts and Creativity (The Physics of Mental Acts). *Spec. Issues Epistemol.* **2008**, *15*, 307–330.
54. McCraty, R.; Shaffer, F. Heart Rate Variability: New Perspectives on Physiological Mechanisms, Assessment of Self-Regulatory Capacity, and Health Risk. *Glob. Adv. Health Med.* **2015**, *4*, 46–61. [[CrossRef](#)]
55. Wilber, K. *A Theory of Everything: An Integral Vision for Business, Politics, Science and Spirituality*; Gateway: Dublin, Ireland, 2001.
56. Putnik, G.D. Complexity Framework for Sustainability: An Analysis of Five Papers. *Learn. Organ.* **2009**, *16*, 261–270. [[CrossRef](#)]
57. Edwards, M.G. *Organisational Transformation for Sustainability*; Routledge: New York, NY, USA, 2010.
58. Krippendorff, K. Beyond Coherence. *Manag. Commun. Q.* **1999**, *13*, 135–145. [[CrossRef](#)]
59. Oral, S.B. Liberating Facts: Harman's Objects and Wilber's Holons. *Stud. Philos. Educ.* **2014**, *33*, 117–134. [[CrossRef](#)]
60. Meppem, T.; Bourke, S. Different Ways of Knowing: A Communicative Turn toward Sustainability. *Ecol. Econ.* **1999**, *30*, 389–404. [[CrossRef](#)]
61. Kuhn, T. *The Structure of Scientific Revolutions*; University of Chicago Press: Chicago, IL, USA, 1970.
62. Chapman, K. Complexity & Creative Capacity: Reformulating the Problem of Knowledge Transfer in Environmental Management. Ph.D. Thesis, Edith Cowan University, Perth, Australia, 2013. Available online: <https://ro.ecu.edu.au/theses/696> (accessed on 13 May 2021).
63. Capra, F.; Luisi, P. *The Systems View of Life: A Unifying Vision*; Cambridge University Press: Cambridge, UK, 2014; ISBN 9781107011366.
64. Swilling, M.; Annecke, E. *Just Transitions: Explorations of Sustainability in an Unfair World*; UCT Press: Cape Town, South Africa, 2012.
65. Gladwin, T.N.; Kennelly, J.J.; Krause, T.S. Shifting Paradigms for Sustainable Development: Implications for Management Theory and Research. *Acad. Manag. Rev.* **1995**, *20*, 874–907. [[CrossRef](#)]
66. Hart, S.L. A Natural-Resource-Based View of the Firm. *Acad. Manag. Rev.* **1995**, *20*, 986–1014. [[CrossRef](#)]
67. Shrivastava, P. Castrated Environment: Greening Organisational Studies. *Organ. Stud.* **1994**, *15*, 705–726. [[CrossRef](#)]
68. Valente, M. Theorizing Firm Adoption of Sustaincentrism. *Organ. Stud.* **2012**, *33*, 563–591. [[CrossRef](#)]
69. Heylighen, F.; Cilliers, P.; Gershenson, C. Complexity and Philosophy. *Complex. Sci. Soc.* **2007**, *13*, 117–134.
70. Nayak, A.; Chia, R. Thinking Becoming and Emergence: Process Philosophy and Organization Studies. *Res. Sociol. Organ.* **2011**, *32*, 281–309. [[CrossRef](#)]
71. Bickhard, M.H. Some Consequences (and Enablings) of Process Metaphysics. *Axiomathes* **2011**, *21*, 3–32. [[CrossRef](#)]

72. Rescher, N. *Process Metaphysics: An Introduction to Process Philosophy*; State University of New York Press: New York, NY, USA, 1996.
73. Morin, E. *On Complexity*; Hampton Press: Cresskill, NJ, USA, 2008.
74. Esbjörn-Hargens, S. An Ontology of Climate Change: Integral Pluralism and the Enactment of Multiple Objects. *J. Integral Theory Pract.* **2010**, *5*, 143–174.
75. Millenium ecosystem assessment. In *Ecosystems and Human Well-Being: Synthesis*; Island Press: Washington, DC, USA, 2005; ISBN 1597260401.
76. Maitland, R. Exploring Emergence in Corporate Sustainability. Ph.D. Thesis, University of Cape Town, Cape Town, South Africa, 2019. Available online: <http://hdl.handle.net/11427/31139> (accessed on 13 May 2021).
77. Carolan, M.S. Ontological Politics: Mapping a Complex Environmental Problem. *Environ. Values* **2004**, *13*, 497–522. [CrossRef]
78. Lakoff, G.; Johnson, M. *Philosophy in the Flesh: The Embodied Mind and Its Challenge to Western Thought*; Basic Books: New York, NY, USA, 1999.
79. Varela, F.; Thompson, E.; Rosch, E. *The Embodied Mind: Cognitive Science and Human Experience*; MIT Press: Cambridge, MA, USA, 1991.
80. Hutchins, E. Enaction, imagination, and insight. In *Enaction: Towards a New Paradigm for Cognitive Science*; Stewart, J., Gapenne, O., di Paolo, E., Eds.; MIT Press: Cambridge, MA, USA, 2010; pp. 425–450.
81. Peter, C.; Swilling, M. Linking Complexity and Sustainability Theories: Implications for Modeling Sustainability Transitions. *Sustainability* **2014**, *6*, 1594–1622. [CrossRef]
82. Yin, R. *Case Study Research: Design and Methods*, 5th ed.; Sage: Los Angeles, CA, USA, 2014.
83. Chu, D.; Strand, R.; Fjelland, R. Theories of Complexity: Common Denominators of Complex Systems. *Complexity* **2003**, *8*, 19–30. [CrossRef]
84. Creswell, J.; Plano Clark, V. *Designing and Conducting Mixed Methods Research*, 2nd ed.; Sage: Los Angeles, CA, USA, 2010.
85. Bakhtin, M. *Speech Genres and Other Late Essays*; Emerson, C., Holquist, M., Eds.; University of Texas Press Slavic Series: Austin, TX, USA, 1986.
86. Fowler, F.; Cosenza, C. Writing effective questions. In *International Handbook of Survey Methodology*; de Leeuw, E., Hox, J., Dillman, D., Eds.; Routledge: London, UK, 2008; pp. 136–160.
87. Leis, R.; Baets, W. Uma Abordagem de Analise Do Desempenho Organizacional a Luz de Uma Visao Holistica de Gestao: Apresentado a Ferramenta Cassandra Tool. In Proceedings of the the 5th CONTECSI—International Conference on Information Systems and Technology Management, San Paulo, Brazil, 4–6 June 2008.
88. UCLA Institute for Digital Research and Education What Does Cronbach's Alpha Mean? Available online: <https://stats.idre.ucla.edu/spss/faq/what-does-cronbachs-alpha-mean/> (accessed on 2 August 2018).
89. Kline, R. *Methodology in the Social Sciences. Principles and Practice of Structural Equation Modeling*, 2nd ed.; Guilford Press: New York, NY, USA, 2005.
90. Yong, A.G.; Pearce, S. A Beginner's Guide to Factor Analysis: Focusing on Exploratory Factor Analysis. *Tutor. Quant. Methods Psychol.* **2013**, *9*, 79–94. [CrossRef]
91. Tabachnick, B.G.; Fidell, L. *Using Multivariate Statistics*, 5th ed.; Harper Collins: New York, NY, USA, 2006; ISBN 0321056779.
92. Hu, L.; Bentler, P.M. Cutoff Criteria for Fit Indexes in Covariance Structure Analysis: Conventional Criteria versus New Alternatives. *Struct. Equ. Modeling A Multidiscip. J.* **1999**, *6*, 1–55. [CrossRef]
93. Hooper, D.; Coughlan, J.; Mullen, M.R. Structural Equation Modelling: Guidelines for Determining Model. *Electron. J. Bus. Res. Methods* **2008**, *6*, 53–60.
94. Browne, M.; Cudeck, R. Single Sample Cross-Validation Indices for Covariance Structures. *Br. J. Math. Stat. Psychol.* **1989**, *37*, 62–83. [CrossRef] [PubMed]
95. Kenny, D. Measuring Model Fit. Available online: <http://davidakenny.net/cm/fit.htm> (accessed on 9 August 2018).
96. Waldrop, M.M. *Complexity: The Emerging Science at the Edge of Order and Chaos*; Touchstone: New York, NY, USA, 1992.
97. Etikan, I. Comparison of Convenience Sampling and Purposive Sampling. *Am. J. Theor. Appl. Stat.* **2016**, *5*, 1–4. [CrossRef]
98. Stake, R. *Multiple Case Study Analysis*; Guilford Press: New York, NY, USA, 2006.
99. Guba, E.G. Criteria for Assessing the Trustworthiness of Naturalistic Inquiries. *Educ. Commun. Technol.* **1981**, *29*, 75–91.
100. Shenton, A.K. Strategies for Ensuring Trustworthiness in Qualitative Research Projects. *Educ. Inf.* **2004**, *22*, 63–75. [CrossRef]
101. Allen, P.M.; Varga, L. Complexity: The Co-Evolution of Epistemology, Axiology and Ontology. *Nonlinear Dyn. Psychol. Life Sci.* **2007**, *11*, 19–50.
102. Peirce, C.S. *The Essential Peirce: Selected Philosophical Writings Volume 2 (1893–1913)*; Houser, N., Eller, J., Eds.; Indiana University Press: Bloomington, IN, USA, 1998; ISBN 0253333970.
103. Baumgartner, R.J.; Rauter, R. Strategic Perspectives of Corporate Sustainability Management to Develop a Sustainable Organization. *J. Clean. Prod.* **2017**, *140*, 81–92. [CrossRef]
104. Mitleton-Kelly, E. A Complexity Theory Approach to Sustainability: A Longitudinal Study in Two London NHS Hospitals. *Learn. Organ.* **2011**, *18*, 45–53. [CrossRef]
105. Cruz, L.B.; Pedrozo, E.Á.; de Fátima Barros Estivalet, V. Towards Sustainable Development Strategies: A Complex View Following the Contribution of Edgar Morin. *Manag. Decis.* **2006**, *44*, 871–891. [CrossRef]
106. Shrivastava, P. Ecocentric Management for a Risk Society. *Acad. Manag. Rev.* **1995**, *20*, 118–137. [CrossRef]

- 
107. Espinosa, A.; Walker, J. *A Complexity Approach to Sustainability: Theory and Application*; Imperial College Press: London, UK, 2011.
  108. Eisenhardt, K.M. Building Theories from Case Study Research. *Acad. Manag. Rev.* **1989**, *14*, 532–550. [[CrossRef](#)]