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Organisational practices and individual innovation behaviour:
A non-linear approach to modelling the emergence of
Corporate Entrepreneurship

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Signed

Signed by candidate

Date:18 January 2018

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Abstract

Organisational practices and individual innovation behaviour: A non-linear approach to modelling the emergence of Corporate Entrepreneurship

Background: Successful corporate entrepreneurship is credited with various positive organisational outcomes and achievements. At the wellspring of corporate entrepreneurship is the individual member of the organisation tasked with innovative behaviour. Corporate entrepreneurship emerges within the interface between innovative individuals and the organisational system they function in. Classical theorising that follows reductionist approaches in the pursuit of pure causality has failed to explain the emergence of corporate entrepreneurship within the dynamic and non-linear processes that constitute the complexity embedded in organisations.

Research statement: Corporate entrepreneurship as an emergent process within an organisation comprises various elements that when studied through classical theories and methods fail to explain the process as a whole. An alternative theory and method is needed if corporate entrepreneurship is to be understood as a complex, dynamic and non-linear phenomenon.

Method of analysis: A two-phase sequential explanatory mixed method of analysis is employed. Quantitative data, that was gathered using existing measuring instruments, includes variables related to human capital and organisational practices and individual innovative behaviour. The data is presented to the Self-Organising Maps software, which utilises the principles of Artificial neural networks to cluster it. Phase 2 comprises a qualitative exploration with subject matter experts, of outlying cluster patterns produced by the quantitative results.

Findings and conclusions: Theoretically, the study describes the relevant concepts of corporate entrepreneurship and organisational practices and complex adaptive systems theory as they pertain to the study. Empirically, the study maps the emergence of innovative behaviour in a manner that explores an alternative to mainstream purist causality. The study produces a conceptual framework that can be contextually adapted and applied in practice to gain understanding into the emergence of corporate entrepreneurship. The study concludes that our understanding of the emergence of corporate entrepreneurship can be enhanced through the use of methods that allow for the non-linear and dynamic nature of the phenomenon, rather than methods that attempt to reduce it.

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Chapter 1

Introduction to the study

This chapter sets the scene for the research exploration of this particular study. Firstly, the importance of the phenomenon under investigation is supported with current findings in the academic literature as well as considerations by industry. Secondly, the current state of research into the phenomenon of corporate entrepreneurship (CE) and factors relating to understanding the emergence of corporate entrepreneurship is briefly summarized, and the research opportunity or gap is identified. The identified research opportunity is formulated into a problem statement supported by research questions and the accompanying research objectives. Section 4 of the chapter separates the research objectives into theoretical and empirical objectives. Section 5 provides a summarized description of the research design employed in an attempt to achieve the research objectives, answer the research questions and ultimately address the research statement. The chapter concludes with ethical considerations during the research process, and a summary of the chapter.

1.1 Background to the research problem

This section provides an overview of the topic under investigation, and sets the scene for formulating the research problem.

1.1.1 The importance of Corporate Entrepreneurship

Successful corporate entrepreneurship - also referred to as intrapreneurship - is credited with various positive organisational outcomes and achievements. These include, but are not limited to, increased corporate competitiveness, both local and global (Bhardwaj, Sushil, & Momaya, 2007); general firm performance (Kuratko, Ireland, & Hornsby, 2001); innovation in products, processes and administration (Dess, Ireland, Zahra, Floyd, Janney & Lane, 2003); profitability and growth prediction (Antoncic & Hisrich, 2004); corporate vitality and long term or sustainable development (Zhang, Wan, & Jia, 2008); knowledge creation; and the general business goal of wealth creation (Dess et al., 2003). Considering all of the available literature,

the above-mentioned positives can become an extensive list. Wolcott and Lippitz (2007, p. 75) simply state that CE is a “potent solution” in attaining and regaining market growth.

Considering the pace at which companies need to transform in both a free market economy and an entrepreneurial age, being static is detrimental. Companies constantly need to adjust, adapt and redefine themselves (Morris, Kuratko, & Covin, 2010).

Zook (2016, p. 3) in an article in the Harvard Business Review notes that new ventures started within the structures of existing organisations have a 1 in 8 chance of developing into a “viable, large scale” business venture, compared to the 1 in 500 chance faced by start-ups. These odds make corporate entrepreneurship both an attractive career opportunity for the entrepreneurial personality and a profitable action for companies.

The literature agrees that corporate entrepreneurship is a positive organisational mechanism. Various authors emphasise that corporate entrepreneurship is vital to the performance and survival of organisations, explaining why increasingly researchers and practitioners alike have started paying more attention to understanding and practising the process of corporate entrepreneurship (Barringer & Bluedorn, 1999; Agor, 1986 ; Kuratko & Audretsch, 2013; Basu & Wadhwa, 2013; Covin & Slevin, 2014).

1.1.2 The importance of innovation and the innovative employee

Corporate entrepreneurship has at its core the individual innovative behaviour of the members that work in the organisation and as its desired outcome, innovation. Goffin and Mitchell (2005) emphasise that innovation emerges through the people that take part in the process of innovation, and that innovation simply cannot emerge without motivated, creative and innovatively skilled organisational employees. Abstein and Spieth (2014) concur by stating that organisations most certainly cannot innovate without employees who exhibit innovative work behaviour.

Innovation refers to the practical introduction of novel or different and useful ideas involving the product and service offering of the organisation, and also the processes by which the

organisation and its activities are governed. Individual innovative behaviour in the workplace refers to the degree to which an employee behaves in a manner that contributes to successful innovation (de Jong & den Hartog, 2010; Farr & Ford, 1990; Kleysen & Street, 2001).

1.1.3 The current state of theorising in Corporate Entrepreneurship

Theory about entrepreneurship, both in and outside of existing organisations, has become increasingly fragmented, and the literature leaves practitioners and scholars with constructs that reflect but an aspect of what is meant by the “mother” construct (Anderson, Drakopoulou Dodd, & Jack, 2012). Aforementioned authors argue that fragmentation within a discipline often happens because of two reasons. The first reason is that the meanings that constitute the phenomenon vary extensively between researchers and practitioners alike. A second proposed reason for theoretical fragmentation in a discipline is that the phenomenon that constitutes the discipline is socially constructed in nature. A possible solution for reconciling this diversity and making the constructs useful, suggested by Anderson et al. (2012), could lie in theorising the constructs as part of a complex whole. They state that by approaching research in this field through the novel way of *connections*, valuable contributions can be made not only to knowledge in the field but also to practice.

Any doubt about fragmentation in theorising around corporate entrepreneurship is cast aside by the presence of a definite definitional gap which further extends to the lack of theoretical and empirical knowledge of the domain, as well as the associated behaviour and action processes (Kuratko & Audretsch, 2013). Anderson et al. (2012) note that current research methods provide clarity on some aspects, features and attributes, but fail in recognising the whole.

A largely reductionist approach seems to be true for both research and practice in most business phenomena. Traditional organisational practices are characterized by mechanistic thinking and working. Wheatley (2011) warns that by continuously practising historical methods we should not expect any miracles in a business age that no longer functions like a machine. Wheatley describes the present environment as “disturbing and mysterious”, where the ability to predict and control is an illusion. Despite this current state of uncertainty and

change, most organisations in most industries, both public and private, still subscribe to an unchanged set and organising of traditional organisational practices. At the same time researchers are equally guilty of mostly following the same classical and Newtonian methods when attempting to better understand business phenomena.

Classical theorising in general business research, including most research relating to corporate entrepreneurship, has failed in explaining the emergence of phenomena within the dynamic and non-linear processes that constitute the organisation. Furthermore, this type of research follows a reductionist approach that seeks to causally explain elements in their separation, with little to no consideration for how holistically elements might come together. Baets (2006) criticizes reductionism for attempting to draw conclusions on problems much larger than those that have been separately studied. Looking at the available research in the area of corporate entrepreneurship, innovative behaviour and the human capital practices that govern organisations, one finds that, for the most part, research is approached in a classical and reductionist manner. In further writings Baets emphasises that “innovative research never follows paths already marked out” (p. xxi).

Birkinshaw (2013) acknowledges that organisations are to a certain extent engineered systems characterized by “boxes and arrows, and accountabilities and KPI’s (p. 2); however, we cannot ignore the social system aspect of the organisation. In social systems, people interact and behave in ways that are difficult to predict. Attempting to understand and manage this type of complexity from a mechanistic paradigm is a mismatch that might not lead to desirable organisational outcomes.

1.1.4 The possibility of an alternative approach

Building from the above discussion, the aim of this study is to explore alternative methods of gaining greater understanding of a non-linear, dynamic phenomenon (CE) within the systemic and often unpredictable environment of organisations. Could there be value in exploring a non-linear organisational phenomenon such as CE from an equally non-linear research perspective?

1.2 Abbreviated literature review

The following section provides an abbreviated review of the current literature around the topic explored in this study. An extended literature review is detailed in Chapter 2.

1.2.1 Defining Corporate Entrepreneurship

Despite the fragmented state of the theory and gaps in the definitions in the scholarly field of corporate entrepreneurship (Anderson et al., 2012), it can be confidently deduced that innovation is “the single common theme underlying all forms of corporate entrepreneurship” (Kuratko & Audretsch, 2013, p. 324). This particular study follows the definition of corporate entrepreneurship as formulated by Sharma and Chrisman (1999). Justification for this choice is twofold. Firstly, it is the definition that is cited most frequently according to Google Scholar, at the time of writing. Secondly, the definition is the product of a research article dedicated specifically to the definitional issues around the term corporate entrepreneurship. Sharma and Chrisman (1999) define corporate entrepreneurship as follows: “...the process whereby an individual or group of individuals, in association with an existing organization, create a new organization, or instigate renewal or innovation within that organization”.

1.2.2 The innovation agents of Corporate Entrepreneurship

Innovation within an existing organisation is driven by a unique group of innovative employees often referred to as intrapreneurs. The behaviour of, and dynamics amongst, employees that function as innovation agents within organisations are governed and organised by a particular mix of general organisational practices as well as specific human capital management practices.

As far back as the 1980s and even earlier, classical theorising established links between the development of innovative employees or intrapreneurs and increased organisational productivity, and considered elements that might have an influence on the creation of a climate that encourages successful innovation behaviour by members of the organisation (Agor, 1986). However, classical theorising has done little to add to the understanding of how

these elements come together and interact in a non-linear, dynamic organisational setting to either enhance or hinder the emergence of individual innovative behaviour.

Anderson et al. (2012) argue that with a process involving entrepreneurial endeavours, as is the case with corporate entrepreneurship, the micro processes become confusingly entangled into the macro processes of social and economic evolution. Innovation failures, for example, are experienced at firm level, while innovation successes have their impact at a national level. Knowing the details of the micro becomes almost impossible, as each is unique and self-organising. Knowing, according to the authors, is limited to identifying some elements and a general account of the process, with a small degree of certainty.

1.3 Corporate Entrepreneurship as a non-linear process

When embarking on a project of sense-making about a phenomenon, researchers, scientists and philosophers employ certain set beliefs and viewpoints about the world in general. A phenomenon like corporate entrepreneurship, where sense-making and meaning are derived from holistically observing the interconnections between people, systemic institutions, material objects and physical entities as outcomes and language call for a paradigm that draws attention to the unique rationality of how singular meanings are socially constructed. Understanding such a phenomenon requires a lens that allows for it not to be seen as a “thing”, but as a way of being. The lens also needs to allow for process formation or emergence by “linking, relating and connecting lived experiences in their social and cultural context”. The aforementioned authors add that an entrepreneurial-like phenomenon seeks an ontology of “becoming” if it is to capture sense-making related to the past and the future as not only events but also processes (Anderson et al., 2012, p. 926).

Acceptance of holism, interconnectedness, constructivism, self-organisation and emergence in a paradigm demands a break from classical Newtonian principles that are fixed in time and space. Baets (2006) states that even though this break from classical research principles has to a certain extent emerged in hard science, it seems the managerial sciences have “sidestepped” the revolution.

This study grounds itself in an interpretivist ontology, with complexity theory as the epistemology. Complexity theory is a paradigm that allows for non-linear dynamics of phenomena, emergence (Byrne, 1998), uncertainty, contradiction (Browaeys & Baets, 2003), adaptation and evolution (Schneider & Somers, 2006). Considering the above, it seems sensible to attempt a deeper understanding of a phenomenon like corporate entrepreneurship by looking at it through a complexity lens.

For sense-making of a phenomenon that consists of concepts with multiple meanings, contingently and contextually, as with corporate entrepreneurship, Anderson et al. (2012) recommend explaining the phenomenon as a complex adaptive system (CAS), as it will allow theorising to be both contingent and contextualized.

CAS theory has proven to provide insight into the evolution of complex, organic-like structures into order and purpose over time. Organisations are characterized by semi-autonomous members that interact at many different levels of cognition and behaviour. These characteristics can be described by the mechanisms and generic constructs that drive CAS theory (Dooley, 1996). CAS allows for the exploration of interconnections and emergent relationships of a large number of components.

1.4 Adopting an alternative approach

It is clear from the above discussion that corporate entrepreneurship is an important and positive organisational phenomenon in a competitive economy, but that classical theorising has failed to explain the process of corporate entrepreneurship. Building from this foundation, this study aims to provide an alternative way of understanding the process of corporate entrepreneurship within its various contexts.

An alternative ontology and epistemology calls for an equally alternative method of analysis. Liao and Wen (2007) find that complexity theory and complex adaptive systems theory are well matched with Artificial neural networks and agent-based simulations as a method of analysis. Artificial neural networks tolerate dynamic and non-linear data in that they have the ability to adjust to the level of complexity of a given system. There are various types of Artificial

neural network methods of analysis. This study utilises Kohonen's Self-Organising Maps in an attempt to observe the emergence of innovative behaviour and other variables related to human capital and organisational practices within the gathered data as a whole. It is important to note that Artificial neural networks as a quantitative method of analysis is of little use if the produced results are not interpreted through quantitative methods (Scarborough & Somers, 2006). This method of analysis is detailed in the research methodology section in Chapter 4 of this study.

1.5 Problem statement

The following problem statement guides the research exploration of this study:

Corporate entrepreneurship as an emergent process within an organisation is made up of various elements that when studied through classical theories and methods fail to explain the process as a whole. An alternative theory and method is needed if corporate entrepreneurship is to be understood as a complex, dynamic and non-linear phenomenon.

Addressing this statement could be useful for researchers, practitioners and policy makers alike. Treating organisational practices and people as linear notions that are bound in silos, is a death knell for any kind of innovation - be it a product, process, or service innovation. An awareness and understanding of corporate entrepreneurship as a holistic process of renewal can assist practitioners in enhancing the levels of innovation throughout the entire value chain. Corporate entrepreneurship, through innovative behaviour, can be a powerful asset to any organisation. However, for corporate entrepreneurship to go beyond being the latest organisational fad marketed through flash training and reward programmes, only to be replaced in a few months with the next new fad and accompanying training and rewards schemes, we need to rethink our methods of understanding such a complex phenomenon. In doing this we have a much better chance of emerging corporate entrepreneurship through innovative behaviour, as a sustainable culture in our organisations – a way of “being” in business.

1.6 Research question

The primary research question for this study is formulated as follows: How may a non-linear framework for the emergence of corporate entrepreneurship be described best?

1.6.1 Secondary research questions

1.6.1.1 How can emerging patterns of corporate entrepreneurship be described through the application of Self-Organising Maps and the principles of Artificial neural network clustering?

1.6.1.2 How are corporate entrepreneurship and innovative behaviour defined, understood and initiated by subject matter experts in business?

1.7 Research objectives

Achieving the theoretical and empirical objectives as set out below will aid in answering the research question.

1.7.1 Theoretical objectives

The following are the theoretical objectives that this study aims to achieve:

TO₁: to describe the relevant concepts of complexity theory as they pertain to this study

TO₂: to describe the relevant concepts of corporate entrepreneurship as they pertain to this study

TO₃: to describe the relevant concepts of strategic human capital and organisational practices as they pertain to this study

TO₄: to map a preliminary non-linear conceptual framework for corporate entrepreneurship based on the identified concepts

1.7.2 Empirical objectives

The following are the empirical objectives the study aims to achieve:

EO₁: to explore the emergence of individual innovation behaviour by using Kohonen's Self-Organising Maps as an Artificial neural network method of analysis on an existing data set

EO₂: to determine the practical applicability of Artificial neural network Self-Organising Maps as a method of interpreting the contextual emergence of innovation behaviour

EO₃: to determine the face validity of the preliminary conceptual framework as perceived by subject matter experts in corporate entrepreneurship through a qualitative research approach

EO₄: to construct the final non-linear conceptual framework for corporate entrepreneurship

1.8 Philosophical stance of the study

The study adopts an interpretivist approach, accompanied by the use of mixed research methods, in addressing the problem statement, research questions and research objectives. Interpretivist approaches can successfully be followed beyond only qualitative methods, as this allows the researcher to gain a much deeper understanding of the unobservable processes responsible for generating the observed data. Furthermore, it allows for the analysis of data from many perspectives, achieving triangulation as a research goal holistically producing improved integration of measurement and modelling.

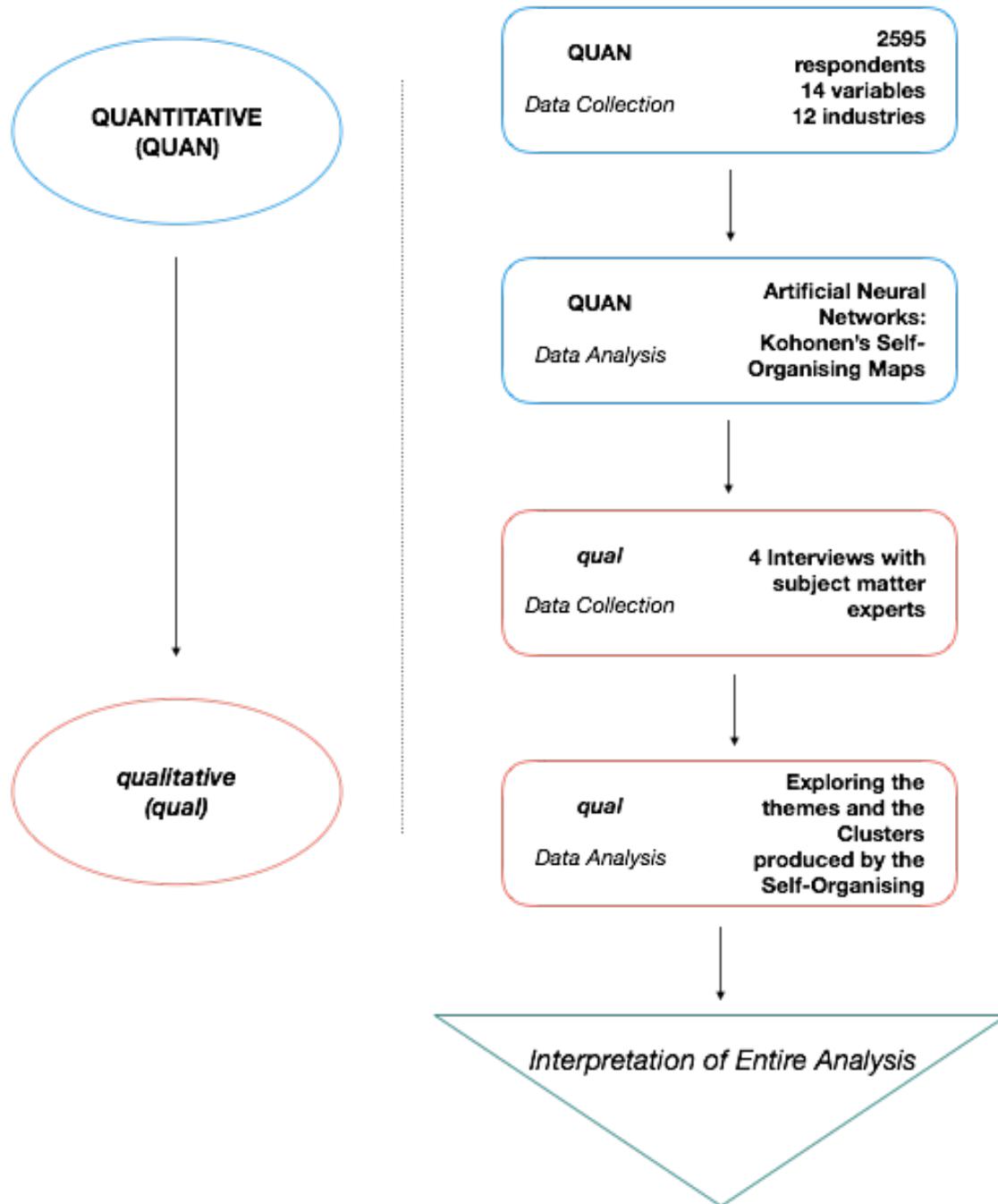
In agreement with epistemology based in complexity, the study aims to understand and describe the phenomenon under investigation in a manner that allows for the observation of emergence, multi-dimensionality, contradiction and openness rather than the reduction thereof. Stepping away from pure causality and prediction embedded in Newtonian thinking, the study moves toward a non-linear and dynamic understanding of a complex phenomenon, in this case corporate entrepreneurship.

Mixed method research design in an interpretivist stance opens the door to multiple methods, different worldviews and also different forms of data collection and analysis, honouring the principles of complexity.

1.9 Research design

A sequential explanatory mixed method was used for the design of the research in this study (Creswell, 2014). The research endeavour is set out in two phases. In Phase 1 the existing quantitative data set was presented to the Self-Organising Maps software, which utilises the principles of Artificial neural networks to cluster the data. Phase 2 comprises a qualitative exploration of the outlying cluster results produced by the ANN Self-Organising Maps, the research findings and the presentation of the final non-linear conceptual framework. Figure 1 presents the research process and design in a flow-chart adapted from (Creswell, 2013).

Figure 1 The Research Process



Source: Adapted from: (Creswell, 2013, p.220)

1.9.1 Phase 1: Clustering the data using Kohonen's Self-Organising Maps

Data collection was undertaken as part of a larger research group at the institution where the primary researcher is employed. The data sample of 2595 respondents was obtained from the targeted population of employees within 43 South African organisations across 12 industries. Existing instruments were used to measure the perception of the positive presence of the chosen variables within the targeted organisations. The variables measured fit into one of three streams relating directly to the topic of this study, namely human capital practices, factors that make for the temperature in a corporate entrepreneurial setting and individual innovative work behaviour. Four instruments were combined into one survey questionnaire. Respondents also noted certain descriptive characteristics relating to age, tenure, nature of their position held, level of education, and the industry in which they work.

Responses will be captured into an Excel spreadsheet and presented to the Self-Organising Map software for cluster mapping. Clusters will be analysed and interpreted according to the strength of the emergence of variables within each cluster. Specific attention will be given, in the interpretation, to the strength of the emergence of the variables relating to innovative behaviour within the presence of the variables relating to human capital practice and factors that, according to the literature, create the temperature for a corporate entrepreneurial organisation.

1.9.2 Phase 2: Qualitative face-to-face interviews

The qualitative phase of the research will be done sequentially to the quantitative phase, in the form of semi-structured interviews. Sampling will consist of subject matter experts. The first part of the interview will be structured in such a manner as to establish the participant as an expert in the area of corporate entrepreneurship, or fields related thereto, such as driving innovation. Secondly, the quantitative research results, specifically the outlying clusters, will be presented to the participants for their interpretation and interrogation. Finally, there will be a discussion with the participants about their knowledge and opinions of the current state of the research themes. Participants' responses will be transcribed and analysed for emergent

themes. In line with the research process, the analysed qualitative data is, finally, interpreted together with the quantitative.

1.10 Ethical considerations

As this study forms part of a group research project, ethical clearance was granted by the UNISA School of Graduate leadership where the researcher gathered the data through participation in a larger research collective. Final ethical clearance was obtained from the UCT Graduate School of Business, where the primary researcher is a PhD candidate and where the study was completed.

1.11 Summary and chapter outline

This chapter provided a broad overview of the research study that this thesis reports on. The other chapters in the study are listed below with a brief description:

Chapter 2 – The theory of corporate entrepreneurship and related concepts: a review of the literature

Firstly, this chapter examines in broad terms the history, theory and psychology related to why people work. The reasons for people becoming part of organisations set the scene for discovering through the literature the processes in organisations that emerge corporate entrepreneurship, and how the literature has come to understand these processes. Finally, the chapter identifies a research gap in the literature with regard to the theoretical approaches that have been followed in an attempt to gain understanding of the emergence of corporate entrepreneurship.

Chapter 3 – The theoretical stance of the study: observing complexity

This chapter explores the theoretical stance that this particular study follows. Moving away from traditional causal research that is wholly embedded in positivism, here interpretivism is proposed as an alternative approach to understanding the phenomenon of corporate entrepreneurship. The chapter also presents a complexity epistemology for sense-making of

the process of corporate entrepreneurship. The chapter concludes with the presentation of the preliminary conceptual framework.

Chapter 4 – Steps to a non-linear framework of corporate entrepreneurship

The steps that were followed in the research process are set out in this chapter. The chapter presents a justification for the use of a mixed research method model. ANN's Self-Organising Maps are explored as a method of analysing the quantitative data, and the selected measurement instruments are detailed. Next the steps followed in the qualitative phase of the study are explained, as a method of interpreting and understanding the quantitative results produced in the first phase of the research.

Chapter 5 – Mapping the corporate entrepreneurial territory using Artificial neural networks

In this chapter, firstly, the descriptive statistics of the sample are presented. Secondly the resultant clusters, as produced by the Self-Organising Maps from the input data, are presented and possible interpretations of the results are discussed. The refined preliminary conceptual framework is presented.

Chapter 6 – Interpreting the outlying clusters, and exploring the emerging themes of innovative behaviour using interviews

The interpretations of subject matter experts regarding the outlying clusters, as determined in Chapter 5, are presented in this chapter, as are themes relating to corporate entrepreneurship and innovative behaviour that emerged from the interviews. The chapter concludes with the presentation of the final conceptual framework.

Chapter 7 - Conclusions, recommendations and limitations

This is the final chapter documenting the study, and presents a summary of the key findings and contributions of the study. The chapter also contains considerations regarding the limitations of the study, as well as suggestions for future research.

1.12 Conclusion

Chapter 1 of this document provided the reader with an overview of the purpose of, and process followed in, this study. The rest of the study is presented in 6 subsequent chapters as stipulated above. The next chapter describes the philosophical stance of the study. Matters relating to the ontology and epistemology of the study are explored.

Chapter 2

Literature review: The theory of Corporate Entrepreneurship and related concepts

The aim of this chapter is to explore the evolution and the theory of corporate entrepreneurship within the context that phenomenon finds itself in. The chapter commences with a justification for the importance of studying the area of corporate entrepreneurship. This is followed by a broad consideration of the history and psychology of why people work, how they came to work as part of organisations and what motivates their behaviour at these organisations. The chapter also briefly synthesizes the literature about the evolution of the management of individuals who work in organisations. Discussion then moves to the human capital practices that are employed in organisations and how the literature to date has suggested people in organisations should be managed in order to achieve higher levels of corporate entrepreneurship. Here the variables related to managing human capital that were included in this study are discussed. This section links to a discussion of innovation theory as the foundation for corporate entrepreneurship, and then places the innovative individual at the centre of innovation. The variables related to individual innovation behaviour that were included in the study are discussed.

This chapter finds complexity to be central in the literature relating to individual innovative behaviour, organisational innovation and ultimately corporate entrepreneurship. The chapter describes the evolution of the theory of corporate entrepreneurship, looks at attempts to clarify the concept and considers current models in the literature that attempt to explain corporate entrepreneurship. The variables related to corporate entrepreneurship that were included in the study are discussed. Finally, mention is made of the literature that considers the importance of the role of management in corporate entrepreneurship. The chapter concludes by proposing the consideration of possible alternative ways of understanding this phenomenon.

2.1 Introduction: Corporate Entrepreneurship

The literature indicates some definitional issues when it comes to corporate entrepreneurship, as many related terms are often used interchangeably with corporate entrepreneurship. This definitional dilemma is explored in section 2.7.3 of this chapter. For now it is accepted, as pointed out by Kuratko and Audretsch (2013), that innovation within existing organisations is the central underlying theme in most definitions.

The literature is rich in research findings supporting the importance of pursuing a successful corporate entrepreneurial strategy in the current age of doing business, often referred to by market analysts as the 4th Industrial Revolution (Louw, 2017) or the New Economy (“New economy,” 2017). Whether one operates in the private or public sector as a small start-up or large multi-national, all market environments are becoming increasingly complex. Participating and competing in current markets require mind-sets and methods that allow for, and optimize on, complexity rather than attempting to reduce or avoid it.

In the quest for sustainable solutions to a variety of ever-changing community needs, organisations are left with little choice but to adopt an entrepreneurial mind-set and heed the call to action for the encouragement of the type of innovative behaviour that enhances corporate entrepreneurial activity. Corporate entrepreneurship provides a useful framework to organisations for coping with, adapting to and leveraging opportunity in unstable market environments. Through the practice of ongoing change and innovation, established organisations can effectively cope with continuously changing market realities (Hayton, 2005; Heavey & Simsek, 2013; Hornsby, Kuratko, Holt, & Wales, 2013; Kuratko & Morris, 2002; Zahra, Nielsen, & Bogner, 1999).

It is not just in entrepreneurship literature where this emphasis on the importance of corporate entrepreneurship is evident. Literature in the field of strategic management, as well as economics, also considers corporate entrepreneurship an important organisational capability (Crawford & Kreiser, 2015).

Sharma and Chrisman (1999) provide one of the most cited definitions of the term corporate entrepreneurship: “... the process whereby an individual or a group of individuals, in

association with an existing organization, create a new organization, or instigate renewal or innovation within that organization". According to Katz and Shepherd (2004), these types of "in-house" start-ups experience better odds for survival due to enhanced initial access to financial, human and organisational resources. In the current dynamic, complex global economy, it is no longer business as usual, and an organisation choosing to ignore the challenges of these tenets might well end up being the one that is ignored by an ever-evolving market that demands relevance (de Jong & den Hartog, 2010; Turner & Pennington, 2015).

There is overwhelming agreement in the literature advocating greater understanding of corporate entrepreneurship, as it has become a necessity for the survival and continued growth of organisations. Researchers in this area confidently conclude that the presence of successful corporate entrepreneurship in organisations contributes to both tangible outcomes, such as increased growth performance and profitability, and intangible outcomes such as knowledge sharing, the development of skills and that ever-elusive, yet over-researched, concept of job satisfaction (Holt, Rutherford, & Clohessy, 2007). Consequently, practitioners and scholars are showing an increased interest in corporate entrepreneurship due to its potential positive effect on revitalisation and performance (Antoncic & Hisrich, 2004).

2.2 The psychology of work: Why humans labour

Armstrong (2003) defines work as: "... the exertion of effort and the application of knowledge and skills to achieve a purpose" (p. 279). The famous philosopher and "prophet" Kahlil Gibran (Gibran, 2017) said, "Work is love made visible" (p. 38). This idealistic sentiment is unfortunately not a true reflection of the motivation of most working humans, according to the academic literature on the topic.

Motivation can be described as the "why" we do what we do. Motivation is about the reasons or factors that determine, energize and provide direction or influence a change of direction or level of energy in behaviour (Arnold & Randall, 2010; Bergh & Geldenhuys, 2014).

Armstrong (2003, p. 279) states that the majority of people work in order to make money. He adds that while "earning a living" is a significant reason for people to work, some people are motivated to work by other reasons as well. These pertain to personal satisfaction brought on

by doing something the worker concerns worthwhile, being recognised, exerting power, taking work opportunities for self-development and enjoying companionship and a sense of achievement.

Understanding what motivates people to work is an extensive research area. Many of the research findings may seem to be conflicting; however, they simply represent the nature of reality – that people are motivated to work by a variety of reasons. One thing the literature seems to agree on is that the main motivation to work can usually be identified as something of value for the particular individual (Quinn, Faerman, & Thompson, 2011).

Research on motivation has produced clarity on the drives that motivate different people. Some of the more cited theories on motivation include Maslow's needs hierarchy, Herzberg's two factor theory (Fang & Gerhart, 2012) and McClelland's learned needs theory (Quinn et al., 2011).

Elements covered in theories of motivation can firstly be divided into either extrinsic or intrinsic motivators. Extrinsic motivators are things that source from outside of the individual. These motivators can be either tangible, for example money, or intangible, for example praise from the individual's manager or team. Intrinsic motivators find their source inside the individual. Intrinsic motivators are psychological in nature (Katz & Shepherd, 2004) and are generated by the individual him/herself, and these factors are always intangible. An example of intrinsic motivation is doing something in order to feel a sense of accomplishment. For employers, providing intrinsic motivation is thus impossible; however, they can contribute to the employee's level of intrinsic motivation by creating situations and environments that may contribute to the employee's intrinsic motivation (Quinn et al., 2011).

A second criterion for the categorisation of motivating factors is driven by the nature of the individual's needs. Some needs are inborn and some are learnt. Learnt motivators differ from innate motivators in that they are not "hard-wired" in the individual. Innate motivators can be influenced through training, behaviour modification or other interventions (Hansen & Sebor, 2002). Motivational theory is largely built on needs theories. Maslow's (1954) hierarchy of innate needs comprises five categories, namely psychological, safety, a sense of belonging,

self-esteem and self-actualization. McClelland (1961) proposes three categories of learnt needs, namely achievement motivation, authority or power motivation and affiliation motivation. Herzberg (1968) advances a theory for motivation based on two factors. The first is what he refers to as hygiene factors: our built-in drive to do all we can to avoid physical pain and provide for our basic biological needs. The second is the human need to achieve and grow (Bergh & Geldenhuys, 2014).

McClelland's achievement motivation theory is strongly associated in the literature with entrepreneurship (Hansen & Sebor, 2002), possibly due to the entrepreneur's inclination to attain goals and personal advancement. Authority of power motivation is found in individuals who need to be influential and effective. Personal status and prestige are important to these individuals, as well as their need to make an impact through the manifestation of their ideas. Affiliation motivation is experienced by the individual that is motivated through interacting with other people. This individual values friendly personal relationships (Ball, 2013).

Human motivation and understanding how to enhance it, is a significant and frequently explored topic of investigation in areas related to work psychology. Managers want to understand what makes their employees more motivated and subsequently better work performers.

2.3 The evolution of human labour: A historical overview

Early beginnings saw humans functioning in environments with no separation between work and home life. The Pre-Industrial Revolution period saw people making a living through activities closely intertwined with their home lives, for example craft or agriculture, leaving no need for any formalised organising or control of human functions. Studies in the management of human capital have been around since the formalisation of corporate business at the turn of the 20th century. The Industrial Revolution birthed technological developments that led to significant growth in the number of factories and an obvious parallel increase in the number of people that went to work in these factories. Home life and work life became separated. Employer-employee relationships were born and they needed to be managed, so the origins

of human capital practices are traced back to employers' efforts to "maintain and utilise their workers better" (Erasmus, van Wyk, & Schenk, 2007).

More specifically, certain historical events have been credited in the literature for the advancement of human capital practices as we know them today. The industrial revolution with its accompanying increase in workforce, especially in the manufacturing sector, was characterized by long work hours and less than ideal working conditions (Bloisi, 2007). The dawn of "*the modern industry*" (Kaufman, 2007, p. 20) saw a realisation of the need for spaces and activities that contribute to some form of worker wellness - i.e. lunchrooms, medical care, housing schemes, recreational programmes, and activities incorporating employees' family members. The aforementioned had to be administrated by someone, and so the position of "welfare secretary" was created, mostly filled by social workers or women. The often informal position of "welfare secretary" was expanded, formalised and governed by separate employment offices. The aim of these offices was the centralisation and the standardisation of functions related to employment.

Both World Wars had a significant impact on the development and formalisation of human capital management practices. Initiatives such as research into industrial worker fatigue and screening tests were initially driven by governments in an effort to maximize war production (Kaufman, 2007). Post World War 2 both governments and industry rationalised the role of personnel management in levels of efficiency (Bloisi, 2007).

According to Bloisi (2007), the formal introduction of legislation in the then industry-driven countries happened in the 1960s. Legislation at this stage related mostly to basic contracts of employment, job training and redundancy pay-outs. The 1970s saw the birth of the movement towards equal opportunities and also the introduction of employment protection schemes.

The first professional scientific management documents date back to the late 1880s. Initially embarked on by engineers attempting to use principles of science in order to attain higher levels of production efficiency, these writings laid the foundations for human capital management and management science in general, as we know it today (Bloisi, 2007; Kaufman, 2007).

2.4 Strategic Human Capital Management

Strategic Human Capital Management is a term used to describe an organisation's strategic approach to managing its people in a manner that focuses on the key issues instrumental to the organisation's success (Robinson, 2009). Incorporating human capital aspects into the organisational strategy is key to achieving a sustainable competitive advantage; this becomes even truer if the organisation operates in markets that are complex, dynamic and competitive in nature (Hayton, 2003). Wright and McMahan (2011) refer to the same concept when using the term "strategic human resource practices", and define it as patterned and planned arrangements, placements and actions within the human resource domain, aimed at enabling the organisation to achieve its goals. The authors make clear that when incorporating "strategic" into the concepts, the focus shifts from actual human capital to understanding the practices that have an impact on human capital.

Human capital is a concept describing the notion that people possess skills, experience and knowledge that are of economic value to organisations. In line with a resource-based view, the value is dependent on the potential of the human capital to add to the core competencies and the competitive advantage of the firm (Baron & Armstrong, 2007). Aforementioned authors note that human capital cannot be owned by organisations; it can only be secured through some kind of employment relationship. The value-calculation determining what human capital adds to the organisation has been extended to include continuous human resource practices such as selection, training, support and compensation (Snell & Dean, 1992). Thus, human resource practices are investments made into human capital, and strategic human capital management adds to the understanding and consideration of said practices that eventually enable the organisation to either achieve its goals or not. Wright and McMahan (2011) emphasise the importance of balance when forging a strategy to increase the value of human capital as a competitive advantage, while considering the impact of human resource practices.

Further evolution in the theorising around human capital draws from the resourced-based theory and finds expression in various business disciplines including overall business strategy and more specifically strategic human capital management (Nyberg, Moliterno, Hale, & Lepak, 2014). The performance of organisations is to a large extent influenced by its human resource

management function, which can be explained by the resourced-based view and the organisation's unique strategic capabilities. Organisational human resources built on a resource-based perspective is characterised as a business function based on the creation of distinctive and differentiated resources that contribute in overall value creation. In achieving the aforementioned the organisation is able to leverage its human capital in such a way that it becomes an intangible asset that creates a competitive advantage (Hayton, Hornsby, & Bloodgood, 2013a).

The resource - based perspective has played a vital role in addressing the debate of whether human resource practices do in fact contribute positively to organisational performance and competitiveness - establishing, through theoretically sound and robust connections in this regard (Mavondo, Chimhanzi, & Stewart, 2005). The most current literature continues to advocate for resource-based theories in the attainment of organisational performance (Nason & Wiklund, 2018).

2.4.1 Human resource management practices

As stated in the previous section, human resource practices are considered the investments made into the human capital portfolio of an organisation. The ever-growing emphasis on innovation and entrepreneurial behaviour within organisations demands a rethinking of the application and appropriateness of human resource practices. The goal should be to find out which human resource policies, systems and practices enable and sustain corporate entrepreneurship (Hayton, Hornsby, & Bloodgood, 2013b).

Organisational form and structure are driven by the organisation's strategic objectives. These structures create the conditions in which individual employees perform their work-related tasks. Human resource systems are reflective of the chosen strategies and preferences of organisational leaders, and significantly influence the reinforcement and the rewarding of behaviour necessary for the achievement of strategic objectives (Hayton et al., 2013).

Human resource management (HRM) can be defined as “a distinctive approach to employment management that seeks to achieve competitive advantage through the strategic deployment of a highly committed and capable workforce using an array of cultural, structural and personnel techniques” (Mercer, Barker, & Bird, 2010, p.4). Kusluvan, Kusluvan, Ilhan, and Buyruk (2010) add that achieving the aforementioned requires designing a formal organisational system enabling the best possible utilisation of human talent to realise the organisational goals.

Certain elements make up the full spectrum functioning of human capital management. According to Cascio (2010), these elements are related to recruitment, training and pay incentive systems. Recruitment relates to the attraction and retention of talent based on clear requirements regarding knowledge, skills, abilities and other characteristics that will aid in achieving the organisational goals. Besides enhancing organisational commitment and desired behaviours, training leads to higher levels of innovation; improved skills and strategic knowledge; greater consistency in performance; and enhanced self-efficiency and self-management.

Steyn (2012) finds that the outcomes associated with human resource management practices are employee attitude, behavioural outcomes and overall organisational outcomes. The conclusion of Steyn’s study confirms that of Cascio (2010) that human resource management practices indeed significantly impact organisational outcomes. Cascio’s three categories of human resource practices are elaborated by him and other researchers in the area.

Certain key practices that relate to managing human capital have been consistently identified by many researchers and authors, and are presented in Table 1.

Table 1 Human Capital Practices

Human capital management practices	Authors	Described as
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<p>1. Training and development</p>	<p>(Grobler, Warnich, Carrel, Elbert, & Hatfield, 2011, p. 340) <i>(Cascio, 2010, pp. 285-6)</i></p> <p>(Armstrong, 2012, p. 273)</p> <p><i>(Bloisi, 2007, p. 215)</i></p> <p>(Swanepoel, Erasmus, & Schenk, 2008, p. 445)</p>	<p>“Training and development”</p> <p><i>“Development” “Workplace training”</i></p> <p>“Strategic Learning and development”</p> <p><i>“Learning, training and development”</i></p> <p>“Training and developing employees”</p>
<p>2. Compensation and reward</p>	<p>(Grobler et al., 2011, p. 401)</p> <p><i>(Armstrong, 2012, p. 321)</i></p> <p>(Swanepoel et al., 2008, p. 475)</p> <p><i>(de Villiers-Scheepers, 2011)</i></p> <p>(Hornsby, Kuratko, & Zahra, 2002, p. 253)</p>	<p>“Compensation or total rewards”</p> <p><i>“Performance and reward basics”</i></p> <p>“Remunerating employees”</p> <p><i>“Intrapreneurship and rewards”</i></p> <p>“The use of appropriate rewards...”</p>
<p>3. Performance management</p>	<p>(Cascio, 2010, p. 328)</p> <p>(Swanepoel et al., 2008, p. 379)</p> <p>(Grobler et al., 2011, p. 292)</p> <p>(Grobler, Hyra, & Bezuidenhout, 2013, p. 1)</p>	<p>“Performance management”</p> <p><i>“Assessing and enhancing work performance”</i></p> <p>“Performance management”</p> <p>“...rethinking the way we manage performance”</p>
<p>4. Supervision and support</p>	<p>(Hornsby, Kuratko, & Zahra, 2002, p 253)</p> <p>(Belousova & Gailly, 2013, p. 363)</p>	<p>“Middle managers' perception of the internal environment for corporate entrepreneurship”</p>

		"...management support for risk-taking and creativity..."
5. Appointment process	(Grobler et al., 2011, p. 179) (Cascio, 2010, p. 197) (Baron & Kreps, 1999, p. 338)	"Recruiting and selection" "The process of acquiring applicants who are available and qualified to fill positions at the organisation." "The art of finding talent" "Staffing and recruitment"
6. Diversification	(Baron & Kreps, 1999, p. 339) (Molefi, 2004, p. 262)	"Diversity in the workforce" "Managing diversity... a critical ingredient"
7. Communication and information sharing	(Ulrich, Younger, Bronckbank, & Ulrich, 2012, p. 160) (Bhardwaj, Sushil, & Momaya, 2011, p. 187) (Zahra, 1991, p. 265)	"Information and communication" "...proper communication and interaction... some of the drivers of corporate entrepreneurship" "... quality and amount of communication are of crucial importance"

2.4.1.1. Training and development

The training and development function in some organisations is clearly distinguished, defined and deliberately planned, while in others the function is informal and fuzzy. Even if there is no formal training function, on commencement of duties or joining a new department or team the employee will go through some kind of socialising processes (Bloisi, 2007). Aforementioned author agrees with many others in stating that it is important that the training and development functions are planned and organised (Arnold & Randall, 2010; Bergh & Geldenhuys, 2014).

Training

Training is about exposing the employee to opportunities that will enhance his/her capabilities in order to help the organisation achieve its goals (Grobler et al., 2011). Training as a function consists of planned programmes that are structures to enhance and improve performance at either individual, group or organisational level (Cascio, 2010). The basis of effective training is that it adds to the skillsets necessary for employees to perform their job task at a satisfactory level (Armstrong, 2012). Thus, learning during employee training is job specific in nature (Swanepoel et al., 2008). Cascio (2010) states that training should add to the overall level of performance if measurable changes can be observed in the knowledge, skills, attitudes or social behaviour of the individual or group that has engaged in the training. Cascio (2010) also reports that training has demonstrated its overall benefit repeatedly in that it contributes to positive effects on task-related behaviours and overall worker performance. The author notes specifically that research indicates improved levels of innovation, tacit skills, technical skills, self-efficacy and self-management, team effectiveness, improved individual attitudes and acceptance and adjustment to market changes and trends, for example e-commerce, paperless systems, flexi-hours or hot desks.

Development

Development is a management function that consistently maintains and further enhances the competencies of employees in their job roles (Grobler et al., 2011). The development of employees is aimed at improving their knowledge, skills, abilities and applicable characteristics. Armstrong (2012) states that employee development is all about assisting employees to grow closer to their full potential. Employee development is a broad function that encompasses all smaller training functions. Development supports the employee's general growth by means of learning and happens both intentionally and unintentionally (Swanepoel et al., 2008).

The South African context constitutes a unique situation when attempting to understand the development, application and effects of training and development of employees. Many South African researchers have made exploring the impact of training and development a large part of their careers (Bergh & Geldenhuys, 2014; Grobler, Warnich, Carrel, Elbert, & Hatfield, 2011; Steyn & Grobler, 2014; Swanepoel, Erasmus, & Schenk, 2008).

Just under ten years ago the corporate spend on training and development by South African companies was estimated at around R 5 billion per year (Grobler et al., 2011). Above-mentioned expenditure is still only 1% of the total employment costs - low compared to partner training countries like the USA and Japan that spend 5% of their total employment costs on training and development (Grobler et al., 2011). The authors list global competition, business restructuring, technological progress, legislative requirements and social and economic pressures as key reasons for South African companies to increase their focus on training and development.

2.4.1.2. Compensation and rewards

Armstrong (2012) relates the concept of reward in an organisational context to recognition for an employee's contribution. Said rewards can be either monetary and consist of a basic pay and possible extras, or non-monetary in the form of praise or opportunity for development.

Grobler et al. (2011) construct a compensation system that is made up of various rewards based on the typology of intrinsic or extrinsic. Here, the concepts of intrinsic and extrinsic rewards relate to intrinsic and extrinsic work motivation as discussed in section 2.2 above. The authors list direct payments such as hourly wages, salary, bonuses, pay incentives or commissions as well as indirect payments such as insurance, medical, paid public holidays and catering or food services as extrinsic or financial rewards. In the category for intrinsic or non-financial rewards, one finds things like verbal recognition, opportunities for promotion, work conditions, opportunities for training and work stimulation.

Aforementioned authors provide some guidance as to what to consider when designing a compensation system for a given organisation. Firstly, the system needs to attract and retain the targeted employees that will contribute to the organisation attaining its goals. Secondly, the system needs to provide mechanisms that stimulate levels of motivation in employees. Finally, the system has to consider, and comply with, legislative requirements.

2.4.1.3. Performance management

Cascio (2010) describes performance management in terms of a compass. The compass fulfils two rolls. It indicates, firstly, an employee's current direction and secondly, the employee's desired direction. The manager or organisational leader acts like a sports coach in clarifying to the employees where they are now, and guiding them to where they and the organisation desire them to be.

A working performance management system puts forth a process that allows for the management of individuals and teams in such a way that they contribute to the attainment of the overall goals of the organisation. The overall function of performance management is ongoing in nature and consists of tasks that address planning, managing, feedback, reviewing and restructuring of individual and group performance development (Swanepoel et al., 2008).

Grobler et al. (2011) find performance management to be a process that meaningfully impacts an organisation's success in attaining its performance goals, through managers and employees enjoying shared expectations and collaboration on reviewing results and rewarding performance.

Despite the consequential benefits of a good performance management system, the aforementioned authors note a study finding that 60 per cent of South African companies lack a formal performance management process. Companies applying some sort of performance management were found to have many issues, including a lack of line management support for the proper and continued execution of performance management initiatives; emphasising the task of performance appraisal over that of development; inadequate information on performance; and a lack of objectivity.

2.4.1.4 Supervision and support (management style)

Successfully managing other human beings starts with treating them with a consideration for their humanness and, in doing so, recognising individuals for their different needs and contributions (Armstrong, 2012). Simply employing motivation strategies without considering the impact of other practices in the work environment, may prove to be unhelpful when

attempting to influence employee behaviour towards higher performance and goal achievement (Swanepoel et al., 2008).

2.4.1.5 Appointment process

According to Baron and Kreps (1999), the first step in the appointment process is to spend sufficient energy on deciding what quality and quantity of employees will serve the organisation's strategy, environment, technology and culture. Cascio (2010) refers to this particular consideration as "planning for people" (p. 154). Integrating the business strategy with planning for a particular workforce is the author's starting point from which the appointment process is designed. Other tasks in the appointment process are the designing of the individual jobs, recruiting and selection.

Recruitment is defined as "The process of acquiring applicants who are available and qualified to fill positions at the organisation" (Grobler, Warnich, Carrel, Elbert, & Hatfield 2011, p. 179). Cascio (2010) refers to effective recruitment as "the art of finding talent" (p. 197). He depicts recruitment as a fierce contest amongst businesses where competitors are constantly vying to find, attract and employ the best people.

Selection follows recruitment and is defined as "the process of choosing from a group of applicants the individual best suited for the particular position" (p. 179). The selection process happens through all - or a combination of some - of the following mechanisms: interviews, screenings or tests that attempt to determine behavioural traits and skills levels; task simulations; testimonies, references, background checks and even lie-detector tests (Cascio, 2010).

The process of recruiting and selecting the best candidates for the job is already challenging enough, but is compounded in the South African business environment by many extra requirements. South African business in particular is faced with very specific political, demographic and economic factors that are forcing businesses to become more innovative and flexible in their methods of recruitment (Grobler et al., 2011).

2.4.1.6. Diversification

In an organisational work setting, diversity refers to “...differences between individuals or groups and/or within groups” (Molefi, 2004, p. 262).

Certain social - and in some cases legal – requirements demand the appointment and maintenance of a workforce that reflects the diversity of the general population. Besides the requirement for a demographically representative workforce, the demand for diversification can also be brought about by external economic factors, such as specific markets. Internally, diversification can add to a larger array of perspectives and ultimately better decision-making. The flipside to the argument for internal diversification is that it may require more effort amongst diversified members to establish certain core values, such as trust (Baron & Kreps, 1999).

Molefi (2004) suggests that distinguishing between groups can manifest in a variety of ways, for example, age, gender, race, language, religion, ability/disability, parental or marital status, sexual orientation, education, socio-economic status, ideology and so on.

(Grobler et al., 2011) note that the case for diversification is especially strong for South African business, as South Africa as a country is among some of the most diverse in the world. Successfully meeting the challenges of a new economy requires of business to acknowledge and encourage the emergence of diversification in the workforce. Instead of seeing diversification as a stumbling block to doing business, managers and leaders should focus on harnessing the talents, energies and differences offered by the diversity in the working population.

2.4.1.7. Communication and information sharing

Communication, as well as the sharing of relevant information, is a core human resource capability. Communication needs to be continual and of acceptable quality. Relationships are a natural and necessary phenomenon in organisations, and it is important to the success of the organisation that these relationships are guided by, and fed with, accurate and timely communication of information (Ulrich et al., 2012). Aforementioned authors propose four

ways in which information flows through an organisation, namely, from the top down; from the bottom up; across departments, groups or teams; and within departments, groups or teams. Jacobs, Yu and Chavez (2016) agree with this notion, and place communication at the centre of the entire organisation, stating that the stimulus for the organisation to act lies in communication. The authors define internal communication as the flow of actions that facilitate the exchange of information and ideas. They add that the quality of communication in organisations has the potential to create an atmosphere characterized by trust and respect.

As stated at the beginning of this section, human resource practices are the investments made by organisations in human capital. According to Baron and Armstrong (2007), the intangible value placed on human capital is becoming increasingly important. The mere existence of organisations depends on their members' ability to innovate, capture and maintain the support of customers and clients and to respond to the ever-changing circumstances presented by the current market economy.

2.4.2 Managing humans for Corporate Entrepreneurship

The type of organisational structure, practices and - of course - the people are, according to Jones (2010), key aspects that determine the culture for innovation behaviour within organisations.

Organisational design refers to how structure, practices and people are organised and co-ordinated with the aim of optimal performance. Greenberg and Baron (2000) use the example of a jigsaw puzzle, the individual pieces representing aspects of units, practices and people that have to be arranged in just the right way in order to complete a meaningful whole.

Organisations that have significantly intensified their focus on innovation and entrepreneurial behaviour soon realize the important role that their human resource functions play in instigating and sustaining corporate entrepreneurship (Hayton et al., 2013b). Other authors that note the importance of HRM as the context within which corporate entrepreneurship occurs include Abstein and Spieth (2014); Holt et al. (2007); Morris and Jones (1993); and Sánchez, Soriano, Sánchez, and Soriano (2011).

Studies in the area of human capital management, specifically the enabling human resource practices, need to consider in depth contextual contingencies if they are going to make a truly valuable contribution to the understanding of employee sense-making that leads to emergent processes linking human capital management to organisational performance outcomes (Legge, 2005). Zhang, Wan, and Jia (2008), looking at the particular outcome of corporate entrepreneurship, agree that in order to encourage and sustain corporate entrepreneurship, organisations need to spend time and energy investigating how best to structure and employ their HRM practices.

Well known for his work in human behavioural theory and entrepreneurship, McClelland (1961) introduced the theory of human resources into the field of entrepreneurship through his work on “the need for achievement”. As stated earlier, McClelland finds the personal characteristic of “need for achievement” to be at the foundational level of entrepreneurial traits (Sadler, 2000). Compared to entrepreneurship, the pursuit of corporate entrepreneurship has its own set of unique constraints and challenges, the most significant being the architecture of organisational design and management process – the process of managing humans in organisational settings being one that is described as “one of the more vital” (Morris & Jones, 1993). At the time of publication in the early nineties, the aforementioned authors observed a fundamental shift from what they refer to as a “micro-oriented, bureaucracy-based, tool-driven discipline” to a practice resembling a holistic fit between human capital management practices and overall organisational strategy. Performance appraisal systems and compensation and reward systems are criticized for being weak in design and constraining to intrapreneurial behaviour. Human capital management practices are hailed as significantly influential when attempting to positively encourage intrapreneurial action within organisations. As stated earlier, strategic human capital management involves incorporating human resource practices into the overall strategy of the organisation.

Ironically, as much as the literature agrees that strategic human capital practices are a definite part of the context in which corporate entrepreneurship emerges in its different forms

(Ahmed, 2016), surprisingly few studies have been conducted on this topic (Sánchez & Soriano, 2011).

This particular study positions its investigation into the emergence of employee innovative behaviour within the context of strategic human capital practices and the consequent corporate entrepreneurial activity, or lack thereof.

2.5 Theories of innovation: From the guillotine to flight to design thinking

Going beyond the action of simply coming up with new ideas, Tidd and Bessant (2009) state that innovation is about the process of growing ideas into practical use. The authors add that although available definitions of innovation might differ in some form or another, they all place the practical completion of the development and exploitation of new knowledge at the centre of the concept.

2.5.1 A short history of innovation theory

According to (Salter & Alexy, 2014) it was in 1772 that the English literate Samuel Johnson was quoted as saying to Sir William Scott, “The age is mad after innovation; and all the business of the world is to be done in a new way; men are to be hanged in a new way; Tyburn itself is not safe from the fury of innovation” (p. 27) (Tyburn’s gallows being the infamous execution venue in London, England, during the late 17th century). During the same century, the French Revolution gave society the guillotine as innovation on much crueller methods of execution, such as the breaking wheel, noose or sword. The guillotine as an innovation offered the French, in their view, a more efficient, humane and pain free way of pursuing justice.

Joseph Schumpeter (1883-1950) is hailed by Fagerberg (2009) as “one of the most original scientists of the twentieth century” (p. 18) and by Salter and Alexy (2014) as the “father of the study of innovation” (p. 29). Schumpeter is in many ways a seminal contributor to the study of innovation, entrepreneurship and corporate entrepreneurship. After brief stints in politics and

banking, with qualifications in economics and law, Schumpeter eventually found his career in academia. Schumpeter's originality is ascribed to his unique approach to understanding innovation and its role in economic and social change. One of Schumpeter's foundational arguments was that economics simply cannot be adequately studied through a solely static lens. Economic development to this innovation theorist was "a process of qualitative change, driven by innovation, taking place in historical time" (Fagerberg, 2009, p.18). Innovation in this regard was postulated as the combining in new ways of existing resources, and Schumpeter named this combining action "the entrepreneurial function" (p. 6). For Schumpeter, the entrepreneur was at the core of innovation. His early work reflected a focus on the individual entrepreneur. Later in his career that focus shifted to the role of the entrepreneurial individual working within an organisation – corporate entrepreneurship or intrapreneurship as we have come to know it today. Advocating to these entrepreneurial individuals to counter resistance to change, Schumpeter categorised 5 types of innovation within organisations, namely, new products, new processes of production, supply through new sources, utilisation of new markets and new ways of organising business.

Many later classifications of innovation are based on the work of Schumpeter - one of those being classifying innovation into either product or process innovation, and another how radical the innovation is compared to what is available at the time (Fagerberg, 2009).

Since the first spark ignited a fire, to the firing of the first combustion engine to a space shuttle rocketing all the way into earth's orbit, it seems humankind has always been obsessed with newness and improvement. In 1999 an article in the Economist, cited by Salter and Alexy (2014, pp. 27-28) called innovation the "religion of the late twentieth century". Interest in understanding the process of innovation across a variety of disciplines has seen a significant increase. Agents in the popular press, academia, politics and business are more than ever before acknowledging the potential advantages for all of society that are locked up in the deeper understanding of the process of innovation, putting it at the centre of economic growth. In a 2009 speech delivered by then American president Barack Obama, innovation is hailed as "... the key to good new jobs" and a way of "...ensuring a high quality of life for this generation and future generations" (Salter & Alexy, 2014, p. 28).

Current developments in the theorising and practice of innovation is characterized by scholars and practitioners classifying innovation into different behavioural dynamics and types. One such a classification is that of open innovation. Open innovation sees organisational innovation activities as part of an open system that allows for the flow of knowledge and technologies across organisational boundaries (West, Salter, Vanhaverbeke, & Chesbrough, 2014).

Another classification which is enjoying increasing attention is disruptive innovation, a term often criticized for being used by innovation practitioners “Too frequently, they use the term loosely to invoke the concept of innovation in support of whatever it is they wish to do” (Christensen, Clayton M., Raynor, Michael and McDonald, 2015, p. 4). Nevertheless, the aforementioned authors argue that using disruptive theory aids in the understanding, measurability and prediction of successful innovation. The authors define disruption within the context of innovation as the process by which an organisation with less resources successfully challenge established well-resourced organisations. The literature is rich in classifications beyond open, and disruptive innovation, however consensus regarding a common and clear classification is pending and might remain that way as innovation is an ever-evolving phenomenon characterized by many complexities. This type of diverse and continuous theorising in this field should be encouraging as innovation, in all its many forms, is vital to human advancement.

2.5.2. The complex nature of innovation

Innovation at its core consists of disruption. Disruption is characterized by non-linear dynamics, emergent properties, discontinuous feedback loops and self-organising patterns (Andriani, 2011). The world of innovation is characterized by similar language to the world of complexity. The diffusion of a given innovation is described in much of the literature through models of self-organising and organic systems; similar to a neo-Darwinian model of evolution, innovation is constantly competing for the consciousness of members of society (Dooley, 1997). Tidd and Bessant (2009) shift the complexity focus to the end product of the innovation process, and state that the level of complexity embedded in the innovation dictates the pace of diffusion of the innovation. Complexity in this regard relates, according to the author, to “the degree to which an innovation is perceived to be difficult to understand or use” (p. 356). That which is

eventually seen as the single innovation is actually more often than not a prolonged process that has involved multiple interrelated innovations (Fagerberg, 2009). The author also touches on the systemic nature of innovation, calling it a “collective achievement” of entrepreneurs within sectors or systems and external sources of innovation. In order to gain a deeper understanding of innovation, researchers need to investigate the discipline from an angle that allows for complexity and does not seek to reduce it. Complexity as a theoretical paradigm is explored in more detail in Chapter 3.

2.5.3. Creativity, invention and innovation

Creativity is named as the source of innovation (de Leede & Looise, 2005; Goffin & Mitchell, 2005; Salter & Alexy, 2014; Tidd & Bessant, 2009). Whether doing things differently, or doing things better, said actions always call for the presence of creativity (Tidd & Bessant, 2009). Goffin and Mitchell (2005) stress that for creativity in an organisation to effectively lead to real and valuable innovation, the creativity needs to be linked to the specific organisational knowledge. As is the case with innovation, theorising on creativity too has fallen victim to a fair amount of misconstruing. Often confused with the concept of art, creativity is actually a way of thinking. Nahavandi (2012) talks of creativity as divergent or lateral thinking that, by moving away from a linear way of thinking, can bring into reality something novel and useful. Goffin and Mitchell (2005), however, note that creativity does not always have to birth something that is totally new. A strong case is made for creativity’s vital role in the recognition and clarification of whatever issue under scrutiny. The contribution of creativity lies in the origination of ideas (Dodgson, Gann, & Phillips, 2014). De Jong and den Hartog (2010) list creativity as a critical component in individual innovative work behaviour, and most evident at the start of the innovation process that is characterized by recognising problems or gaps and generating ideas to address them.

Invention, according to Fagerberg's (2009) description, sounds like the link between the creative process and the manifested innovation. The author speaks of invention as the “first occurrence of an idea” (p. 3). Where creativity originates the idea, invention subsequently allows the showing of how an idea will work in practice (Dodgson et al., 2014).

Innovation has already been briefly defined. Also - already mentioned but worth repeating - is that the literature has found defining innovation a bit of an elusive task. According to Fagerberg (2009), the trouble in defining concepts often stems from their complex nature. He goes on to suggest that when defining a complex phenomenon, one might find it useful to define it in terms of what it is not. Innovation is a stranger in any linear context. For example, the construction of a linear model of innovation implies the phenomenon is an applied science that consists of well-defined stages for clearly identified things to go through in a predictable manner. The aforementioned thought implies a generalisation of causality, and causality cannot hold true for most innovations. The linear nature of the model also assumes a start and an end to the process; this totally ignores the multiple feedback loops that are an inherent part of innovation. In his own attempt to define innovation, Fagerberg (2009) puts the concept in context with invention, in that if invention is the first occurrence of an idea, then innovation is “the first attempt to carry it out in practice” (p. 4).

The next section explores the role of human behaviour in the action of the innovation process.

2.5.4 Humans at the centre of innovation/ Innovation manifesting through humans

“Innovation has nothing to do with how many R&D dollars you have... it’s not about money. It’s about the people you have...” – Steve Jobs, interview with Fortune Magazine, 1981, in Tidd & Bessant (2009).

Studies in the management of innovation engage in research at different levels of organisations, i.e. networks, departments, teams or individuals (de Jong & den Hartog, 2010). Innovation management is an applied field and consequently studies thereof should be guided by practice. On an individual level, aspects of practice relate to individual motivation and behavioural factors linked to innovation as an outcome. Moving from an individual to an organisational level, we find factors that relate to the guidance and organising of power relationships and those that govern innovation at a social level in the organisation (Dodgson et al., 2014). Examples of such practices are human capital management practices as discussed earlier in this literature review, and also regulatory policies and structural procedures that allow or disallow for innovative interactions within the organisation. A third level from which

to research innovation in organisations relates to the science of politics, and is concerned with understanding the influences institutions exert. This is, however, not a level that this particular study is concerned with.

Innovation within organisations is driven by a unique group of employees referred to as intrapreneurs. Pinchot (1985) coined the term “intrapreneuring”, and in doing so provides for employees aspiring to be entrepreneurs an alternative possibility to having to leave their organisations in order to achieve their entrepreneurial aspirations. Intrapreneurs are employees within organisations that identify new opportunities or innovations and then take responsibility for the management of the development and delivery of said opportunities and innovations. Intrapreneurs differ from entrepreneurs in that they function within already existing organisations that were generally founded by entrepreneurs (Jones, 2010).

Thus, innovation emerges through the people that participate in the process thereof. In the absence of motivated, creative and by implication innovative employees, innovation simply cannot emerge. People are key to the process of innovation (Goffin & Mitchell, 2005).

The ability to recognise opportunities is among the most important attributes the successful intrapreneur must possess, according to Zahra, Nielsen and Bogner (1999). Aforementioned authors refer to intrapreneurs as “sense-makers” within the context of organisational learning and add that without the intrapreneurs’ ability to recognise, identify and construe emerging knowledge in the organisational system, organisational learning within corporate entrepreneurship activities would not be possible.

Belousova and Gailly (2013) place the intrapreneur at the centre of the corporate entrepreneurial process when stating that entrepreneurial initiatives are developed by organisational employees that have the ability to combine entrepreneurial activity with their day-to-day work activities. In other words, for the intrapreneur behaving innovatively and constantly improving and renewing becomes a way of being. This type of behaviour is referred to in the literature as innovative work behaviour (IWB).

Innovative work behaviour is a term used to describe the degree of innovation in the behaviour of the individual in the organisation. A more favourable degree of said behaviour is characterized by initiating and intentionally introducing novel or different and useful ideas around the organisation's product and service offering or the organisational processes (de Jong & den Hartog, 2010; Farr & Ford, 1990; Kleysen & Street, 2001).

Abstein and Spieth (2014) emphasise that organisations can most certainly not innovate without employees who exhibit innovative work behaviour (IWB). The authors define IWB as "the intentional creation, introduction and application of new ideas, processes, products or services within a work role, group or organization for the benefit of the individual, group or organization". This type of behaviour is noted as being a crucial asset for an organisation's success and important for the entire workforce, and not simply for those in focused innovation-orientated roles.

Awareness of this important employee skill has led to an increase in the scholarly attention that has been paid to the management of innovation (de Jong & den Hartog, 2010).

At the very basic level innovative behaviours by employees in organisations are assumed to be those of generating, testing and implementing ideas (Krause, 2004).

Going into more depth, De Jong and den Hartog (2010) distinguish what are, according to them, four distinct aspects of behaviour in the innovation process.

The first behaviour is usually sequential to an element of chance, a trigger event or a source, i.e. coming across a new opportunity or the emergence of some kind of problem, and is referred to as *idea exploration*. Idea exploration can involve exploring possibilities of ways to renew or improve the organisational offering. Seminal management author Peter F. Drucker (1985) lists seven possible sources of new opportunities, namely, unexpected successes; failures, or gaps between the way things are and the way they could/should be; process needs; changes in the structure of maker or industry; changes in the compilation of demographics of the labour force or market; perceptual changes; and the acquiring of new knowledge (de Jong & den Hartog, 2010) .

Idea exploration is, according to the authors, followed by *idea generation* as the next step and essential behaviour in the process of innovation. Idea generation involves the combination and reorganisation of existing concepts and available knowledge in order to improve performance or address identified problems.

The third behaviour relates to the *championing* of ideas. Once the idea has been generated it needs to be promoted or advocated. Championing is especially necessary in contexts of uncertainty or where there is a high level of resistance to change.

The final behaviour identified by these authors is that of *idea implementation*. Actions associated with successful implementation include incorporating innovations into existing work processes and also the testing and consequent modification of innovations.

Kleysen and Street (2001) present similar behaviours to the innovation process of de Jong and den Hartog (2010), save the addition of formative investigation that follows idea generation and precedes championing. *Formative investigation* is explained by the authors as “concerned with giving form to and fleshing out ideas, solutions, and opinions and trying them out through investigation” (p. 286).

Varying findings on the dimensionality of innovative behaviour measures can be found throughout the literature. Some find IWB to be a one-dimensional measure (Basu & Green, 1997; Bunce & West, 1995; de Jong & den Hartog, 2010; Kleysen & Street, 2001; Scott & Bruce, 1994, 1998), while others conclude the construct to be multi-dimensional (Dorenbosch, van Engen, & Verhagen, 2005; Krause, 2004; Reuvers, van Engen, Vinkenbunrg, & Wilson-Evered, 2008).

The display of innovative behaviour is noted by many authors to be a significant attribute of an employee who engages in corporate entrepreneurial activity or intrapreneurship (de Jong & den Hartog, 2010; de Villiers-Scheepers, 2011; Ireland, Kuratko, & Morris, 2006; Lau, Shaffer, Fai Chan, & Wing Yan Man, 2012; Sánchez & Soriano, 2011). Corporate entrepreneurship refers

to entrepreneurial types of behaviour that occur inside an existing organisation (Kuratko, Morris, & Covin, 2011).

This particular study seeks to better understand individual innovative behaviour as a catalyst for the emergence of corporate entrepreneurship on an individual level within an organisational context. Available literature on the theories in the discipline of corporate entrepreneurship is explored in the next section of this chapter.

2.6 Theories of Corporate Entrepreneurship: the current state of research and practice

The following section starts off by emphasising, through the literature, the importance of corporate entrepreneurship. It describes the evolution of the theory of corporate entrepreneurship and considers some of the influential researchers in the discipline. A short section is dedicated to defining corporate entrepreneurship and distinguishing it from related concepts. The greater part of this chapter describes current theories and models aimed at understanding or explaining the emergence of corporate entrepreneurship, in line with the research objectives posed in the study.

2.6.1 The importance of Corporate Entrepreneurship

The literature is rich with research findings supporting the importance of pursuing a successful corporate entrepreneurship strategy in the current age of doing business. Whether one works in the private or public sector, all market environments are becoming increasingly complex and dynamic and just generally turbulent.

In order to successfully identify new opportunities and pursue continued superior market and financial performance, organisations are obliged to become more entrepreneurial. Corporate entrepreneurship provides a useful framework to organisations for coping with, adapting to and leveraging opportunities in unstable market environments. Through the practice of ongoing change and innovation, established organisations can effectively cope with continuously changing market realities (Hayton, 2005; Heavey & Simsek, 2013; Hornsby et al., 2013; Kuratko & Morris, 2003; Zahra et al., 1999). It is not just in entrepreneurship literature

that we find this emphasis on the importance of corporate entrepreneurship; literature in the fields of strategic management and economics also considers corporate entrepreneurship an important organisational capability (Crawford & Kreiser, 2015).

According to Katz and Shepherd (2004), one in seven entrepreneurs in the US establish businesses through innovative partnering with their employees. These start-ups experience better odds for survival due to enhanced initial access to financial, human and organisational resources. Due to the dynamic, discontinuous, complex global economy, it is no longer business as usual, and organisations choosing to disregard the challenges of these tenets might well end up being ignored by an ever-evolving market that demands relevance (de Jong & den Hartog, 2010; Turner & Pennington, 2015).

There is overwhelming agreement in the literature that research augmenting understanding of corporate entrepreneurship is indeed worthwhile, as it has become a necessity for the survival and continued growth of organisations. Qualitative studies in the area conclude confidently that the presence of successful corporate entrepreneurship contributes to both tangible outcomes, such as increased growth performance and profitability, and intangible outcomes such as knowledge sharing, the development of skills and that ever-elusive, yet over-researched, concept of job satisfaction (Holt et al., 2007). Consequently, practitioners and scholars are showing greater interest in corporate entrepreneurship due to its potential positive effect on revitalisation and performance (Antoncic & Hisrich, 2004).

2.6.2 The evolution of the theory of Corporate Entrepreneurship

Conceptualisation of corporate entrepreneurship can be traced back to the early 1970s with authors like Peterson and Berger and Hanan (Christensen, 2005). Expanding on the seminal work done by Schumpeter on entrepreneurship in the early 1930s, Peterson and Berger made a foundational contribution to the field when they established a link between initiatives taken by individuals working in organisations and organisational-level entrepreneurial activity. In an Unplugged edition of the journal *M@n@gement*, current influential authors in this field – the likes of Zahra and Hornsby – dedicate the first article to evolutions in, and contributions made to, corporate entrepreneurship research over the past five decades (Zahra, Randerson, &

Fayolle, 2013b). The authors commence with a disclaimer to the effect that they do not discuss every single historical event and acknowledge that other researchers might in all fairness have a very different view of significant milestones in this field. The authors encourage variety in approaches to understanding this phenomenon, noting the importance of not defining scholarly fields by judgements by, and the preferences of, a few researchers (Zahra, Fayolle & Randerson, 2013).

For the purposes of this study the events noted in the Unplugged article are used to compile a visual timeline illustrating the contributions made to theory in the field of corporate entrepreneurship (see Figure 2).

Early published work was dominated by qualitative and conceptual research that attempted to make sense of entrepreneurship as a phenomenon that is possible on an organisational level. Further research focused on defining corporate entrepreneurship and drawing the phenomenon's boundaries.

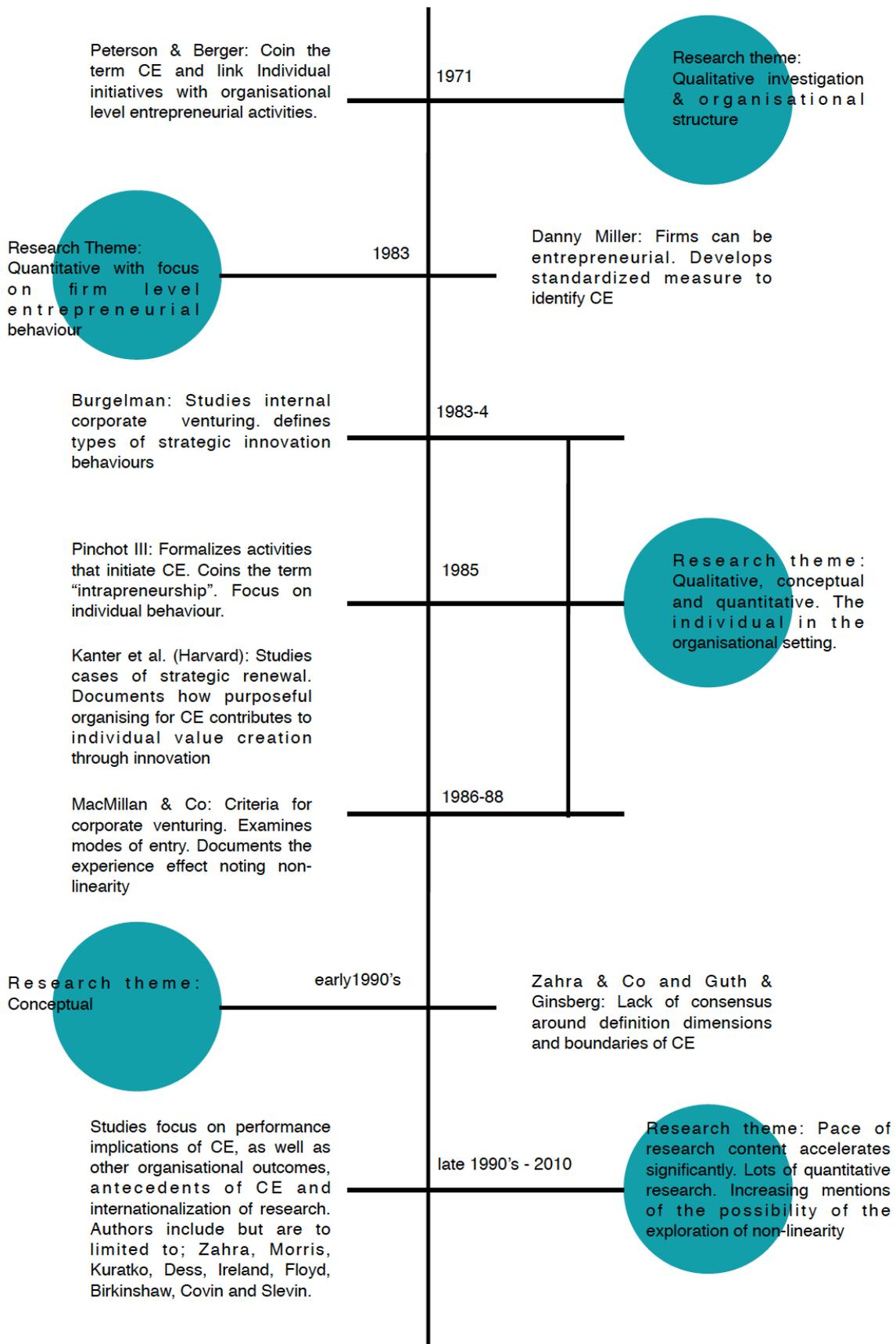
Following on the work of Peterson and Berger that broadly looked at organisational structure and individual efforts that accumulate to higher-level entrepreneurial behaviour, Danny Miller in the early 1980s made 3 major contributions to the field. Firstly, Miller showed that firms can indeed behave entrepreneurially; secondly, he defined corporate entrepreneurship in terms of having three related dimensions – innovation, risk-taking and pro-activeness. Finally, Miller developed a standardised measure that identified corporate entrepreneurship at organisational level. Miller is hailed as a hero in this field, not necessarily for the above-mentioned contributions, but rather for stimulating an interest among scholars in the field. Consequently, by the mid-1980s business academics intensified their research and publications on topics within the discipline of corporate entrepreneurship.

Pinchot (1985) focused his research on the informal activities executed by individuals within organisations that stimulate, and allow for, corporate entrepreneurship. Pinchot is - as already mentioned - also famous for coining the term “intrapreneurship”, a term describing individual intra-corporate entrepreneurial behaviour. This term is further explored in upcoming sections of this study. During the same time Harvard, through the work of Kanter and others at the

institution, started investing more resources into research in this now acknowledged field. Kanter's work took shape in a case study methodology, resulting in a greater understanding of how organisations, through programmes aimed at innovation that consequently add to individual value creation, can purposefully organise themselves for successful corporate entrepreneurship.

The second half of the 1980s saw Covin and Slevin expanding on and validating Miller's 1983 standardised measure. MacMillan is mentioned in the literature together with his colleagues for examining modes of entry for successful corporate venturing as an aspect of corporate entrepreneurship. Consideration of the possibility of non-linearity in the phenomenon of corporate entrepreneurship is mentioned early on in the research evolution; however, even to this day it has not been explored. Together with Siegal and Siegal, MacMillan notes that in instances of successful entrepreneurship the "experience effect" is present; however, experience and success are not always linear.

Figure 2 Key events and research themes in corporate entrepreneurship research



Source: Compiled with information from Zahra, Shaker Fayolle & Randerson (2013)

The year 1990 saw the first formal notification by Guth and Ginsberg of a lack of consensus regarding the definition of corporate entrepreneurship. Guth and Ginsberg would go on to be widely cited for their work in the area of corporate entrepreneurship. Their early contributions also relate to understanding corporate entrepreneurship from two dimensions - firstly, through innovative activities that are related to new businesses being developed within the existing structures of the organisations; and secondly, creating value by recombining the organisation's resources (also sometimes referred to as strategic renewal).

From 1990 onwards research frequency in the area of corporate entrepreneurship rapidly intensified. For the next 20 years research in this discipline was dominated by three key themes: firstly, the examination of performance implications (if any) of corporate entrepreneurship; secondly, documenting particular antecedents to, and effects of, corporate entrepreneurship; thirdly, venturing into understanding the international implications and effects of corporate entrepreneurship.

The 1990s were also characterized by research that increasingly adopted quantification methods, leaning towards a desire for predictable causality and precise prediction.

Other highlights during this period, according to the Unplugged article, include: Zahra, Nielsen, and Bogner (1998) and Yang, Narayanan, and Zahra (2009) investigating the effect of corporate entrepreneurship on organisational outcomes, other than financial performance. They explored outcomes such as learning, knowledge creation, up-skilling or development of capabilities. Despite the focus on quantification and prediction, research during this time did make mention, once again, of the idea of non-linearity within this phenomenon. Throughout the 1990s, though, performance implications seemed to get the most research attention. Non-linearity with regard to the effect of corporate entrepreneurship on organisational performance stayed a focus for Zahra, and the researcher continually questioned whether the effect of corporate entrepreneurship on performance might be non-linear. From 2010 onwards, there has been a shift in focus towards antecedents and specific conditions for corporate entrepreneurship.

Although some authors like Zahra (Lerner, Zahra, & Kohavi, 2007; Zahra, Shaker Fayolle, & Randerson, 2013) do sporadically mention the non-linearity embedded in corporate entrepreneurship, it is never fully explored. The inspiration for the exploration in this particular study lies in attempting to gain a deeper level of understanding of the non-linear and complex nature of the phenomenon of corporate entrepreneurship.

2.6.3 Corporate Entrepreneurship: Clarifying the concept

Working from a clear terminology is essential to the success of every research discipline (de Wolf & Holvoet, 2005). As is the case with entrepreneurship, the literature struggles to provide a succinct and agreed upon definition for corporate entrepreneurship.

Terms such as intrapreneurship, corporate venturing, organisational entrepreneurship and even strategic renewal are often used interchangeably with corporate entrepreneurship (Morris et al., 2010). Phan, Wright, Ucbasaran and Tan (2009), in a paper on the current trends within corporate entrepreneurship, state that when compared to the definition of entrepreneurship, corporate entrepreneurship seems to be a contradiction in terms. However, within all these definitions some common elements do seem to arise. Zahra, Nielsen, and Bogner (1998) refer to Miller (1983) as possibly the most influential research studies in the definitional dilemma facing this discipline. Here corporate entrepreneurship is defined by the terms “risk-taking”, “pro-activeness” and “radical product innovations”. Since then researchers have elaborated on the terms included in their respective definitions. Core elements of more recent and popular definitions are shown in Table 2. Definitions of both corporate entrepreneurship and intrapreneurship are included, as the literature uses these terms interchangeably.

Table 2 Definitions of Corporate Entrepreneurship

Author	Definition
Sharma and Chrisman (1999, p. 18)	“... the process whereby an individual or a group of individuals, in association with an existing organization, create a new organization, or instigate renewal or innovation within that organization”

Hayton (2005, p. 21)	"... involves organizational learning, driven by collaboration, creativity and individual commitment"
(Goodale, Kuratko, Hornsby, & Covin, 2011, p. 116)	"... refers to the pursuit of entrepreneurial actions and initiatives that transform the established organization through strategic renewal processes and/or the firm's scope of operation into new domains, that is, new product-market segments or technological areas"
(Gündoğdu, 2012, p. 299)	"...entrepreneurial activities conducted within existing organizations"
(Simsek & Heavey, 2011, p. 81)	"...a set of firm-level activities that center in the discovery and pursuit of new opportunities through acts of innovation, venturing and renewal"
(Holt et al., 2007, p. 40)	"Entrepreneurial activities and behaviors in larger, established organizations"
(Ireland et al, 2009, p. 21)	"a vision-directed, organization-wide reliance on entrepreneurial behavior that purposefully and continuously rejuvenates the organization and shapes the scope of its operations through the recognition and exploitation of entrepreneurial opportunity"
(Wolcott & Lippitz, 2007, p. 75)	"... a process by which teams in an established company conceive, foster, launch and manage a new business that is distinct from the parent company but leverages the parent's assets, market position, capabilities or other resources"

The last-mentioned authors note other related terms often used include "organizational entrepreneurship", "intrapreneurship" and "corporate venturing". "Intrapreneurship", according to McFadzean, O'Loughlin and Shaw (2005), can be used interchangeably with corporate entrepreneurship. However, Wolcott and Lippitz (2007) warn the distinct difference between corporate entrepreneurship and corporate venturing lies in the latter pursuing financial investments in external companies. To this they add that corporate entrepreneurship goes beyond simply developing new products, and also includes innovations in other areas of the business such as services, channels and brands.

The already mentioned seminal author in the field, Pinchot (1985), who as we now know coined the term intrapreneur, refers to the phenomenon defined above as "intrapreneuring", as it has to do with the building of entrepreneurial processes and entities within existing firms. It should be borne in mind that the work of Pinchot emphasised individual actions and behaviours.

Twenty years on, Dess and Lumpkin (2005) agree with Pinchot and add that corporate entrepreneurship is tasked with achieving two specific outcomes, namely pursuing new venture opportunities and strategic renewal. Growth may also, of course, be achieved through actions such as strategic alliances, joint ventures or mergers and acquisitions. Corporate entrepreneurship in a sense is unique in that its focus is on internal development of new ventures.

Despite ever-present definitional issues around corporate entrepreneurship, the point made by Kuratko and Audretsch (2013) that innovation is a central underlying theme in this phenomenon, is evident in all these definitions.

Innovation, as already explored in some detail in this study, within an organisational context can be understood as the process through which resources and competencies are applied in order to develop and deliver new or improved products or to come up with alternative and better ways of making or delivering said products (Jones, 2010). Newness in this sense needs to increase overall effectiveness in order for it to qualify as innovation. Shaw, O'Loughlin and McFadzean (2005) define innovation as "...the response to environmental challenges or future opportunities" (p. 394), noting uncertainty, risk and change as triggering environmental factors for innovation.

For the purposes of this study the definition formulated by Sharma and Chrisman (1999) for corporate entrepreneurship is accepted: *"... the process whereby an individual or a group of individuals, in association with an existing organization, create a new organization, or instigate renewal or innovation within that organization"* (p. 18). The justification for this particular choice relates to this definition having been cited the most, according to Google Scholar. Furthermore, it is the only article that could be found where the content is fully dedicated to the definitional issues surrounding corporate entrepreneurship. Katz and Shepherd (2004) highlight this particular definition as a comprehensive one. A final consideration for using this definition relates to the inclusion of the components of a process, the individuals and groups within the process, and the concepts of newness and innovation.

2.6.4 Modelling the process of Corporate Entrepreneurship: Existing models and current trends in the literature

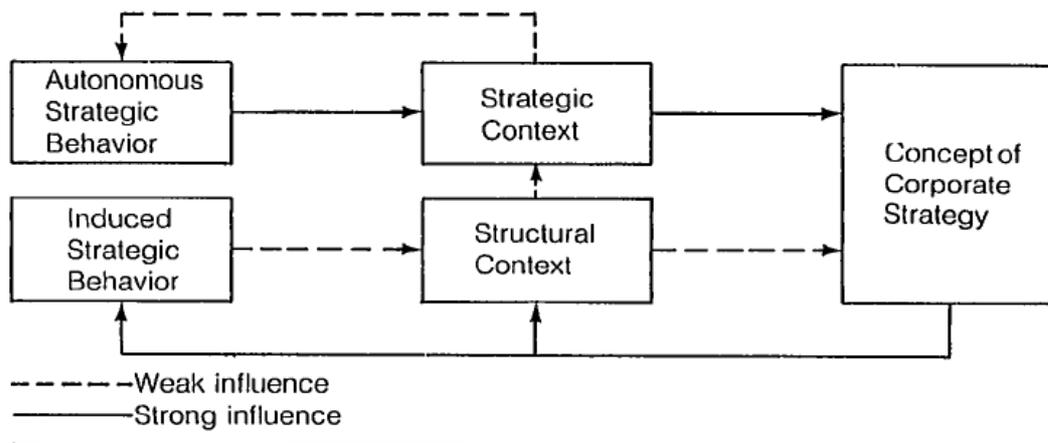
Current literature confirms that corporate entrepreneurship is a positive organisational mechanism. Various authors emphasise that corporate entrepreneurship is vital to the performance and survival of organisations, explaining why increasingly researchers and practitioners alike have started paying more attention to understanding the elements that make up, and practising the process of, corporate entrepreneurship. (Agor, 1986; Antoncic & Hisrich, 2004; Barringer & Bluedorn, 1999; S. Basu & Wadhwa, 2013; Burgelman, 1983; Covin & Slevin, 2014; Guth & Ginsberg, 1990; Hornsby et al., 2002; Kuratko & Audretsch, 2013). Despite this increased acknowledgement of the field, research into corporate entrepreneurship has equally endured an overdose of classical reductionist research methods, as is the case in many other business research disciplines.

The following section explores some of the existing models found in the literature that aim to explain corporate entrepreneurship as a process.

2.6.4.1 Models of Corporate Entrepreneurship: Boxing complex non-linearity

A study of the literature on process models for corporate entrepreneurship leads one to the early work done by Robert Burgelman, a business professor with an extensive career in corporate entrepreneurship related research, working at Stanford since 1981 and eventually becoming the Director of the Stanford Executive Program. Burgelman in his 1983 work is one of the pioneering authors attempting to pin down the particulars in the process of corporate entrepreneurship from a strategic perspective. The Model of Interaction of Strategic Behaviour, Corporate Context, and the Concept of Strategy developed by Burgelman in 1983 and refined in another publication in 1984 puts the process into the typical boxes and arrows type of model. Burgelman's model illustrated in Figure 3 makes a case for challenges associated with the strategic management of entrepreneurial activities within an existing organisation, and he advocates work autonomy, diversity and management support (Burgelman, 1983; Burgelman, 1984). The mechanistic structure of the model, however, seems difficult to achieve as it - like so many business process models - does not allow for any form of non-linearity or natural emergence to be discovered and nurtured.

Figure 3 The Model of Interaction of Strategic Behaviour, Corporate Context, and the Concept of Strategy



Source: Burgelman (1984, p. 155)

Wolcott and Lippitz (2007) present four models from which to create novelty in existing organisational structures. The benefits and challenges contained in each of the different models should, according to the authors, guide innovation drivers in the selection of a specific model. These model builders acknowledge, to a certain extent, the significant influence of differences in context in the generic application of a model to different environments. They state that companies are different, and a model that works wonderfully for one company might be fatal for another. The authors use the example of “organisational slack”, where employees are granted 15% work time to develop their own ideas, as an illustration. While this concept works well for 3M, the same principle was responded to by pharmaceutical business leader Dr Nelson Levy with the following reaction, “I might as well give my people 15% paid leave!” (p. 76).

The proposed models are illustrated in Figure 4. They differentiate two dimensions relating to the level of direct control by management that guide the company’s approach to corporate entrepreneurship. The horizontal dimension defines who within the organisation takes ownership for the creation of newness. The vertical dimension illustrates the method by which corporate entrepreneurship projects are funded. They encourage companies to deliberately nurture and manage corporate entrepreneurship on a strategic level because “corporate entrepreneurship won’t just happen” (p. 82).

This work of Wolcott and Lippitz (2007) to a certain extent provides some alternative to the menu of available one way “boxes and arrows” models. The model is also included as it is one of a few studies in the literature where the authors provide real life examples of their theories. The four models are discussed below.

The first model is referred to as the Enabler model (p.77) and is positioned as having dedicated resource authority with diffused organisational ownership. An Enabler model of corporate entrepreneurship is characterized by the provision of senior management attention and funding to prospective projects with the proposition that employees within the organisation given the necessary support will be willing to develop new concepts. Google is used as the “poster child” in illustrating this model. Google allows its employees 20% of their work time to pitch ideas to co-workers and put together teams that explore concepts and build prototypes. Project teams are formed in an instant and meet the requirements that the teams define themselves. Google is said to be “an internal ecosystem of entrepreneurs” (Wolcott & Lippitz, 2007, p. 77).

The Opportunist model of entrepreneurship (p76) sees an ad hoc allocation of resources toward new ideas, while allocating organisational ownership in a diffused manner, similar to The Enabler model. The theory in this model is embedded in the idea that all projects start out as opportunities with no resources or designated ownership. Champions of new projects often have to fight many odds while creating newness, often in spite of their corporations. Medical device company Zimmer Holdings Inc. is used as an example of the Opportunist model. Ideas within this organisation firstly have to be presented or championed in order to get approval for the necessary support from top management. Zimmer has a research and development division tasked to undertake new product development; however, the organisation is not formally structured for corporate entrepreneurship. The Opportunist model is well suited to organisations which are open to experimentation and have a trusting corporate culture made up of diverse social networks within its formal hierarchy. This type of Opportunist corporate entrepreneurship saw Zimmer successfully surviving severe pricing pressure within the industry, becoming a preferred supplier for various private insurers who are even willing to pay a premium price for Zimmer products.

The remaining two models in this theory are both characterized by high levels of focused organisational ownership. Companies such as IBM, Motorola and Cargill are examples of companies that employ a Producer strategy (p78) when it comes to their pursuit of corporate entrepreneurship. This entails the deliberate establishment of formal organisational structures devoted to corporate entrepreneurship and allocation of dedicated funds, as well as influence and support, to prospective innovation projects. While the aim of the Producer model is to encourage latent entrepreneurship within the organisation, it goes further in that it allows for protecting emerging projects from turf wars, encourages collaboration across business units, creates potentially disruptive business units and also builds platforms for employees to pursue careers outside their current business unit.

Finally, the Advocate model (p.78) is also focused on the formalisation of organisational ownership of new concepts, but funding within moderate budgets can only be accessed within specific business units. The global corporation DuPont employed an Advocate strategy in 1999 when top management realised the need for a new way of thinking due to a steadily declining growth rate. The establishment of a small internal group of employees tasked to focus on growth strategies resulted in the Market Driven Growth initiative. This initiative can be approached by employees for assistance with new ideas, from idea conceptualisation through to commercialisation. However, idea developers go through a stringent process of training and proposal presentation before any funds are allocated at the discretion of the established initiative.

Figure 4 The Four Models of Corporate Entrepreneurship

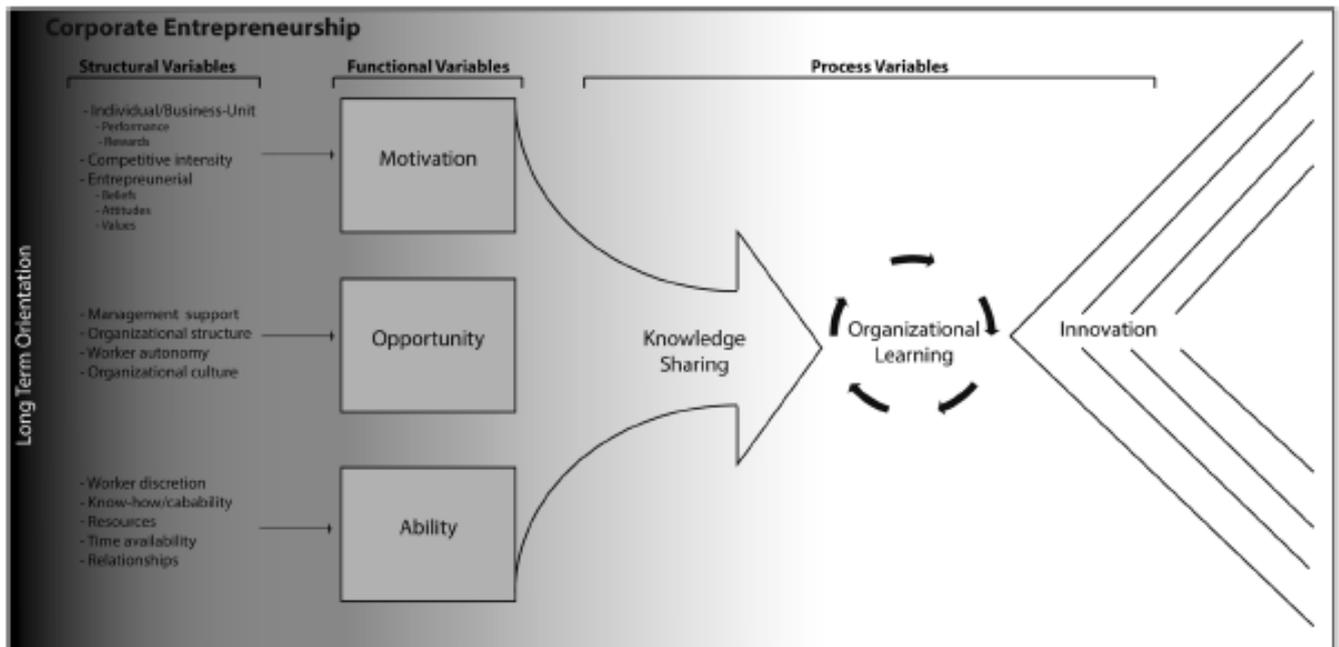


Source: Wolcott and Lippitz (2007, p. 77)

Applying a suitable model to the organisation can, according to the authors, assist in an increase of corporate entrepreneurial activity; however, they warn that this capability is not one that is instantly built, and state that corporate entrepreneurship “will always be a rough-and-tumble process with few guarantees” (p. 82).

More recently Turner and Pennington (2015) developed a framework that attempts to understand knowledge sharing and organisational learning as a driver of innovation and entrepreneurial behaviour in complex organisations (see Figure 5).

Figure 5 Theoretical model for corporate entrepreneurship



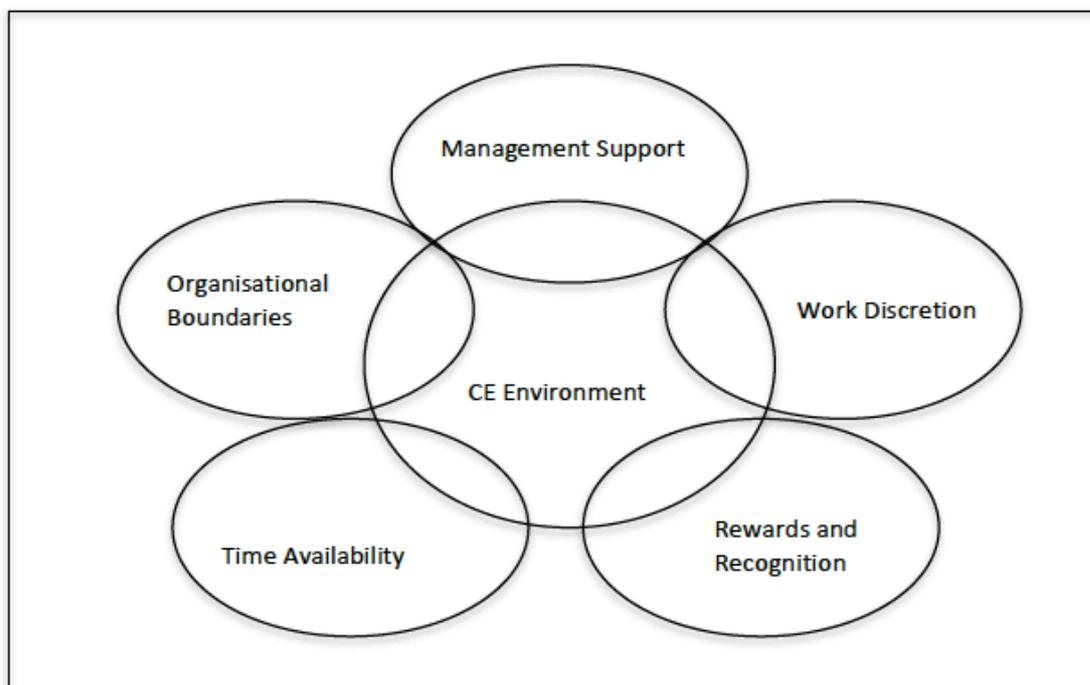
Source: Turner & Pennington (2015, p. 450)

Their framework uses motivation, opportunity and ability as functional variables that shape the starting blocks for knowledge sharing as a mechanism for organisational learning leading to the ultimate goal of innovation. Said functional variables are fed by specific structural variables. Motivation is supported by the individual's or business unit's attitudes, beliefs and values as well as the competitive intensity and the performance outcomes and rewards offered by the structure. The opportunity variable is fed by the context in which corporate entrepreneurial behaviour happens. The context here is created by organisational factors relating to management support, organisational structure, employee autonomy and the specific organisational culture. Finally, ability as a variable also depends on organisational practice elements like work discretion, capability, available time and robustness of relationships. Structural variables associated with opportunity and ability are in agreement with the enablers of corporate entrepreneurship as proposed by Hornsby, Kuratko and Zahra (2002).

2.6.4.2 The Famous Five enablers for Corporate Entrepreneurship: A small step out of the box

The groundbreaking work of Hornsby et al. (2002) identifies specific corporate entrepreneurial enablers rather than pinning down a set model or process. Five enablers complete the Corporate Entrepreneurial Assessment Instrument (CEAI) as illustrated in Figure 6. These enablers together, but also individually or in different combinations, are believed to play a vital role in the successful pursuit of a company's entrepreneurial endeavours, as they are an indication of the interest in, and support shown for, entrepreneurial efforts within the established organisation.

Figure 6 Enablers in the Corporate Entrepreneurial Assessment Instrument



Adapted from: Hornsby et al. (2002, p. 261)

Management support entails the willingness of management to facilitate and champion entrepreneurial activities within the organisation. This type of management support extends to various activities, including access to resources and expertise, campaigning for innovative ideas and formalizing entrepreneurial activity within the organisation's systems and processes. *Rewards and recognition* involve the presence and execution of an effective rewards system. This system has to encourage entrepreneurial activity while taking into consideration goals, feedback, an emphasis on individual responsibility, and incentives based on results.

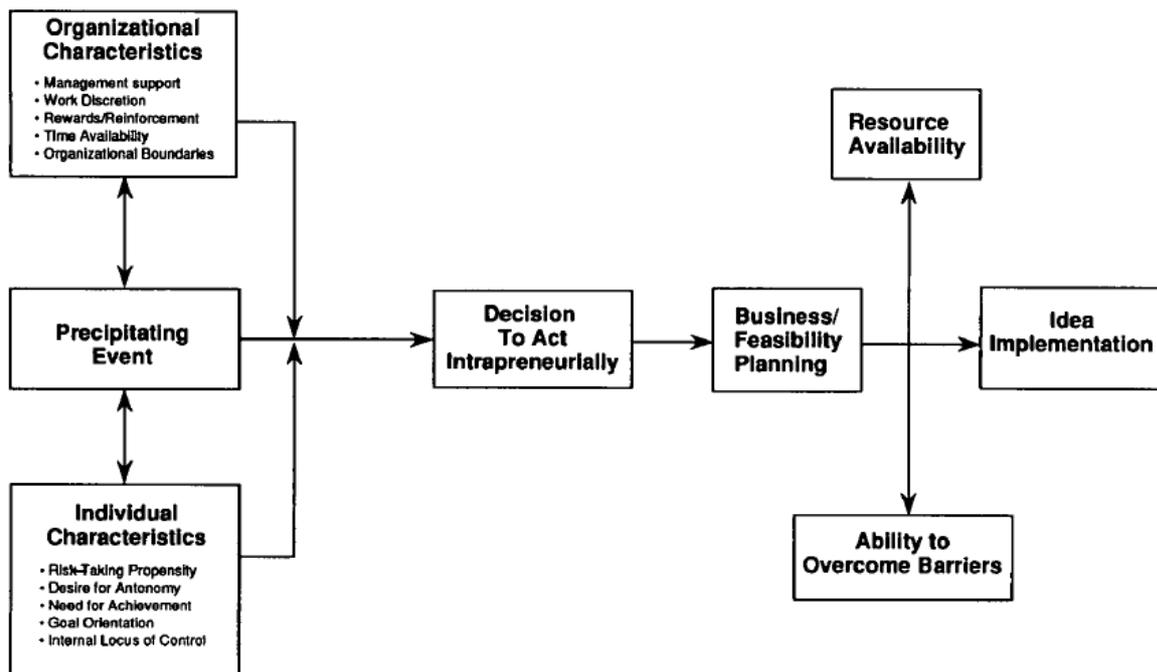
Work discretion / autonomy: leaving employees room to make decisions requires effective delegation of authority and responsibility. The organisation must also allow for a degree of tolerance when it comes to failure.

Time availability is a resource based enabler specifically relating to time available to the employee to pursue entrepreneurial endeavours within the organisation.

Organisational boundaries refer to how the organisational structures provide administrative mechanisms that allow for ideas to be considered, selected and implemented. Ideally, organisational boundaries should be perceived by the employee as promoting and encouraging idea implementation.

The enablers in the CEAI have been included by one of its developers - Hornsby - together with other authors, in a paper attempting to address the lack of theoretical frameworks and models in this discipline (Hornsby, Naffziger, Kuratko, & Montagno, 1993). They develop what they refer to as an Interactive Model of the Corporate Entrepreneurial Process. Figure 7 illustrates the components they include in the so-called interactive process. The components relate to both organisational and individual characteristics that they assert have an effect on the corporate entrepreneurship process.

Figure 7 An Interactive Model for Corporate Entrepreneurship



Source: Hornsby, Naffziger, & Montagno (1993, p. 31)

In discussing the model, the authors emphasise that corporate entrepreneurship is a multi-dimensional phenomenon in which the interactive nature of the process cannot be ignored. This despite the model not really proving to be less linear than any of its predecessors. Encouraging the use of the components of the model for future research, they note that the pursuit of successful corporate entrepreneurship lies in understanding the interaction of participative components.

Numerous studies have through classical statistical methods found the presence of the five corporate entrepreneurial enablers as set out by Hornsby, Kuratko, and Zahra (2002) highly predictable of innovative behaviour and performance (Goodale et al., 2011; Hornsby et al., 2002; Van Wyk, R & Adonisi, 2012; Venter, Kruger, & Urban, 2010; Villiers-Scheepers, 2012). However, the available literature has not produced documentation of the enablers being analysed using some form of alternative method that allows for, rather than reduces, the complexity and non-linearity embedded in corporate entrepreneurship.

Could the application of Hornsby et al's (2002) enablers in an alternative method of analysis assist in understanding the emergence of corporate entrepreneurship as a complex and non-linear phenomenon?

One of the aims of this study is to explore the five enablers through an alternative method of analysis, one that allows for the complex non-linear and dynamic nature of the phenomenon of corporate entrepreneurship.

2.6.4.3 A square peg in a round hole: The role of management in the emergence of Corporate Entrepreneurship

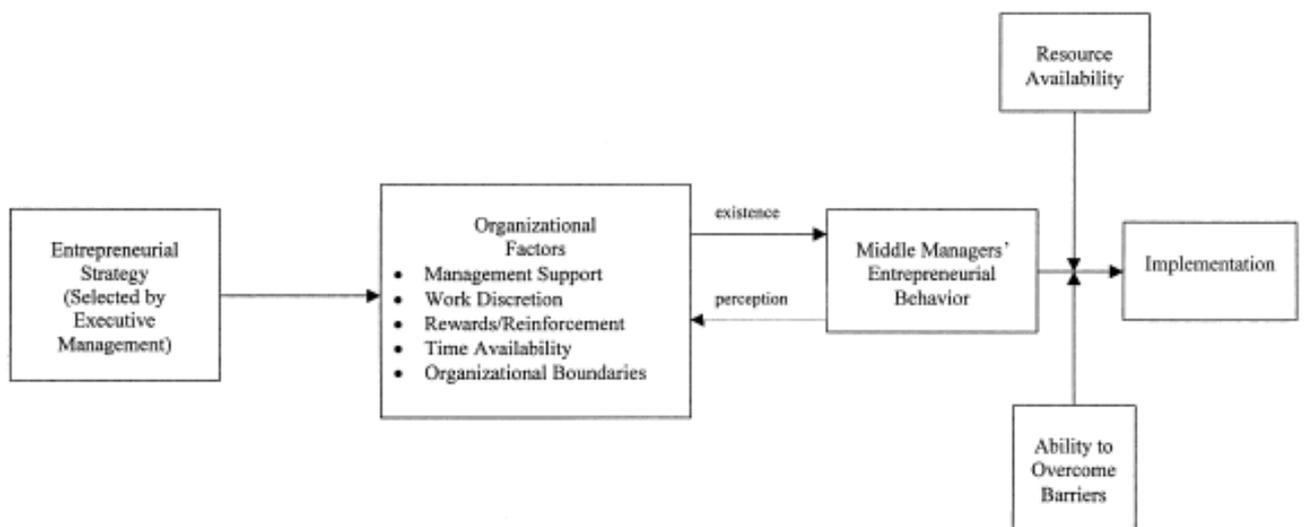
Management and management support seem to be a theme of particular interest among scholars in this area (Hornsby, Kuratko, Shepherd, & Bott, 2009; Hornsby et al., 2002; Katz & Shepherd, 2004; Kuratko, Ireland, Covin, & Hornsby, 2005) Consequently a section of this literature review will pay particular attention to findings in the literature around aspects of management within an environment that either fosters or inhibits the emergence of corporate entrepreneurship.

Hornsby et al. (2002) look at the internal environment for corporate entrepreneurship, and offer a very comprehensive literature overview of the role of middle managers in corporate entrepreneurship. The writers quote Bower, who in 1970 became one of the pioneers highlighting the importance of middle managers as change agents in modern organisations. Several other authors throughout the 1980s and the 1990s who increasingly noticed in their research the importance of the middle manager in any organisational process of strategic change, organisational renewal and the encouragement and support of entrepreneurial activities, are mentioned.

There also seems to be some value in the investigation of innovative behaviour at different levels of management. Hornsby et al. (Hornsby et al., 2009) argue that the operational ability of intensified entrepreneurial action is provided by the management level of a particular employee.

Floyd and Wooldridge (1992) also recognise the importance of the middle manager. They attribute specific responsibilities that could possibly enhance innovation behaviour to this level of management. These responsibilities include championing innovative alternatives and being the pathway to reach senior management. Furthermore, middle managers are action agents in altering structure, implementing strategies conceptualised by senior management at lower levels and providing feedback. Zahra et al. (1999) expand on earlier work when discussing the challenges and difficulties associated with corporate entrepreneurial activities, and strongly advocate proper management capability for the outcome to be favourable to the organisation's performance. Figure 8 shows a model devised by Hornsby et al. (2002) that illustrates where in their process middle managers' perception of the internal environment for corporate entrepreneurship is formed, as well as indicating the influence these researchers believe this perception of middle management has on the final implementation of innovation.

Figure 8 Middle managers' perception of the internal environment for corporate entrepreneurship



Source: Hornsby et al. (2002, p. 31)

It is interesting to note that the middle manager and his/her perceptions and behaviour are central to the model, emphasising again the importance of this specific employee in the process of corporate entrepreneurship.

2.7 Chapter summary

Current research methods in the field of corporate entrepreneurship provide clarity on some aspects, features and attributes, but fail in recognising the whole. Theorising within the discipline of corporate entrepreneurship needs to consider the construct as a complex whole. Adding a valuable contribution to this particular body of knowledge, both scholarly and practically, requires a research method of inquiry done through a novel way of connections (Anderson et al., 2012).

This view of Anderson et al. (2012) is confirmed when considering the process models that have to date been developed by researchers in the field of corporate entrepreneurship. For the most part, available process models look at aspects, often in isolation, in order to provide a causal account of which organisational practices predict the existence of an organisational climate that enables corporate entrepreneurship.

The purpose of this literature review was to identify key themes and existing process models within the current literature about the phenomenon under investigation, namely the emergence of innovation behaviour as part of corporate entrepreneurship within the context of human capital management practices. The aim is that the identified themes discovered in the literature and process models may assist the researcher in conceptualising, interpreting and organising emergent themes embedded in the primary data of this study. Exploration of the themes of both the literature and the data will be done through the theoretical lens of complexity, as set out in Chapter 3.

Chapter 3

Theoretical perspective: Observing complexity

3.1 Introduction

The existing literature as reviewed in Chapter 2 is lacking in research approaches that allow for the non-linear nature embedded in a dynamic phenomenon like corporate entrepreneurship. Instead of attempting to embrace, and consequently better understand, the interconnected nature of the elements that constitute the complexity involved in the interaction of said elements, classical research approaches attempt to reduce it. An alternative research lens is needed if understanding and insight are to be gained into the full richness of the concept corporate entrepreneurship.

This chapter considers the theoretical approach of the research study. The theoretical approach of a study includes the selected ontology and epistemology that inform the researcher's philosophical stance. The theoretical approach also guides the research methodology and provides context for logical interpretation and evaluation criteria. Discussion and inquiry into any form of social science should commence with a thorough consideration of the epistemology (knowledge informing the research) and the ontology (what the researcher accepts as the nature of reality) and finally the methodology (methods of gaining knowledge).

Attempting to understand a phenomenon by undertaking research requires from the researcher to utilise an appropriate philosophical stance or paradigm perspective and theoretical orientation or interpretive framework for examining the particular reality. A philosophical stance is typically the departure point in a research endeavour and has to do with the researcher's position and use of abstract lenses and beliefs that ultimately inform the research. Selecting an applicable theoretical orientation allows for the systemization of knowledge, as well as a certain consensus in terminology and research procedure.

3.2 On the theoretical menu: Lines and boxes or circles and stars

Researchers, philosophers and scientists employ certain set beliefs and viewpoints about the world in general when embarking on any project requiring a degree of sense-making. Said beliefs and viewpoints or lenses fall within one of two general paradigms, Positivism or Interpretivism.

Pure Positivist researchers prefer to understand the world in terms of measurement, classification, diagnoses, prediction or testing of separate parts. The notion that the world can be understood through the application of a scientific method is what attracts researchers to this research paradigm (O'Leary, 2007). The positivist lens rejects metaphysical speculation, and generalises from observations made by the human senses (Lewis-Beck, Bryman, & Liao, 2004).

Interpretivist purists attempt to understand the world in a holistic manner, seeking a deepening of understanding through organic-like lenses that are bounded in systemic thinking and concerned with social context. Understanding and interpretation in this paradigm relate to the purposes and intentions people have and the meanings they give to the world and their actions as well as their interactions with others (Given, 2008). Perceptions and the interpretations of what is perceived in this paradigm are further influenced by values, expectations and language (Repko, 2012). Belief that there is no absolute truth, and certainly no special research method to lead to an absolute truth, is usually what resonates with researchers that choose to function in this paradigm (Given, 2008). Interpretivism shifts the emphasis from causality to the deeper interpretation of meaningful stories (O'Reilly, 2009) and the interpretivist allows for plurality in perspectives when attempting to gain understanding and insight into a given phenomenon (Mathison, 2005). The human being cannot be separated from the process of making sense of the world. In an interpretivist perspective, the researcher is engaged in the research, thus the human being cannot be separated from the process of making sense of the world (Babbie, Mouton, Voster, & Prozesky, 1998).

From these two theoretical stances flow various accompanying theories and research methods. It is important for the researcher to explore the possibilities within the different

paths of understanding phenomena in order to establish which path is best suited to address the research question posed by the given research project.

3.2.1 Boxes and arrows: Positivism

The theoretical paradigm known as Positivism allows for seeing the workings of phenomena as a machine made up of specific parts. This type of human mind makes sense of the machine-like world by attempting to understand the individual parts through measurement, diagnoses and prediction. Ideas and sense-making within this paradigm are informed by so-called Newtonian knowledge (Wheatley, 2011). Galileo and Descartes initially crafted the conceptual framework of a perfect machine resembling the world, ruled and governed by precise mathematical laws. This nuts and bolts conceptual framework was, according to Capra (1997), victoriously completed by Isaac Newton with his grand conceptualising of Newtonian mechanics, hailed as the defining scientific achievement of the seventeenth century. In business research, findings made in a Positivist stance are more often than not presented as models consisting of boxes linked by arrows that indicate some kind of assumed causal order.

Newtonian science rests within the Positivist philosophical stance, a paradigm characterized by reality measuring and testing. The primary purpose of employing a Positivist approach in research is one of controlling the research setting or context (Terre Blanche, Durrheim, & Painter, 2006), ultimately producing a precise understanding and description of mechanisms and laws that dictate social life.

A number of ontologies and epistemologies fall within this Positivist sense-making paradigm, each of these demonstrating certain characteristics and employing certain methods of understanding the world.

Ontology, derived from the Latin term “ontologia” refers to “the science of being” (Simons, 2003) or the study of being. Ontology, or our ontological stance, determines how we choose to see “the nature of reality” (Repko, 2012, p. 298). Ontologies within this paradigm generally set out to determine what can be established with a certain degree of certainty, also seeking plausible explanations for verifiable patterns using methods similar to those used by natural

scientists (Patton, 2002). Furthermore, ontologies with a Positivist paradigm are selected when the researchers are in pursuit of results that reflect a law-like, causal and stable external reality.

Epistemology is a term that describes “how we know what we know” (Crotty, 1998, p. 8). Also finding its roots in the Greek language, “reason” or “logos” is in this instance combined with “episteme” translating to “knowledge”, bringing us to “the theory of knowledge” (Martinich & Stroll, 2017). On an epistemological level Positivism follows processes that are considered to be objective, where the researcher or observer is detached from that which is being researched. This type of epistemology requires a research methodology that is experimental and quantitative and allows for the testing of hypothesis (Terre Blanche et al., 2006).

Generally, paradigms residing in this Newtonian, quantitative philosophical stance are reductionist in nature and well suited when the researcher is seeking objectivity, linearity and accurate prediction. The research outcomes of this particular study preclude the scope, characteristics and boundaries of a Positivist philosophical stance, as the researcher is seeking a deeper understanding of, and not an absolute glimpse into, the emergence of elements that make up the phenomenon.

3.2.2 Circles and stars: Interpretivism

Interpretivism or social constructivism is a school of thought that opposes the mechanistic way of thinking. Interpretivism was originally found in the disciplines of art, literature and philosophy during the late eighteenth and nineteenth centuries (Capra, 1996). This disruption in Newtonian thinking was initiated by the Romantic Movement, with many of its followers passionate critics of the stances and ideas of Newton. Philosophers in this period revisited the Aristotelian school of thought, returning the emphasis to the “nature of organic form”, concentrating on “a qualitative understanding of patterns” and explaining life phenomena “in terms of visualized forms” (Capra, 1997, p. 21). The pursuit of understanding the organic form of phenomena saw the philosopher Immanuel Kant contrasting the nature of machines to that of organisms, in that organisms are “self-reproducing, self-organising wholes” (p. 21). Kant is consequently credited as the first scholar to use the term “self-organising”. Interpretivist interpretations rebel against the confinement of metaphorical boxes and are even less willing

to settle for ordered causality. Interpretivism embraces the sense of continuation in discovery and the notion that there will always be more beyond that which we think we know. This notion is illustrated by the choice of the title of this section.

Researchers within the Interpretivist stance seek to derive meaning in human action, viewing individuals as actors within their different social contexts (O'Reilly, 2009). Interpretivism is concerned with the study of social worlds or contexts inhabited by humans when attempting to understand social phenomena. Said social worlds are interpreted by their inhabitants through the meanings they produce and reproduce as a central part of their everyday activities (Byrne, 1998). Also referred to as "romantic hermeneutics" or "anti-positivist", Interpretivism is rooted in an ontology where internal reality cannot be separated from the subject under study and the research discovery process is acknowledged as a subjective experience (Terre Blanche et al., 2006). Observer subjectivity is part of the epistemologies in this paradigm, as the observer simply cannot be disconnected from that which is being observed (Repko, 2012). Research methods are interactional and mostly interpreted in a qualitative way (Terre Blanche et al., 2006).

Social Constructivism also finds a philosophical home within the Interpretivist paradigm, agreeing that knowledge about reality is socially constructed (Repko, 2012). In Social Constructivism representations of people and objects are understood through the signs and images that have the power to create their particular representations. People are studied with the premise that their thoughts, feelings and experiences are all products of various systems of meaning (Terre Blanche et al., 2006). Systems of meaning are emphasised as existing on a social, rather than an individual, level. Essentially Social Constructivism is about social interaction and sequential meaning creation. In seeking an understanding of the environment in which they exist, Social constructionists are subjective in the development of their meaning towards experiences (Creswell, 2013a). Accompanying research methodologies are qualitative, interpretive and concerned with meaning (Repko, 2012).

Using a combination of the principles embedded in each of the philosophical stances could be advantageous when researchers are not looking to be limited in their exploration (Patton, 2002). Generally, researchers that utilise a combination of different approaches when

attempting to gain insight into phenomena are often referred to as pragmatists. Pragmatism is preoccupied with the use of various methods of data sourcing, collection and analysis that might best be combined to answer the research question (Creswell, 2013a).

Babones (2016), however, states that quantitative research methods find equal right in an Interpretivist approach, as it allows the willing researcher the opportunity to gain a much deeper understanding of the unobservable processes responsible for generating the observed data. Furthermore, it allows for the analysis of data from many perspectives, achieving triangulation as a research goal holistically producing improved integration of measurement and modelling. Sequentially to the above discussion, and in accordance with the researcher's own view of the world, this study will look at the research problem through an Interpretivist lens.

3.2.3 An act of balance

The choice of paradigm the researcher pursues lays the foundation for the rest of the research project. A paradigm can be explained as a cluster of beliefs that guides the researcher in a specific discipline as to what should be studied, in what manner it should be studied, and how the eventual results should be interpreted (Bryman, 2012).

Reflecting on the nature of the context in which this particular study is taking place (i.e. a study of emergent patterns based on a set of variables within a context of organisational and social complexity), the researcher has settled for an Interpretivist philosophical stance that allows for an alternative approach to interpreting quantitative data. In agreement with Patton (2002), the researcher prefers exploring the research problem by not advocating a single-sided view of existence. This will inevitably lead to a mixed method approach to the research process (Creswell, 2013a) that is well accommodated by an Interpretivist lens, according to Babones (2016). This insight offers a unique opportunity for the researcher to pursue, combining a variety of research approaches without having to complicate the ontological foundation of the study.

Bryman (2012) suggests various instances where seemingly opposing approaches could be combined. Deciding on a partnership of approaches could be due to the need for one of the following:

1. triangulation or a greater validity of results
2. offsetting the weaknesses of one paradigm with the strengths of another
3. producing a more comprehensive account of that which is being investigated
4. one paradigm providing an account of structure, while the other adds to the insight around process
5. different research questions within the same project requiring different approaches
6. one research approach being used to explain the results produced by the other one
7. an alternative approach helping to interpret unexpected results yielded by a particular research approach

The choice of paradigm also reflects the researcher's personal view of the world: that there are no single truths, and that insight into a problem may be gained from multiple perspectives. At the same time the research tradition of triangulation is honoured through a sequential explanatory mixed method design (Creswell, 2009). The sequential explanatory research method used in this study will be detailed in Chapter 4.

3.3 Systems theory: All that interconnects, creates

During the early twentieth century, organismic biologists critical of mechanistic approaches engaged with renewed enthusiasm in understanding biological form. Their endeavours saw them rediscovering, extending and redefining the insights, ideas and concepts of Aristotle, Johan Wolfgang von Goethe, Leonardo da Vinci and Immanuel Kant (Capra, 1996; Packham, 2014). From the essence of these discoveries and reflections emerged some of the key aspects of systems theory as we know it today. As the concept of organising gradually replaced the idea of function, mechanistic thinking made way for systems thinking. Capra (1997) notes that since that shift in thinking, "system" as a term has been used to describe both living organisms and social systems. Capra continues to elaborate, defining a system as "an integrated whole whose essential properties arise from the relationship between its parts" (p. 27). Systems thinking is subsequently defined as "the understanding of a phenomenon within the context

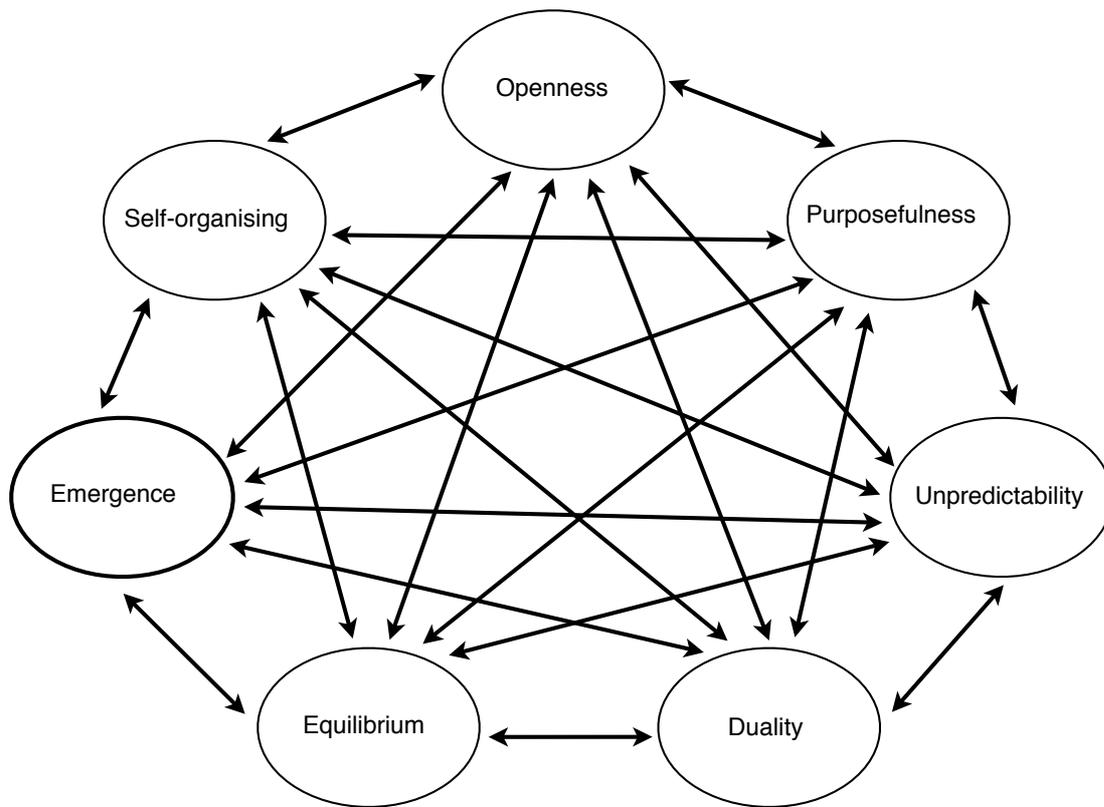
of a larger whole". The author clarifies that the systematic understanding of things literally implies placing them in context, "to establish the nature of their relationships". Ludwig von Bertalanffy, a biologist himself, is considered by many scholars as one of the most influential pioneers in general systems research (Packham, 2014). With his greatest influence in the area of systems theory being recorded in the mid-twentieth century, von Bertalanffy was, according to Packham (2014), vociferously opposed to the mechanistic and one-way causal paradigms offered by classical science. He is credited with the construction of much of the language and many of the distinctions between concepts like open and closed systems, causality and functional complexity, as well as entropy as a generalised concept (Pickel, 2014). Other notable more recent researchers in this field include Gregory Bateson and Margaret Mead (Packham, 2014). Spending a large amount of his energy to illustrate the role of patterns in systems theory, Bateson (1980) urges the scholar to shift his or her focus to relationships as the basis for defining all phenomena, and in so doing finding the "pattern that connects".

In opposition to reductionist approaches, systems thinking deals very well with complex phenomena because of the theory's ability to see the whole as different to the sum of its parts. Furthermore, systems thinking engages issues such as complexity, uncertainty and the changing nature of phenomena - issues that classical reductionist methods fail to properly engage (Packham, 2014).

3.3.1 Guiding themes, concepts and principles of systems theory

In observing all they encounter, systems thinkers are constantly guided by certain principles. These systems principles are, according to Gharajedaghi (2011), the building blocks of the mental models the systems thinker or designer is constantly constructing. Figure 9 is an adaptation of the aforementioned author's model incorporating the key themes, concepts and principles of systems theory mentioned in the literature.

Figure 9 Systems themes, concepts and principles



Source: Adapted from Gharajedaghi (2011, p.30)

3.3.1.1 Systems are open

Openness implies that understanding of the behaviour of a living system can only be achieved if considered in the context of its environment. Any enquiry into human nature is rendered pointless once the abstraction of interest is separated from its environment or culture. Seminal work done by organic biologist Von Bertalanffy (1973) in this area acknowledges the openness of all living systems. The open nature of systems allows for the system's survival through constant interaction with the environment. Dismissing the application to open systems of the second law of classical thermodynamics that states that an entropy or disorder within a closed system will continue increasing, Von Bertalanffy posited that entropy might decrease in open systems, although at the time the mathematical techniques needed to formally prove such an expiation on the second law, were not available to him. Whereas closed systems settle at a certain point of equilibrium, open systems are characterized by a

continuous flow of matter, maintaining the system in a steady state far from equilibrium (Capra, 1996). Equilibrium is discussed as a distinct principle of systems theory in section 3.3.1.6. Isolation is fatal to the continued survival of a system. Bateson (1979) emphasises that the survival of a system is dependent on the system's ability to interact and connect with its environment.

Not to be separated from this discussion is the concept of boundaries of a system. Boundaries determine the rules of the system's transactional environment. Balance-keeping in boundary permeability determines the survival of the system. A system that is separated from its environment by boundaries that are either too permeable or too unyielding eventually destroys itself (Bateson, 2000). The ability of the system to adapt is key to its sustainability. Thus, open systems are referred to as Complex adaptive systems. Complex adaptive systems have a large number of agents that interact with one another. Each of these agents or actors behaves according to its unique principles of interaction, but no individual actor alone, or anything outside the system, determines the behaviour of the system as a whole. The patterns generated by systems are a summation of all the interactions among all the agents and the systems' environment (Stacey, Griffin, & Shaw, 2000).

Attempting to research systems requires an understanding of the actors influencing the variables in a system, given the transactional environment or context. In organisational systems, said actors comprise the key stakeholders of the system. Stakeholders could be customers, suppliers and shareholders or, as in this research project, the members of the organisations themselves that function within certain boundaries, in this case human capital practices. Gharajedaghi (2011) concludes that dynamics related to boundaries and interactions in an open system are steered by an internal code of conduct, much like DNA or culture.

An example of how this plays out in organisations can be seen in company mergers, when the organisational culture is often changed without due consideration for the agents (employees) or other variables that constitute the current culture. The change in culture leaves employees disoriented, often resulting in counterproductive outcomes.

3.3.1.2 Systems have purpose

Purposefulness is what takes information and knowledge to a level of understanding. Knowing what is going on becomes valuable once one can observe how it is going on, and of even greater value once one understands why it is going on. Purposeful systems, according to Gharajedaghi (2011), are systems that are guided by a set of clear values. He adds that purposeful behaviour attempts to achieve or live up to those values. Generally, these values are embedded within the culture of the situation, and the particular actor more often than not does not even realise that he or she has a choice. Defaulting on these values happens because they are seen as being out there. According to the author, the only way to change the perception that values are out there is to challenge them.

This principle can have serious implications for the functioning of organisations. One of these implications is referred to by Stacey, Griffin and Shaw (2000) as “getting things done, anyway” – managers coming together year after year, revisiting the frameworks and strategies set out at the last strategic gathering and consistently designing and implementing more new interventions. The team soon realises that few or none of these strategies or plans have been followed, yet day to day activities have produced certain unexpected outcomes, encounters and interconnections. Said unexpected outcomes, encounters and interconnections are what the authors refer to as “getting things done”; they are rarely discussed - or are even avoided - as a possible point of embarrassment. In agreement with Gharajedaghi (2011), who states that regaining purposeful behaviour starts by challenging default behaviour, Stacey et al. (2000) recommend asking and discussing, “How do we ‘get things done’, anyway”? They conclude that this repetitive search for improved systems and procedures is nothing more than a desire to control the experiences of the organisation.

3.3.1.3 Systems may produce duality

Multi-dimensionality is discussed as “one of the most potent principles of systems thinking” (Gharajedaghi, 2011, p. 38). This principle refers to the ability of the systems thinker to see “complementary relations in opposite tendencies” and the ability to “create feasible wholes with infeasible parts” (p. 38). Duality is present in almost all we know and experience. The

quoted author lists the examples of security and freedom, order and complexity, collectivism and individuality, art and science and modernity and tradition. These dualities are positioned such that a victory or advancement of one is naturally perceived as a loss for the other. With the opposing tendencies bounded in duality in terms of a “zero sum game”, certain consequences are inevitable. Firstly, tendencies are constructed as mutually exclusive entities with the dynamics between them conceptualised as either win/lose or as an either/or relationship. A second consequence is that a certain degree of compromise is required to deal with the conflict when opposing tendencies are presented as a continuum. The author plots the colours black and white at the opposite sides of a continuum as an example. Between black and white on a continuum are many variations of grey. Conflict is resolved when parties settle on a “compromise point” between the two opposite tendencies. Within social realities that are continuously faced with paradoxes, this constant struggle between opposite tendencies is exactly what necessitates the development of new frameworks. Two considerations are proposed for achieving a compromise point within developed frameworks. Presenting themselves as paradoxical as well, the proposed considerations are a concern for change and a concern for stability. Gharajedaghi (2011) argues that where consideration for both stability and change is low, members of a system find themselves in “lose/lose” situations that are often characterized by “anarchy”. A high consideration for stability, accompanied by a low consideration for change, gives rise to “conservative” environments where one part of the system wins at the expense of the other. An opposite scenario characterized by low stability and a high concern for change can result in “radical” system behaviour. Finally, a “mature” type of system finds its design in a high consideration for both change and stability.

The potential of duality within systems, when applied to corporate entrepreneurial systems and particularly the themes highlighted in the research questions within this study, namely human capital practices and innovation, might play out in the following hypothetical scenarios within the different types of multi-dimensional systems:

– An anarchical system might demonstrate very undefined, relaxed to non-existent human capital practices. Aforementioned levels of human capital practices, accompanied by high levels of employee insecurity, could result in little to no innovation within the system leading to unsustainability of the organisation as a corporate entrepreneurial system.

– A conservative scenario could see a system built on well defined, yet inflexible human capital practices that are aimed at creating stability above all else. In the pursuit of ultimate stability, innovation could be sacrificed as employees or members of the system become complacent in their predictable and safe roles within the organisation.

– The radical type of system could also be detrimental to the sustainability of the system. Here, human capital practices (which include resources and support for innovation) are undefined or even non-existing, while a large emphasis is placed on the frequency of innovation. Innovation within the organisation as a corporate entrepreneurial system might arise as short-lived or not at all due to the change associated with innovation not being supported by a certain level of necessary stability.

The sustainability of the organisation as a corporate entrepreneurial system might just lie in finding a “compromise point” that is characterized by high concern for the quality and frequency of innovation while supported by well-defined and relevant human capital practices.

3.3.1.4. Synergism: Emergence in open systems

Laszlo, Alexander and Krippner (1998) speak of the concept of synergy that can be directly linked to the phenomenon of emergence. Synergy - simply meaning that the whole is greater than the sum of its parts - is a concept that cannot be separated from emergence. Synergism describes the distinct interaction of agents, agencies or conditions (Slinker, 1998) that constitutes such a greater whole. Corning (2002) refers to the stance of Aristotle when he emphasises that this “greater” whole is not “more” than the sum of the parts but just different. The author links synergy to emergence, in stating that synergistic effects of different kinds, in nature as well as human societies, are the products of emergent phenomena that interact cooperatively and exist as a “subset of a vast (and still expanding) universe” (Corning, 2002, p. 23). Emergence, according to the previously cited author, is the product of a self-organising process in a complex system.

Emergent property is another principle of systems thinking discussed by Gharajedaghi, and also noted widely by other scholars in the literature (Capra, 1996; Laszlo & Krippner, 1998; Merali & Allen, 2011). Originally a term coined by the philosopher Bond, “emergent

properties” refer to “properties that emerge at a certain level of complexity but do not exist at lower levels” (Merali & Allen, 2011). The uniqueness of emergent properties lies in their being properties of the whole and not properties of the parts. Should the whole cease to exist due to its parts being dismantled, the emergent properties also cease to exist. Laszlo, Alexander and Krippner (1998) explain this characteristic using the example of the human cerebral system – patterns of sensation, emotion, thought, etc. are all contained within the cerebral system, that is made up of billions of individual neurons. However, none of the individual neurons have the characteristics or functions of these emergent patterns - it is the unique interconnection between the neurons that gives emergence to the cerebral system. Henning (2009) notes this concept as non-summativity and colourfully explains its meaning by quoting the famous children’s poem by Carrol:

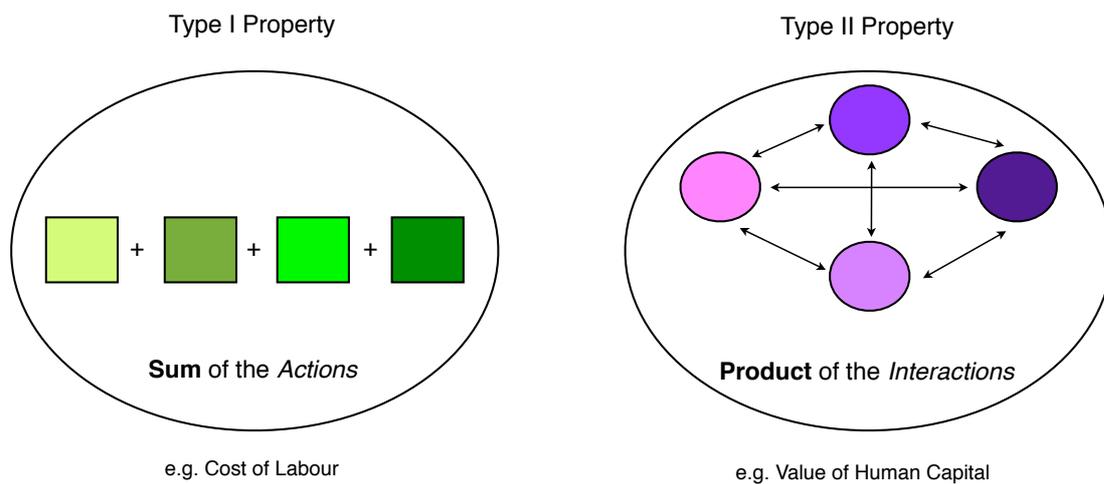
*“Humpty Dumpty sat on a wall:
Humpty Dumpty had a great fall.
All the King’s horses and all the King’s men
Couldn’t put Humpty together again”.*

As the poem shows, non-summativity means that the emergence of things can only happen collectively or in some kind of interaction with other things. Consequently, when the emerged thing is taken apart, it cannot be put back together. Henning (2009) adds that putting the parts back in an attempt to achieve the original whole is similar to attempting to unscramble eggs.

Gharajedaghi (2011) explains that the emergent property cannot be measured, only its manifestation. He uses the examples of emergent properties like love, success, failure and happiness – these phenomena do not fit into the classical description of what a property is, adding that it is impossible for these abstract concepts to be alone in their distinction. They are all products of interactions. Not yielding to any of the five human senses, emergent properties reject analysis or explanation through the uses of analytical tools or causal methods. Figure 9 has been adapted to illustrate what Gharajedaghi (2011) means when differentiating between what is referred to as type I properties, which lean more toward being classical in nature with regard to measurement and analysis, and type II properties, which are emergent in nature. Type I properties are simply measured and analysed as a sum of all the parts

contained in the property. Type II properties reflect synergism or emergent properties and are understood in terms of the interactions between the various parts contained in the property. The emergent property is thus a product of interactions.

Figure 10 Synergism: properties of the whole VS. properties of the parts



Source: Adapted from Gharajedaghi (2011, p. 45)

The author concludes this section by stating that emergent properties are better understood when described as a process of becoming rather than a state of being.

In organisations, we often undervalue or even overlook emergent properties. For example, by using a simple linear equation we are able to calculate the monetary cost of the physical development of a product. However, when it comes to considering the ideas giving birth to that product and coming together at a time when the market is ready for that product, more often than not no value is placed on that emergence brought on by the synchronicity of various people, ideas and market factors. Furthermore, that emergence is explained away as a product of unrelated processes and procedures or as simple coincidence.

3.3.1.5. Open systems are unpredictable

Social dynamics is the mechanism involved in basically all of our day-to-day activities. Built on a level of complexity where analytical methods fail in sense-making, social dynamics is filled

with counterintuitive behaviour. Complexity as a theoretical framework is discussed in the next section. Counterintuitive behaviour is when actions seek to achieve a desired set of outcomes, but in the end the opposite to that which was desired is achieved. A very clear example provided by the author relates to the illegalisation of drugs. Making the sale and use of drugs illegal is done with the good intention of promoting social wellbeing through eliminating the negative influence of drug use. However, these good intentions not only increase the burden on national money coffers, but often birth and sustain a multi-billion-dollar crime industry. In addition to that, drug consumption is higher and criminal justice systems are more burdened than ever.

A few concepts need to be taken into account simultaneously in order to understand the principle of counter-intuitiveness. The first relates to cause and effect, the second to the role of chaos theory and the third to the backdrop of complexity as a departure point for selecting the appropriate methods that may be used to gain insight into phenomena that are embedded with the principles of systems thinking. For example, when encouraging innovative behaviour in an organisational context it may happen that the organisation, fuelled by good intentions, over-formalises the processes of innovation. This action may then have the opposite outcome, making it more difficult for individuals and teams to give innovative emergence to their creative ideas.

Gharajedaghi (2011) makes some assertions around cause and effect, and a concept often misconstrued as implying singular causality. The first is that cause and effect can be separated in time and space. In other words, an event taking place at a given time within a given space can demonstrate a delayed effect, resulting in an impact at a different time and a different place. The second is that the relations between cause and effect are of a circular nature, meaning that one can replace the other one. A third assertion is that any given event can produce multiple effects. These multiple effects have an order of importance that may shift at any time. Finally, removing the initial cause will not necessarily result in the elimination of the accompanying effects. Cause and effect as discussed here by no means imply a singular causality, as this would be in contrast to the researcher's philosophical stance. This idea of multiple causes, creating several outcomes, is expanded on in the next section highlighting multifinality and equifinality.

An important aspect to add to the conversation surrounding cause and effect is that of multifinality and equifinality. Multifinality rejects the classical principles of causal enquiry seeking prediction of future states through the analysis of the initial isolated condition. Multifinality uses various combinations of certainty, chance and choice in looking at the responsibility of future states (Gharajedaghi, 2011). In simple terms multifinality assumes that identical initial conditions can lead to a number of diverse outcomes (Preacher, Wichman, MacCallum, & Briggs, 2011).

Equifinality poses the idea that a number of different stimuli exerted on a system can all lead to the same result (Hanson, 1995). Ultimately equifinality captures the possibility that different paths can lead to the same destination. Of practical importance for the organisational practitioner is that different strategies can be implemented simultaneously in an attempt to reach a desired outcome or solution (Haines, 1998).

3.3.1.6. Equilibrium in open systems

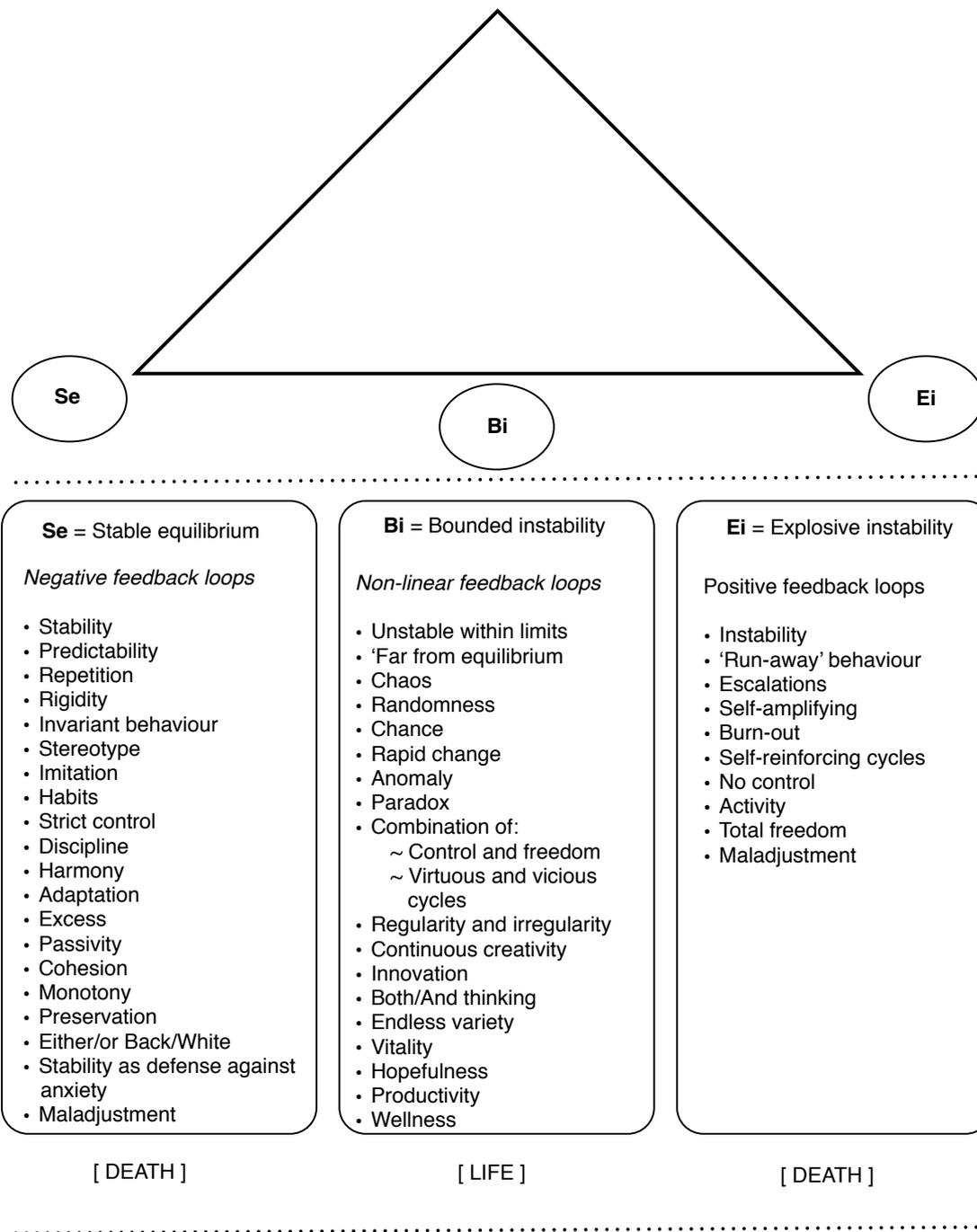
In order for an open system to optimize its ability to self-organise and create new structures and meaning, the system needs to function off balance or far from equilibrium. Closed systems, on the contrary, are constantly moving toward entropy or the death of the system. In organisations or teams closed systems are identifiable as systems where only ideas and information that support and preserve existing policies and procedures, products and leadership are entertained. Anything foreign is not allowed into the system. Systems like these are kept at equilibrium and subsequently lose their ability to adapt to even the tiniest of changes in the environment (Henning, 2014).

Byrne (1998) refers to dissipative systems as systems that function “far from equilibrium” to distinguish them from “near to equilibrium” systems. Near to equilibrium systems are neither entirely static nor totally isolated from the environment; however, these systems essentially pursue equilibrium, also referred to as homeostasis. The system is constantly returning to its neutral or ground state due to the operation of negative feedback loops that, as the author describes, dampen the change within the system.

“Inherently evolutionary” is how Byrne (1998, p. 30) describes systems that operate far from equilibrium. These types of systems are open to change. Change within the system comes from two sources, the first being perturbation that comes from the external relation that the system has with its environment and the second being an internal source of change. Internal fluctuations happen spontaneously and test the boundaries of the system on a continuous basis. These two sources of change can be at play simultaneously. Internal fluctuations happen because of the strength of the internal force or because the internal fluctuation is interacting with the other source of change, the external environment.

Henning (2009) proposes a three state triangle model to illustrate the three dynamic systems that are inherent in all living systems. The author identifies the states as Stable equilibrium, Explosive instability and Bounded instability (see Figure 10). Stable equilibrium (Se) happens when a system is receiving negative feedback loop or change dampening. Se states can be identified by their predictability and mechanisation, repetition of activities and resistance to change. These types of systems are incapable of producing any valuable degree of creativity or innovation. The absence of any variation is the status quo, with no flow of matter between the system and its environment. The author uses the example of an estuary that has been cut off or blocked from the seawater flowing in and out, ending both the movement of the water and the formation of rhythmic patterns. Subsequently the ecosystem can be observed dying.

Figure 11 The Three State Triangle



Source: Henning (2009, p. 81)

As in nature, so too in business Se systems are dead or close to dying. Organisations functioning in a state of stable equilibrium (Se) are identifiable by low-level functioning. With very rigid boundaries, these organisations are basically cut off from all commercial activities with both

current and future customers. The organisation becomes isolated and ceases to evolve, running through the same old leadership and marketing strategies, products and services over and over again with no progress.

Explosive instability (Ei) is found at the opposite end to Se in Figure 11 and also functions in an opposite manner. Ei is a systemic state that is driven by positive feedback loops reinforcing either a “vicious” or a “virtuous” cycle (Henning, 2014, p. 4), due to the fact that positive feedback increases tiny changes. The system functions in the absence of control and in total freedom. A consequence of a system functioning in this state, is that the smallest change in the system can have an enormous impact on the system as a whole. When negative feedback loops are absent and thus unable to offer some kind of counter resistance to the system, a further consequence is that the system becomes explosive. Likening it to a tsunami, the author explains how the initial wave is caused by underwater disturbances, and eventually becomes a runaway mass of destruction. In organisations, systems that are in a state of Ei are characterized by low levels of discipline, a lack or total absence of a clear vision and a culture defined by fragmentation in its actions. Too many interventions are implemented too frequently. When all these various interventions yield no valuable change, the organisation as a system exhausts itself.

The third state of equilibrium is that of Bounded instability (Bi). This is an ideal state for a system to function in, and includes both equilibrium and instability. The system is “bounded”, in other words it is in a state that is “unstable within limits”. The tension that is created by the two contradictory forces (stability and instability) competing for space in the system is precisely what produces Bi.

Henning (2014) concludes her discussion of the three state triangle model by emphasising that the constant oscillation between instability and stability is key for organisations as systems to remain competitive. Stacey et al. (2000) attribute the strategic success of organisations to Bi. Organisations functioning in a state of Bi are organisational systems that are “always at work”. These organisations never settle in a state of balance or equilibrium.

Living systems can at any given time function in any of these three states; however, for a system to get stuck in either Se or Ei is detrimental for the system, almost certainly leading to the death of the system.

3.3.1.7 Open systems are self-organising

Gharajedaghi (2011) notes that self-organisation is not necessarily an act committed consciously. In the majority of instances self-organisation happens automatically through a random process of iteration. Stacey (2003, p. 48) defines self-organising in this context as simply “the processes in which a system chooses a path at a bifurcation point as a result of individual variability, or fluctuations”. The bifurcation point is the point at which disturbance in a system has reached the point where the system is destabilized and can no longer remain the way it currently is (Wheatley, 2011).

When self-organisation occurs by default it is usually through the use of implicit cultural codes, and thus should reflect the patterns that are produced by the torus attractor. When the process of self-organisation redesigns patterns, this is reflective of a strange attractor at work (Gharajedaghi, 2011). (See section 3.3.3 on attractors.)

Wheatley (2011) interestingly notes the paradox present in self-organisation, which she states is in the partnered presence of freedom and order. The author continues to explain that effective self-organisation enjoys the support of two key elements. The first is a clear sense of systems identity, or a collective purpose that dictates to an extent the decisions made by agents or actors, while at the same time allowing for the second key element, a measure of freedom for actors in their decision-making. The active presence of these two key elements results in larger coherence and strength within the system. Stacey et al. (2000) also use the word paradox when explaining the self-organising aspect of Prigogine’s dissipative structures (see section 3.3.2), saying that essentially patterns need to lose their uniformity or symmetry in order to be able to create new patterns or structures.

According to Nicolis and Prigogine (1981), when attempting to model in any way the behaviour of complex objects, as is the case with the variables associated with human capital and

innovation behaviour, the phenomenon of breaking symmetrical patterns is of particular interest. For it is in the breaking of these symmetrical patterns, far from equilibrium and order, that bifurcation happens and a new order is born. Thus, new structure is built from disorder. Self-organising is often clearly observed during the new formation of, or changes to, teams or departments in organisations. Without direct supervisory instruction, the members in the team or department organise themselves into roles and responsibilities in order to continue functioning.

3.3.2 Putting systems theory to work

Merali and Allen (2011) concur that it was the increased application of systems thinking that led to the corrosion of Newtonian paradigms in the field of organisational management. Initial exploration away from machine-like practices governed by deterministic laws was focused on organisational design and problem solving that could be structured and controlled by certain management interventions. The first part of the twentieth century saw the rise of Cybernetics, a movement aimed at controlling and coordinating mechanisms for machines, organisms and the design of organisations. Coined by Norbet Weiner during the Second World War, the term cybernetics was defined as “a new science of control and communication in animal and machine”. A valuable contribution made by the exploration of Cybernetics was in the conceptualizing of feedback loops which in turn eventually led to a more profound understanding of systems theory. Later on, organisational theorising shifted away from a forced organisational design practice to a more organic engagement with concepts such as self-organisation, emergence adaptation and interdependence as ways of attempting to explain the unintended and unexpected consequences of implemented management interventions. Ilya Prigogine, considered a pioneer in the area of systems theory, demonstrated with his colleagues in the 1960s how the energy inputted into an open system that operates far from equilibrium with many interacting components produces order of a higher level.

Prigogine's dissipative structures

Through the observation of dynamic patterns of change, Prigogine and co. (Stacey et al., 2000) formalised them as dissipative structures – “the most general expressions of deterministic chaos found in nature” (Byrne, 1998, p. 30). A dissipative structure or system works as follows: the system is held far from equilibrium due to particular constraints present in the environment. In this state, tiny fluctuations are amplified, breaking the symmetry of the entities that make up the system. This continues until the system reaches a bifurcation point - that is a point of instability in the system - where the system is presented with possibilities and opportunities for developing in new ways and directions. The entire composition of entities within the system spontaneously self-organises at the point of bifurcation. In doing so the whole chooses a different pathway, producing the sudden emergence of a new coherent pattern in the absence of any form or blueprint. This pattern is what Prigogine calls the dissipative structure – a structure that dissipates energy or information that is imported from its environment, so as to continuously renew itself. Temporary stable states are frequently interrupted with evolving interactive processes, giving rise to new forms of ununiformed patterns (Stacey et al., 2000). Byrne (1998) refers to Prigogine's dissipative system as “capable of evolutionary behaviour” (p. 30).

According to Stacey et al. (2000), the dynamic of dissipative structures has significant consequences for organisational management. Referring specifically to the nature of control, the aforementioned authors emphasise that “change at the edge of chaos is controlled by the very nature of the dynamic, making it unnecessary, as well as impossible, for individuals to take control”. In general management discourse this notion of control can be very difficult to accept. Management, as it is understood at a superficial level, is all about control in order to achieve survival. The ability to shift the focus in organisational management from individuals being “in control” to understanding control as a general characteristic of the system's dynamic and embracing periodic destruction of parts of the system, generates significant implications to be considered in the theory and practice in the management and organisational areas.

The understanding of the consequences of actions - both short and long term - demands from the systems thinker thorough consideration of the phenomenon in its totality and the creation

of a dynamic model capable of simulating the non-linear nature of a system and capturing the interactions among the variables. It can again be reiterated that this approach is distinctively different from conventional simple correlation (Pidd, 2004).

Instead of seeking to reduce the chaotic nature embedded in all interacting phenomena, researchers and practitioners taking a philosophical stance based on the principles discussed above, embrace the unconventional principles and research practices that endeavour to understand phenomena in their chaotic totality.

In organisational settings, embracing the chaotic nature of things adds to the ability of the organisation to adapt to unexpected changes inside and outside of the organisational system. Resisting, and attempting to reduce, the chaos and complexity embedded in everyday organisational life often leads to prolonged tedious lead times, the inability to respond timeously to market demands and many more unproductive organisational outcomes.

3.3.3 Chaos theory

Non-linear relationships and the changing nature of things are phenomena that simply cannot be forced into simple linear discourses and equations derived from singular, isolated causes and seeking a consequent effect (Byrne, 1998). Simple deterministic equations sometimes produce a variety of complex behaviours. The opposite is also true: complex chaotic behaviour has the ability to unexpectedly produce ordered structures and interesting patterns. Siemens (2014) defines chaos as “the breakdown of predictability, evidenced in complicated arrangements that initially defy order” (p. 4). Capra (1997) notes that in Chaos theory, the “chaos” relates to behaviour that is random, but also behaviour that demonstrates a “deeper level of patterned order” (p. 122). Byrne (1998) concurs, placing chaos theory not as the “antithesis” to order, but as the “precursor of order” (p. 5).

Social contexts house unpredictable and non-linear systems, and Gharajedaghi (2011) advocates chaos theory as an interesting alternative to gain insight into this type of phenomenon. The author states that chaos theory, which was developed and advanced by scholars from diverse disciplines, deals with the dynamics of complex phenomena. He goes on

to discuss the acknowledgement of iteration within the theory of chaos as the essence of holistic approaches and an important dynamic for the discovery of complex patterns within systems. Chaos theory states that patterns within nature are determined by so-called attractors. One such attractor is a strange attractor. Gharajedaghi (2011) explains that strange attractors are multifinal, self-organising and purposeful in nature. The characteristics of an attractor is reflective of collective choices in socio cultural systems.

The iteration in the organising around attractors is what creates the possibility for order to emerge from chaos. Looking at nature, we find that said iteration happens automatically. When it comes to social beings, however, systems can by choice return to neutral and start a new iteration.

The explanation of the strange attractor is directly related to the discussion on the characteristics of the concept of self-organisation. Not only self-organisation but also holism, openness, emergence, interdependence, multi-dimensionality and non-linearity are some of the concepts that run through the literature covering the paradigms and stances of systems theory, chaos theory, complexity and complex adaptive systems. Although these paradigms can be discussed separately, it becomes clear in theorising and exploring their application that they not only represent the interrelatedness of all phenomena but also are in themselves related to one another.

This study's philosophical exploration thus far has highlighted key elements and principles of a stance that allows for the exploration of phenomena that are characterized by holistic observation of non-linearity, interconnectedness and pattern formation within open systems.

It is the scientific study of these types of open systems, as discussed in previous sections of this chapter, that laid the foundation for the science of complexity (Merali & Allen, 2011). Complexity as it has evolved is briefly discussed in the following section.

3.4 Complexity theory

The complexity paradigm addresses the “science of evolutionary change, adaptation and self-transformation” (Merali & Allen, 2011, p. 43). Complexity is a strand of thinking that has developed parallel to that of chaos theory (Byrne, 1998), and is also more technically known as non-linear dynamics. Complexity theory differs from a positivistic stance in that it finds no benefit in seeking the new solely in the old. Complexity theory is seen as a transdisciplinary discipline, as it merges the scientific and philosophical disciplines and refuses to “parcel” problems within disciplines. Rather than simply differentiating objects of knowledge, complexity finds the connection between them. Complexity involves, amongst others, concepts such as uncertainty, and discards the notion that there is something like total and absolute knowledge. Another idea entertained by complexity is that of contradiction or elements of antipathy between concepts. This shift in paradigm might not be welcomed by all practising managers who still use traditional methods in the sense-making of their surroundings, as it assumes that organisations are complex systems (Browaeys & Baets, 2003). The authors quote Genelot (1998), who states that complexity is a significant challenge of our time, and goes on to define it as “what escapes us, what we have difficulty with to understand and to control”.

In their paper investigating the theory of complexity and its implications for leadership, Schneider and Somers (2006) mention three interrelated building blocks that make up the theory, namely, non-linear dynamics, chaos theory and adaptation and evolution. As already discussed in previous sections on theories related to systems and chaos, many sciences consider non-linear, dynamic systems embedded in chaos theory as the foundations for their explorations. Awareness of the relevance of complexity now also enjoys increased attention in various other disciplines including psychology, sociology, economics, political science and organisational theory.

At a scientific level complexity scientists concern themselves with complex, seemingly disorderly and often turbulent systems in nature (Stacey, 2003). Work in the field of organisational and management studies has accelerated in recent decades, in keeping with

this paradigm that challenges classical disciplinary assumptions and boundaries that force linear thinking and analysis.

Rejecting the validity of purely analytical approaches is, according to Byrne (1998), one of the most important aspects of complexity theory. The author notes the importance of starting one's exploration in a holistic manner when dealing with emergent properties. The presence of emergent properties is characteristic of realities where changes do not occur in a linear way. It has to be acknowledged that there is a significantly large set of systems which exhibit this character, organisations included.

3.5 Synthesizing theory towards an organisational application: Complex adaptive systems

A key characteristic of contemporary business problems is that they involve numerous aspects that adapt and learn as they interact; this amongst other characteristics makes them complex adaptive systems. Complex adaptive systems refer to systems that are made up of a large number of components. These components are often referred to as agents. Agents interact and consequently adapt and learn (Holland, 2006). Interactions among agents are governed by a set of rules. Through adapting to one another and the rules an emergent order is created. Instead of seeking complex outcomes from simple causes, complex adaptive systems theory is preoccupied with the emergence of simplicity from complex interactions (Thietart & Forgues, 2011). A complex adaptive system has unique non-linear, self-organising capabilities (Mendenhall, Macomber, & Cutright, 2000). Capra (1996) describes this capability as "the entire network continually 'makes itself'" (p. 98).

Theorists and writers have in significant numbers attempted to explore theories and concepts related to complex adaptive systems. These stem from seminal contributions made by Jantsch, Pirgogine and Stengers, Maturana and Varela, Gell-Mann and Holland, and extend to modern and popular authors and academics like Wheatley, Stacey, Baets, Capra and Bateson.

The complexity paradigm is described as "systematic inquiry to build fuzzy, multivalent, multi-level and multi-disciplinary representations of reality. Systems can be understood by looking

for patterns within their complexity, patterns that describe potential evolutions of the system” (Dooley, 1996, p. 2). Levin (2002) defines the study of CAS as “a study of the interplay among processes operating at diverse scales of space, time and organizational complexity”(p. 3), with an understanding of the interrelationships between processes, patterns and forces that create the system as key to the study. Thietart and Forgues (2011) refer to exactly this research capability when discussing the discovery of a “hidden process” (p. 56) within the set of rules, interaction of agents and random events embedded in the dynamics of a system. This is something that purely classical business theorising does not allow for.

Encouraging innovative behaviour in dynamic systems is one of the contemporary business problems shown by the literature that is bound with complex adaptive systems (Holland, 2006), making it an applicable epistemology for addressing the research problem in this study.

3.6 Systems evolutions: Natural selection favours the resilient, not the stable

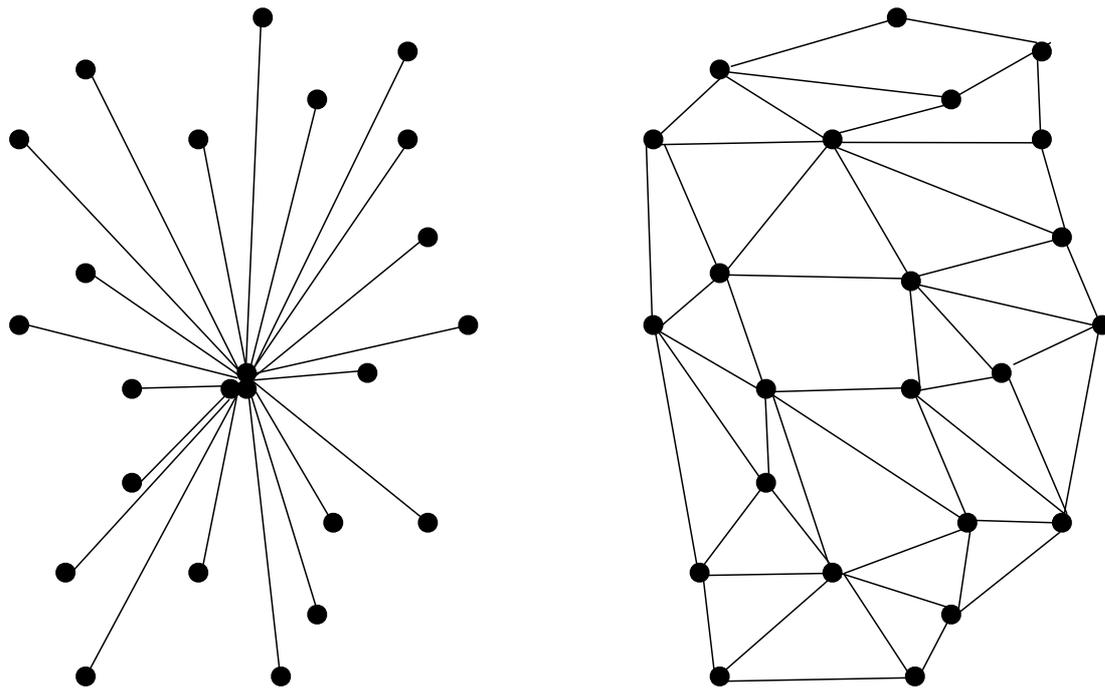
Theorising in the field of complex adaptive systems theory lends additional insight into the concept of far from equilibrium states embedded as key component of living open systems. That is, complex adaptive systems theory accepts that the evolution of a system depends not on the stability of the system, but on the resilience of the system. Stability is counter related to integration. The successful pursuit of greater resilience lies in the interrelatedness of the components of a complex dynamic system which are embedded in their environment through feedback loops. Systems become resilient when they are capable of adapting to ensure the survival of their overall organisations. Adaptability in this sense stems from flexibility, agility, and the system’s willingness and capability to modify its structure (Juarrero, 2011).

Complex systems are found to be more resilient than simple systems. The aforementioned author notes that complex open systems in constant interaction with their environment make the most resilient of systems. The resilience of the systems is increased even more when interacting components are rich in variety and abundant in the number of couplings within the system.

The idea of resilience embedded in complex adaptive systems theory has significant implications for managers as organisational practitioners. The manager needs to prepare and organise the organisational system in a manner that allows for agility and self-organising when faced with a crisis situation or a new opportunity. Adopting resilience as a goal requires from the organisational leader to trade his or her role as “clockmaker” for that of “catalyst” (p. 163). Juarrero (2011) concludes the topic of resilience by using as example the global financial crisis that started in 2007. By 2008 organisations and institutions that were built on solid structure rather than resilience were brought to their knees by their inability to adapt to the accompanying levels of change and uncertainty, many of them dying.

Azadegan and Dooley (2011) propose another practical application of system resilience in the area of operations management. The authors investigate the lowered risk associated with changing a centralised operations distribution structure to a decentralised one. Figure 10 shows how when all the elements associated with the distribution of the organisation are linked to a central point, any change or disruption to that central point will be detrimental to the entire structure. Redesigning the system to one that reflects a distributed network, one can observe all the elements of resilience as put forth by Juarrero (2011), namely interaction of a variety of components linked through a multitude of couplings. Change or disruption in one of the components will not necessarily negatively impact the entire system at once. Thus, the network type structure makes for a system that is agile, flexible and able to easily modify its structure.

Figure 12 Centralized and distributed networks



Source: Azadegan & Dooley (2011, p. 422)

3.7 When humans are the agents in a complex adaptive system

Complex adaptive systems can be characterized as networks of agents. In these networks of agents, control is vastly dispersed and there is simultaneous competition and co-operation amongst agents (Holland, 1995). These agent-comprising networks can be clearly observed in organisations. Within the different levels of the organisation, systems constantly revise and rearrange the elements that make up the system. Agents that take part in creating the system, anticipate the future system using their actions and interactions to possibly leverage from it (Pidd, 2004).

Attempting to make sense of complex, living open systems in organisations requires pairing the lens provided by natural complexity sciences with a lens from some theory of human consciousness. Stacey and Griffin (2005) note that the sole application of complex adaptive systems theory, with its source in complexity science, to areas involving humans, such as organisations, is limited. Humans as agents are different to agents in general complex adaptive simulations as they are “conscious, self-conscious, reflective, often spontaneous and capable of making choices”. Thus, the interpretation of the system should happen through human

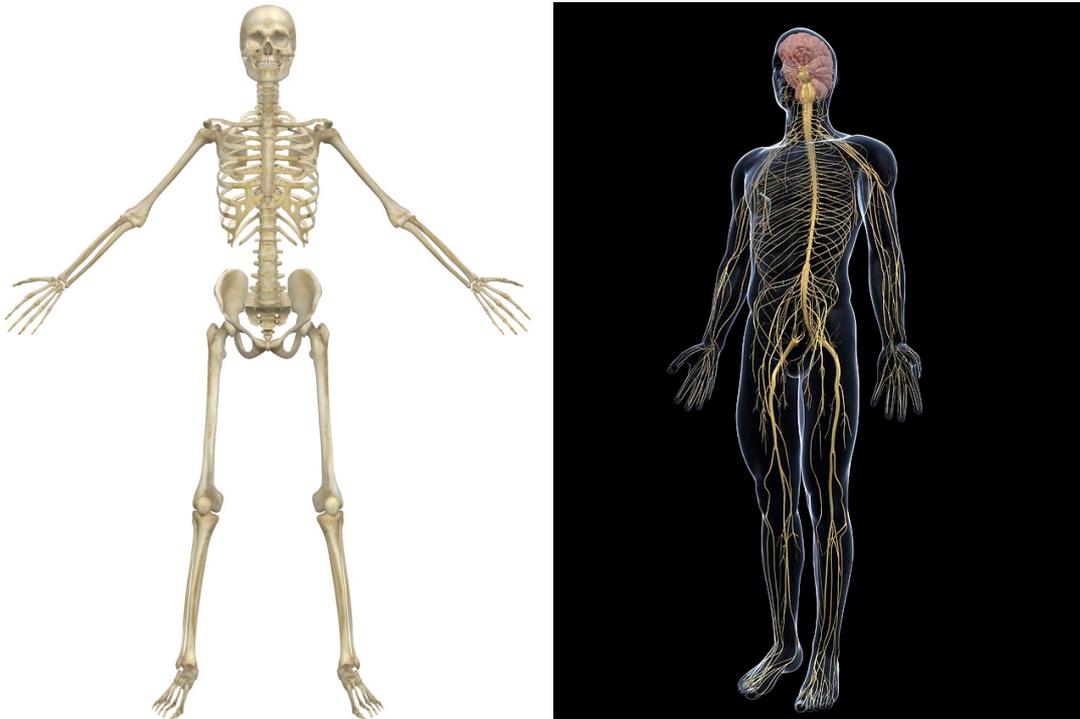
theories involving these human consciousness aspects. The authors add that the discipline of social sciences has long explored the concepts of particularly self-organisation and emergence, making it a long-standing, inter-disciplinary fit. Taking this into account, the results of this particular project will be interpreted from a complexity perspective, partnered with the theory of work psychology as explored in Chapter 2.

3.8 Preliminary conceptual framework: A corporate entrepreneurial nervous system

The literature proposes certain considerations the researcher needs to make when deciding on the construction of a model versus a framework from which to understand the phenomenon under investigation. In order to build a simulation model, the researcher needs to have prior understanding of how the entities within the system interact and change to produce the behaviour of the system being simulated (Pidd, 2004). This is evidential of the typical existing models explaining corporate entrepreneurship, as discussed in Chapter 2. Moving towards a complexity paradigm, it is the aim of this project to understand the phenomenon of corporate entrepreneurship within organisations as a non-linear, dynamic and emergent phenomenon. In attempting to discover the “hidden process” as referred to by Thietart and Forgues (2011, p. 56), the researcher might be better served in pursuing a structure that reflects characteristics that show more flexibility, agility and adaptability and are less rigid and prone to “boxes and arrows” models. Taking this into account, a framework will be better suited to accommodate the specific research objectives of this project. Pidd (2004) clarifies that a framework retains some structure while allowing for the flexibility of application within various contexts and containing different entities or agents. The framework allows for insightful understanding of the complex context, and from there a model suited to the unique context could be constructed.

Figure 13 depicts a comparison between the human skeletal structure and the human nervous system.

Figure 13 The human skeletal structure and nervous systems



Sources: Interactive Biology and Ancestral Movement

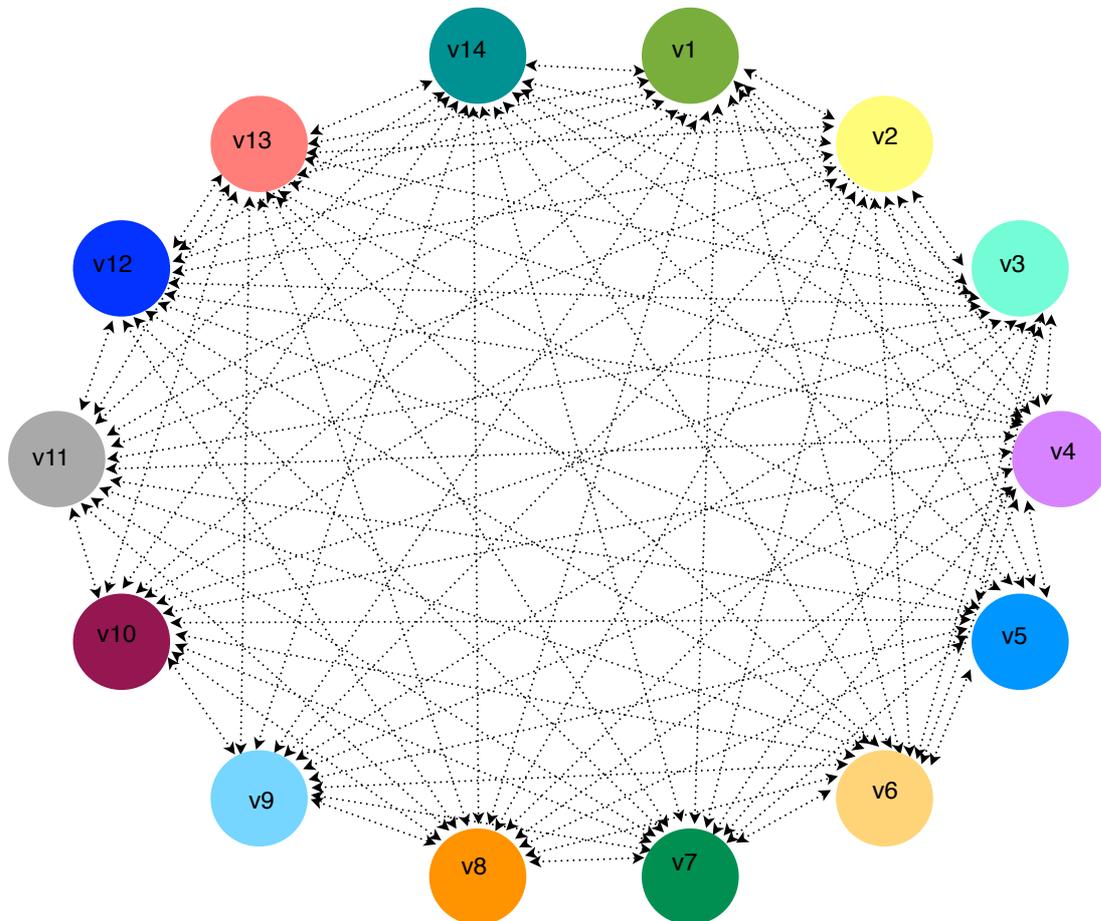
The skeletal structure allows for controlled movement and every part (bone) is connected to a limited number of other bones. In other words, each bone experiences sensations in isolation – e.g. the knee-bones cannot feel that the wrist-bones are broken. Models are similar: each part of the model is only connected to a limited pre-set number of other parts. Experiences or sensations moving through the model have to follow a predetermined set path. Deviation distorts the models, while any form of unpredictability or change could even break the model. Should a part of the skeleton break, outside intervention is needed to fix it – healing requires a cast or even possibly surgery. This is symbolic of what happens when a part of a linear model breaks.

The nervous system, on the other hand, is a flexible and interconnected structure. Every part of the system is somehow connected to every other part. Applying pressure to a nerve point in the foot, could alleviate pain in the head. A small injury to a certain part of the brain could result in the inability to walk or talk. The nervous system exhibits many of the same characteristics as those embedded in complexity theory and complex adaptive systems theory,

such as interconnectedness, openness, self-organisation and emergent properties stemming from the dynamic negotiation of equilibrium.

Taking into account the themes, principles and concepts of an Interpretivist complex ontology and accompanying complex adaptive systems, the preliminary conceptual framework as set out in Figure 14 is proposed:

Figure 14 Preliminary conceptual framework for mapping the emergence of corporate entrepreneurship



A review of the literature on the topic of corporate entrepreneurship (refer to chapter 2), indicates that generally, research on the topic has for the most part resorted to linear models that are determined by classical causal methods, reflecting a strictly positivistic research view. Furthermore, research in this area is more often than not done for the sole purpose of prediction, at the expense of deeper insight and understanding.

Attempting to understand a dynamic, non-linear phenomenon such as corporate entrepreneurship requires the utilisation of an equally dynamic and non-linear research lens. Another consideration for the researcher is the role of the uniqueness of context. When

corporate entrepreneurship happens, it happens within existing organisations. The literature reviewed in this chapter confirms the organisation as a complex adaptive system. An understanding of complex adaptive systems is driven by certain themes, concepts and principles originating from complexity theory, chaos theory and systems theory, as has been set out in this chapter.

The proposed preliminary conceptual framework as presented in Figure 14 takes into account the considerations uncovered by the gap presented in the current literature (i.e. a non-linear understanding of the phenomenon of corporate entrepreneurship within the organisational context), and the guidance provided by the chosen ontological and epistemological stances discussed as the theoretical paradigm in this chapter.

As already stated it is presented as a framework, in order to allow for both an unforced emergence of deeper understanding of the phenomenon of corporate entrepreneurship and flexibility in application when considering changes in contexts, variables or actors/agents.

At this stage of the project it is important to construct the preliminary conceptual framework in line with the criteria provided by the chosen theoretical framework.

The framework is intended to resemble a complex adaptive system within which certain elements are present and interact through actors and agents, in order to manifest some kind of emergence of a phenomenon - in other words, "how" the phenomenon emerges within that context.

The complex adaptive system is the organisation. Agents within the system are representative of the employees of the organisation. Conditions within the system are represented by the interconnectedness of the practices that govern the behaviour and interactions of the agents in the system. Adhering to the principle of self-organising, the interconnected nature of interactions is expected to emerge some kind of synergistic phenomenon, in this case innovation behaviour and eventual corporate entrepreneurship. The strength or weakness of this emergence of corporate entrepreneurship is a consequence of the unique interconnections within the system.

The criteria provided by the chosen theoretical stance have certain implications for the conceptual framework. The first implication is that all variables should enjoy the freedom to interact with all other variables, thus the framework needs to be tolerant of non-linearity. This is in direct contrast with classical methods that group variables into either dependent or independent in an effort to find causal relationships between the two groups. The second implication is that the framework needs to allow for the spontaneous formation of patterns, i.e. the emergence of new systemic properties; this directly relates to the concepts of self-organisation and feedback loops embedded in the theoretical stance. Thirdly, the model should be open to interacting with the environment in which it finds itself, thus rigid framework boundaries are not ideal.

The current version of the framework represents the 14 variables identified by the literature review for inclusion in the first phase of the study, which relates to the quantitative part of the study. The methodology involved in Phase 1 of the research fieldwork will be detailed in the next chapter.

It is important to note that the conceptual framework is at this stage considered preliminary, and in accordance with the theoretical stance of this research project, allows for changes to be made to the framework as “hidden patterns/processes” emerge.

The next chapter discusses the chosen research methodology that supports the theoretical stance as set out in this chapter.

Chapter 4

Research methodology: Steps to a non-linear model of Corporate Entrepreneurship

The aim of this chapter is to present the methodological steps the researcher followed towards the conceptualisation of a non-linear framework for the emergence of corporate entrepreneurship. Details pertaining to the two-phase mixed method research design, the population and sample framework of each of the two phases, as well as the data collection method, will be discussed. Kohonen's Self-Organising Maps as the quantitative method of data analysis, and thematic content analysis as the qualitative method of analysis, will be presented. Finally, the ethical considerations pertaining to the study will be addressed.

4.1 Introduction

The theoretical foundation set out in the previous chapter shaped the research methods selected to address the research objectives of this study. As outlined in Chapter 1, this study aims to explore the emergence of corporate entrepreneurship through individual innovative behaviour within human capital and other organisational practices, using alternative methods to the more frequently used classical methods. More specifically, the research objectives of the study are restated below:

Theoretical objectives

TO₁: to describe the relevant concepts of complexity theory as they pertain to this study

TO₂: to describe the relevant concepts of corporate entrepreneurship as they pertain to this study

TO₃: to describe the relevant concepts of strategic human capital and organisational practices as they pertain to this study

TO₄: to map a preliminary non-linear conceptual framework for corporate entrepreneurship based on the identified concepts

Empirical objectives

EO₁: to explore the emergence of individual innovative behaviour by using Kohonen's Self-Organising Maps as an Artificial neural network method of analysis on an existing data set

EO₂: to determine the practical applicability of Artificial neural network Self-Organising Maps as a method of interpreting the contextual emergence of innovative behaviour

EO₃: to determine the face validity of the preliminary conceptual framework as perceived by subject matter experts in corporate entrepreneurship through a qualitative research approach

EO₄: to construct the final non-linear conceptual framework for corporate entrepreneurship

(Gray, 2017) defines research methodology as "approaches to systematic inquiry developed within a particular paradigm with associated epistemological assumptions" (p. 780). The approach encompasses methods, techniques, tools and procedures used in the research process (Babbie et al., 1998).

Classical business research methods will not contribute to addressing the specific research problems posed by this study, nor will they complement the theoretical framework of the study, as these methods are founded in causality and precise prediction. For the study to fulfil its promise of looking for emergence within a holistic context, the researcher needs to employ an alternative method that would accommodate these specific characteristics within the observed phenomenon.

4.2 Research design

This section maps out the steps in the research process followed in this study. The research design serves as a blueprint for the achievement of the research objectives and the answering of the research questions (Cooper & Schindler, 2014). The choice of research design, according to Bryman and Bell (2011), should reflect the priorities in the required dimensions of the research - in this case non-linearity and emergence.

4.2.1 Research design that allows for non-linearity and emergence

This study is bound in an epistemology of complex adaptive systems theory. Complex adaptive systems theory allows for the observation complexity in emergence of variables within a non-linear process. The first portion of data was gathered through a quantitative survey questionnaire and analysed by means of quantitative software packages for sample and data descriptive output purposes. The second portion of the data collection and interpretation was qualitative in nature. Qualitative data was gathered through semi-structured interviews with subject matter experts and analysed interpretations of the quantitative results for emerging themes.

Bryman (2012) states that combining research methods in accordance with the ontology and epistemology is done with the aim of providing a more comprehensive account of both the structure and the process involved in the phenomenon under investigation. Another reason for combining research methods is to use the qualitative inquiry to explain the findings of the quantitative results. Creswell (2009) hails mixed methods as a step forward in the evolution of both social and health sciences research, as problems in these areas are complex and inadequately addressed through the sole use of one method. Finally, one method of honouring the research trend of triangulation is through the application of more than one research method. More information about triangulation is presented in section 4.2.1.2.

There are various ways to design research in order to bring quantitative and qualitative methods together (Flick, 2014). Creswell and Plano Clark (2018) suggest that due to the complexity involved in designing mixed method research, each research design manifests

some form of uniqueness. This study, in particular, follows a sequential explanatory mixed method design, as explained in the next section.

4.2.1.1 Sequential explanatory mixed method design

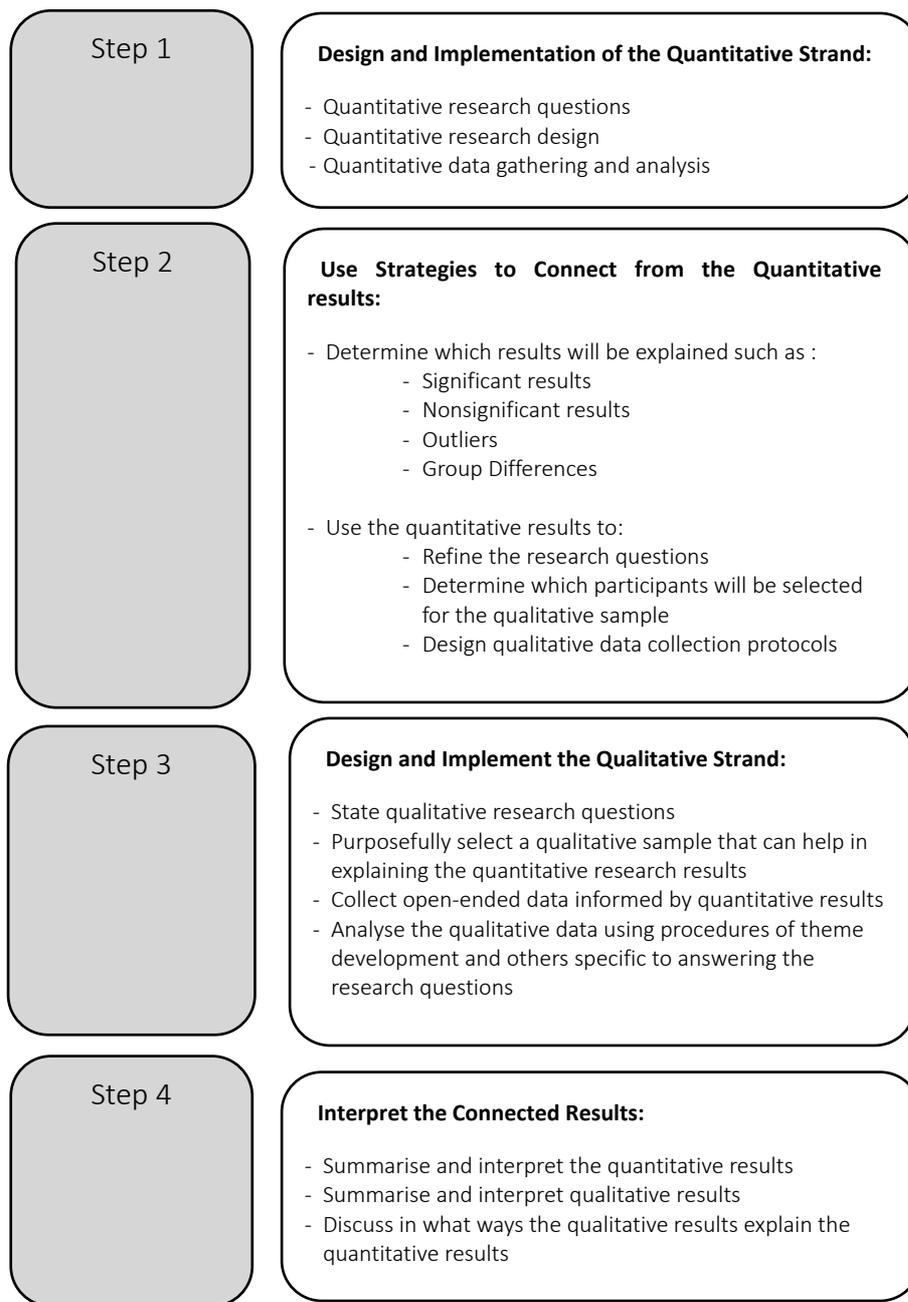
The research process was conducted in two phases where one occurred sequentially to the other. Sequential explanatory mixed method design is defined by Creswell and Plano Clark (2011) as a mixed method research design starting with a quantitative phase. The particulars contained in the quantitative results were followed up with a second phase of research that was qualitative in nature. The purpose of the second phase, i.e. qualitative inquiry, was to add depth to the interpretation of the quantitative results. A sequential explanatory mixed method allows the researcher to discover patterns, trends or inclinations as well as interesting relationships within the quantitative data, and also provides the opportunity to discover possible mechanisms or reasons for the resultant patterns, inclinations or relationships.

Creswell and Plano Clark (2011) justify the pursuit of a sequential explanatory method on the following grounds:

- The researcher is familiar with the variables and has access to existing quantitative instruments.
- The researcher, or the research problem, leans more towards the quantitative side. The authors explain that this research design tends to appeal to quantitative researchers, as the research process often commences with a quantitative foundation.
- Data gathering, analysis and reporting are simple and structured. Gathering of data happens in two separate phases, as does the analysis thereof. The authors propose that data results should also be recorded in two phases. Thus, documenting the results for the researchers is straightforward and delineation for the reader is clear.

Creswell and Plano Clark (2018) advocate the sequential explanatory mixed method design type as one of the simplest of types, and provide procedural steps that could be included as part of the design, as shown in Figure 15.

Figure 15 Basic procedures for implementing a Sequential Explanatory Mixed Method Design



Source: Adapted from Creswell & Plano Clark (2018, p. 79)

The steps as set out above were used as the basic structure of the sequential explanatory mixed method design implemented in this study. The originators of the above structure add that this type of mixed method design is well suited to achieving the research goal of triangulation.

4.2.1.2 War of the research approaches: Triangulation – the peacemaker

For as long as academics have been doing research, they have been debating passionately the value, significance and relevance of quantitative vs. qualitative research. Qualitative and quantitative research methods both follow mostly well established and intensely specialized methodologies. Methodologies in these two paradigms have managed to find little common ground other than that in both camps, new knowledge is sourced from experience generated through the human senses (Scarborough & Somers, 2006). Creswell (2009) is well known in the literature for advocating the combining of the two schools of research methods.

In cases where researchers follow only one method, any unexpected, provocative or atypical results are countered by conducting additional research while using a similar methodology. In the quantitative camp, we find deeper inquiry in the form of high-level post-hoc analysis, often in an effort to explain growing variances. In the same instance qualitative researchers resort to further exploring additional field data and alternative insights (Scarborough & Somers, 2006). Mixed method research design allows the researcher multiple ways of looking at research problems (Creswell & Plano Clark, 2018).

Rather than being forced to wear only one research method hat, researchers should embrace mixed methods as a progressive action in the research evolution, optimizing the strengths of both qualitative and quantitative approaches (Creswell, 2009).

Scarborough and Somers (2006) state that despite the increased calls for better integration of research methods or so-called “triangulation”, very little action has emerged. Coviello (2015, p. 19) agrees, but offers some hope in stating that there is a movement in the research toward more “sophisticated forms” of mixed method research. According to the author, mixed methods have the potential to provide “richer, sharper bi-focal” understanding. In line with this suggestion for sophisticated mixed methods, Scarborough and Somers (2006) propose the use of analysis based on Artificial neural networks as a good solution for increased integration of quantitative and qualitative methods, adding to the eventual value of research output. According to these authors, the use of Artificial neural networks encourages quantitative researchers to integrate their thinking with that of qualitative researchers. This integration is

manifested in that the researcher interprets the quantitative output through the exploration of prior knowledge, theory and the qualitative interpretation of the results in order to conclude what makes sense in the analysed system and what does not.

Triangulation refers to the use by researchers of more than one research strategy. Research strategies have different strengths and weaknesses, and in employing multiple research strategies the researcher, according to Esterberg (2002), builds the strongest research designs. Triangulation can take shape according to paradigms, methodologies, researchers and so on. Triangulation is said to counter to an extent the personal bias that is often the effect of employing a single methodology (Babbie et al., 1998). Aforementioned authors add that, generally, triangulation is considered to be one of the best methods to enhance validity and reliability.

Scarborough and Somers (2006) address the issue of inflection in data outputs, stating that this can be a particular challenge in results that are non-linear in nature. Inflection in this regard is presented by the authors as an instance where small changes in an input variable cause the emergence of large changes in the criterion. This is, of course, also true to the characteristics of complex phenomena.

In this particular research study the qualitative phase (explained as Phase 2) of the research happens sequentially to the quantitative phase (explained as Phase 1), and is used as a method of interpreting and gaining insight into the dimensional emergence of the different variables within the cluster networks. This action on the one hand serves as the triangulator, and on the other hand feeds the qualitative insight back into the quantitative results, honouring the non-linearity embedded in both the phenomenon under study (individual innovative behaviour and corporate entrepreneurship) and the paradigm and process used to study the phenomenon (complex adaptive systems theory).

Particulars regarding the methods of analysis followed in the two phases of the research are explained in the next sections.

4.3 Phase 1 – Self-Organising Maps: A quantitative inquiry

Self-Organising Maps is a type of Artificial neural network, and is discussed in this section as the selected quantitative method of analysis for this study.

4.3.1 An intelligent information processing method that observes both coherence and outliers

Self-organising maps (SOM) is a type of Artificial neural network (ANN). Teuvo Kohonen is famous for formalizing the SOMs as an application of ANNs. Kohonen poses a strong idea through his proposed method of analysis that relates directly to the research aim of this study. He asks whether researchers should not become more focused on understanding modern-day research problems by putting them into perspective with the nature of natural emergence, instead of constantly seeking causality and unattainable prediction. Happily marrying robust rowed and columned data sheets with an appropriate method of analysis under a non-linear, dynamic and complex lens can prove to be a difficult task, but an interesting task nonetheless, and one that can be accommodated by SOMs.

Kohonen (1997) looks at intelligent information processing, and explains that it finds its purpose in “the creation of simplified images of the observable world at various levels of abstraction in relation to a particular subset of received data” (p. 79). He uses the metaphor of the human brain to illustrate what is meant by intelligent information processing. The basic topography of the brain can easily be explained as various neural connections. In theory, the axon of the neural cell grows towards a connection destination guided by certain chemical markers. Seems simple enough? However, these connections are not always one-on-one connections, and can actually become very complex. Within the signal transmission paths of the brain we find processing stations referred to as nuclei where signals are mixed. In some brain maps the aforementioned structure becomes even more abstract allowing for sense-making at various levels of abstraction of multiple, continuous, complex information and sensory inputs.

Researchers in various disciplines have, for decades, been obsessed with understanding human brain processes in an attempt to construct intelligent machinery, or artificial intelligence that has the capability of dealing with complexity (Brighton & Selina, 2003). Research and development within the area of artificial intelligence has produced chess playing computers, robotic hotel staff and even self-driving cars.

One of the advancements made in the study of artificial intelligence is the development of Artificial neural networks (Singh, 2017). Non-linear computational elements, referred to as *nodes*, are what constitute an ANN. By means of linkages, nodes are densely interconnected. The purpose of the nodes is to receive one or more input values, and through transformation, combine the input values in an output value (Venugopal & Baets, 1994). Aforementioned authors state that the true value of ANN comes when individual neurons are joined in networks. ANNs are able to present data propagation through multiple layers of neurons interacting with one another. Different ANN models have distinct characteristics and applicabilities classified according to the following properties:

- the network topology* – the structure of the network
- the network computational property* – how and what the network is able to compute
- the network learning or training property* – how and what the network learns

The “learning” of a network as referred to above happens in one of two ways (Venugopal & Baets, 1994):

Supervised learning occurs when each input is paired with a target value that represents the researcher’s desired output and information regarding errors is provided to the programme.

Unsupervised learning sees the training set consisting of input vector only. In unsupervised networks the outcome or output is not paired to an input, but determined by the training process of the network. Suited to the purpose of this study, unsupervised learning networks allow for the construction of internal models that capture pattern formation and self-organisation within the network being analysed.

Deep learning is one of the many positive developments in technology made possible by ANNs. Singh (2017) refers to deep learning when describing the area of artificial intelligence that has been inspired by the structure of, and processes in, the human brain, the aim being to equip

machines with an instinctive ability for making sense of the physical world. Systems designed as a product of deep learning do not need specific algorithms in order to make sense of data for themselves. As with the human brain, these deep learning machines learn and become smarter in essence due to their experience. The author refers to the smartphone voice assistants, “Siri” (iPhone) and “Alexa” (Samsung) as an example of products inspired by deep learning. Some of these learning machines are now as competent as humans at voice and object recognition. Every time the device is used it becomes “smarter” with regard to the needs of the user.

An Artificial neural network can be described, in the simplest form, as a computer programme that has been designed to learn in a similar way to that of the human brain. Kohonen (1997) talks about seeking “intelligent information processing” (p. 79). Intelligent information processing is seen in this context as “the creation of simplified images of the observable world at various levels of abstraction, in relation to a particular subset of received data”. Presenting data in an economical and value-added way is a core dilemma in investigating research problems. This is an ability of “human information processing” central to the functioning of the human brain; however, up until a few years ago it remained a mystery in information sciences. Data processing techniques have for the most part been characterized by mechanistic, linear processes. ANNs provide an alternative. Kohonen theorized that ANNs aim to abstract self-organising processes that make sense of information by generating maps that resemble the network in the human brain.

There are various types of ANNs suitable for different applications. Kohonen (1997) postulates three unique functions that occur within all types of ANNs. Firstly, the output of every network is a function of all of the inputs. Kohonen refers to this as *signal transformation* and equates it as:

$$n_j = n_j(x)$$

As a general rule n_j -functions are non-linear and have a characteristically sequential memory. In other words, should the signals change over the course of time – as is the case in all dynamic and non-linear systems – the output stays a function of the present as well as the past inputs.

A second function present in all types of ANNs is referred to as *relaxation*. Due to this function, all outputs in the network eventually are relayed back to the points of input. The transfer relations of these relays in the network are non-linear in nature. Instances where stable solutions are the result are referred to as *attractors*.

The third function present in all types of ANNs is that of *decoding*, also described by Kohonen (1997) as the presence of *feature sensitive cells*. The purpose of decoders or feature sensitive cells is that of feature detection and pattern recognition.

Building on the aforementioned functions of ANNs, Kohonen (1990) distinguishes three types of ANNs:

1. Feedforward Networks or Signal-Transfer Networks – The prime characteristic of this type of network is that the values of the output signal are uniquely dependent on the input signals. Mapping of the results lies within certain parameters that are defined by supervised fixed functions. The determination of these functions is dependent on the obtainable component technology. Functions are fitted to the data using either computation through algebra or gradient-step optimization.
2. Feedback Networks or State-Transfer Networks – In this type of network the feedbacks and non-linearity are very strong, causing activity to quickly converge into stable states; this is referred to as the attractor. The final state is known as the outcome of the computation.
3. Competitive unsupervised learning or self-organising networks – In this instance the simplest structures within the network, usually the cells, are the recipients of identical input information. Through what Kohonen refers to as lateral interactions, inputs behave in a competitive manner. This action is what is referred to as Competitive-Learning Networks. This category of ANNs is home to Self-Organising Maps (SOM), that is of particular interest as an analysis method in this study.

The initial basic idea for SOMs was penned by Kohonen in his notebook in 1976. It was, however, early in 1981 that he, together with other researchers, commenced with serious work in this area. Kohonen was looking to design an algorithm that would map patterns

resembling similarity, or more specifically, pattern vectors that emerge close to each other given an input signal space.

The author's simplest description of a SOM is "globally ordered maps of various sensory features onto a layered neural network"; he further defines it as "an 'elastic net' of points (parameter, reference, or codebook vectors) that are fitted to the input signal space to approximate its density function in an ordered way" (p. 69).

In a 1990 conference paper, Kohonen explains the computational workings of the self-organising map. According to him, inputs resembling that of a spreadsheet-like structure are received by cells that become specifically attuned to a variety of input signal patterns. Said process of patterning input is an unsupervised learning process. An unsupervised learning approach to data analysis is ideally a good starting point for clustering (Balakrishnan, Cooper, Jacob, & Lewis, 1996). The input responses form an order. A specific network cell's spatial location corresponds to a specific domain of input signal patterns. Each cell is responsible for separately decoding the same input. The decoder thus is concerned more with the presence or the absence of an active response, than the exact input-output signal transformation or size or value of the response (Kohonen, 1990).

SOM can be effectively applied when wanting to visualise complex data in a two-dimensional presentation or as with many other clustering techniques, when the aim is to create abstractions of data. The SOM's visualisation ability makes the method ideally suited to survey data. Vesanto and Alhoniemi (2000) show SOM to be of significant value in the visualisation and the exploration of the properties of data. SOMs allow for modelling, making it possible to apply the obtained results within a framework to future data. Data is ordered in such a way that it shows the qualities of the data similar to a cluster-type structure. This feature of SOM lends the researcher the opportunity for interesting observations of coherence and non-coherence within the cluster structures. Furthermore, the researcher also has the opportunity to select interesting groups or units of the map for further cluster analysis, producing interesting summaries and quantitative descriptions of data properties. Another feature of SOM is the ability of the mapping method to preserve the topology of the data (Hynar, Burda, & Sarmonova, 2005).

Artificial neural network - SOM as a method of analysis, is well suited to addressing the empirical objective related to the visual mapping of the variables into a possible framework for corporate entrepreneurship in this study.

Chen, West and Mangiameli (1995) find SOM a superior clustering technique. The authors note that SOM has an advantage over other conventional clustering methods in that its value increases with higher levels of cluster distribution within the dataset. SOM - also referred to as Kohonen maps in some literature - has the ability to deal with high-dimensional data. This type of complex data is mapped into a simpler space with fewer dimensions. But the true advantage of SOM is that while simplifying the dimensionality of the data, it manages to preserve the content (Basheer & Hajmeer, 2000).

At the most basic level a SOM can be understood as a data abstraction method producing maps harnessing the pattern recognition abilities of the human brain through self-organising processes (Wehrens & Buydens, 2007). Gathered data is prepared and can be inputted into various available software packages. N-dimensional input data is transformed into patterned output data that reflects similar patterns onto points within close proximity of each other (Basheer & Hajmeer, 2000).

This particular study utilises the Kohonen package in the R Studio software suite. The Kohonen package in R consists of standard SOMs and extensions that enable classification, regression and data mining. Central to this particular study the package provides the core function of SOMs, that is visualisation of data. The method for training the SOM through the implementation of a batch algorithm is in many ways similar to the strategy followed when doing k-means clustering (Wehrens & Buydens, 2007).

Computation of a SOM can happen in various ways. The algorithm is simple and allows for adaptations according to the goal of a specific research project. The following description applies to a basic SOM, that is designed to enable unsupervised exploratory analysis, and is applied in this specific research project. The first step involves the assigning of a *codebook vector* to every unit. The assigning of a codebook vector reflects “the role of a typical pattern,

a prototype associated with that unit” (p. 3). Subsets of the data are assigned randomly to the units. Training of maps is done by repeatedly presenting the data to the map, referred to as iteration or the learning rate (Appendix 4). Units compete during iteration of the presentation of data to the map. The unit that presents as most similar to the training object, referred to as the “winning unit”, is updated to become even more similar. By using a weighted average, the weight of the new object becomes one of the training parameters of the SOM. The learning rate keeps decreasing until the map converges.

SOM as a method of analysis with unique characteristics is well aligned with the theoretical paradigm of this study, and should be best suited to address the proposed research questions.

4.3.2 Process of gathering and analysing the data for Phase 1

The following section discloses the population and sample groups included in the study, the process of gathering and analysing the data, and ethical considerations.

4.3.2.1 Population and sample groups

Employees working for organisations from different industries in the private and public sector took part in Phase 1 of the research with the anticipation that distinct patterns of the emergence of corporate entrepreneurship might be observable. Respondents were selected through non-probability sampling conducted in 60 organisations operating in 12 industries. The following industries were represented in the sample:

1. Utilities
2. Manufacturing
3. Provincial Government
4. Finance
5. Mining
6. Legal
7. Information Technology
8. Construction
9. National Government

10. Transport
11. Trade
12. Community and Social Services

The sample was randomly drawn from a population consisting of all employees in the targeted organisations. Sixty employees were randomly targeted within 60 different organisations each, bringing the total targeted population to 3600. Returned responses came from 43 organisations. Due to ethical considerations, the names of the organisations are kept confidential. A total of 2 295 of the targeted 3 600 employees returned the completed survey questionnaires.

4.3.2.2 Process of collecting the data in Phase 1

Data collection was done as part of a larger research group at the institution where the primary researcher of this thesis is employed. Sampling action was undertaken by 60 Masters students who acted as field workers after completing training and information sessions related to research competencies and ethics. The primary researcher of this study was responsible for the capturing and analysis of all the data. Participants were approached by field workers in their specific organisations and requested to complete the research survey questionnaire (see Appendix 2 for an example of the survey questionnaire). Participants were informed that research on organisational practices and employee innovation behaviour was being conducted for academic purposes, that participation was completely voluntary, that all information would be kept anonymous and treated as confidential, that they could withdraw participation at any stage during the questionnaire and that completing the questionnaire would take approximately 20-30 minutes. Participants were given brief instructions on how to complete the questionnaire and encouraged to ask for clarification or explanation of any term that they might not be familiar with. Care was taken not to influence their answers.

4.3.2.3 Measurement Instruments

The measurement instruments were selected based on the literature reviewed in Chapter 2. All instruments are existing instruments and have been used by at least the developer and

other researchers. The measurement instruments are discussed below. The discussion of each instrument covers its content, its measurement outcome and its reliability and validity factors as reported by previous studies. Four instruments were selected and combined into one survey questionnaire. Firstly, we look at the questionnaire measuring various human capital practices and secondly, the questionnaire measuring factors that determine the temperature in a corporate entrepreneurial setting. Finally, two measures of innovative behaviour are included, the first relating to general individual innovative behaviour and the second pertaining to innovative work behaviour. The reader is reminded that part of the unique contribution of this study lies in the alternative method of data analysis produced by these existing measurement instruments.

4.3.2.3.1 The Human Resource Practice Scale

The Human Resource Practice Scale (HRPS) developed by Nyawosa (2009) is designed to measure the perceived effectiveness of the human resource practices within an organisational system. Seven practices in total are included: training and development; compensation and rewards; performance management; supervisor support; staffing - also referred to as the appointment process; diversity management; and communication and information sharing. Three questions (items) are posed for each practice, constituting a total of 21 items. Respondents were requested to assign a score to each item on a scale ranging from 1 (disagree strongly) to 5 (agree strongly). A high score would indicate agreement by the respondent that the particular human capital practice was effective, while a low score would indicate the opposite.

The developer reports internal consistencies of between 0.74 and 0.93, and significant correlations in the anticipated direction, on the original version of the survey that consisted of a total of 27 items measuring nine practices. This particular study utilises a shortened version of the HRPS refined by Steyn (2012). The shortened version of the survey produces internal consistencies that vary between 0.78 and 0.88. As for validity, Steyn (2012) finds the seven practices to correlate in an expected way with various other attitudinal aspects, such as job satisfaction (positive correlation) and intention to quit (negative correlation).

4.3.2.3.2 The Corporate Entrepreneurship Assessment Instrument

Originally developed as an 84-item survey questionnaire, the Corporate Entrepreneurship Assessment Instrument (CEAI) attempts to assess the temperature of the internal entrepreneurial environment of an organisation. Developed by Hornsby, Kuratko and Zahra (2002), a principle component analysis of the CEAI produced five definite internal organisational factors, namely, management support, organisational boundaries, time availability, work discretion, and rewards and reinforcement. As for reliability, the developers report that internal consistency was attained using Cronbach's calculation.

For the purposes of this study a shortened version of the CEAI was used. The shortened version as refined by Strydom (2013) produces four items for each of the five constructs. Selection of the four items for each construct was done in accordance with their high factor loadings. Strydom (2013), similar to Hornsby, Kuratko and Zahra (2002), finds for favourable levels of Cronbach's Alpha. Considerable statistical investigation has been done on the factor validity of both the original and the shortened instruments (Hornsby et al., 2002; Steyn, 2017; Strydom, 2013). For each statement, respondents are requested to rate their level of agreement on a five (5) point scale; 5 – strongly agree; 4 – agree; 3 – uncertain; 2 – disagree; and 1 – strongly disagree. Observing a high score for any given factor would be indicative of a positive contribution of the presence of that factor to the entrepreneurial activity in the organisation; a low score would be indicative of the opposite.

4.3.2.3.3 The Individual Innovative Behaviour Measurement

The instrument developed by Kleysen and Street (2001) aimed at measuring Individual Innovative Behaviour (IBB), was used in this study. The 14 items relate to five different elements of individual innovative behaviour, namely, opportunity exploration, generativity, formative investigation, championing and application. Dimensionality between the elements could, however, not be confirmed and consequently developers suggest combining the individual measures into a single measure indicating the overall level of innovative behaviour the respondents perceive they demonstrate in their daily lives. Items are presented in the form of questions about the frequency by which certain behaviours are exerted. The respondents

indicate their perceived behaviour frequency on a scale from one (1) to six (6), where 1 indicates “never” while 6 indicates “always”. A high score observation would be indicative of high levels of perceived innovative behaviour, while the perceived absence or lack of innovative behaviour would be indicated by a low score.

4.3.2.3.4 The Innovative Work Behaviour Instrument

The second measure of innovative behaviour used in this study was developed by de Jong and den Hartog (2010) and is called Innovative Work Behaviour (IWB). Four dimensions of innovative work behaviour are proposed, namely, exploration, generation, championing and implementation. Similar to Kleysen and Street (2001), the IWB developers find no proof of dimensionality in the measurement instrument, and also advocate the analysis of the instrument as a single measure for innovative behaviour. The questionnaire consists of 10 items asking the respondent to indicate frequency in stated behaviours. The original statements as presented by the developers relate to the perception the respondent has of the behaviour of those around him/her. For the purposes of this study the stem of each question was adapted in order to obtain the respondents’ perception of their own behaviour. For example, “How often does this employee....”, was adapted to “As an employee, how often do you...”. Respondents were presented with a six (6) point scale on which to indicate the frequency with which they perceive themselves to display certain innovative behaviours. The lowest end on the scale (0 - never) would indicate very low or total absence of the particular behaviour, while responding on the highest level (6 – Always) would indicate high frequency of that particular innovative behaviour.

4.3.2.3.5 Demographics of the sample

The study reports on several demographic elements of the sample, namely, age, tenure, level of qualification, level of employment position, type of position (core business or support services) and whether the respondent’s position is managerial or non-managerial.

The purpose of reporting on demographics is to gain a deeper insight into the composition of the clusters constructed by the Kohonen Self-Organising Maps.

4.3.3 Process of analysis of the data in Phase 1

The gathered data was captured into an Excel spread sheet. Data was standardised to allow for accurate comparison between instruments with different scales and checked by the University of Cape Town's Centre for Statistics. Demographic descriptive analysis statistical summaries of the overall dataset were done using the STATA software package.

The data set was then imported into the R studio software package for the construction of the neural network Self-Organising Maps. By navigating the process explained above in section 4.3.1, responses were self-organised into clusters. The output provided by the R software illustrates the patterned organisation of the data. The data is analysed to establish areas of strong emergence, as well as areas of weak emergence with regard to the variables included in the study. Clusters are analysed according to their descriptive characteristics and mapped in areas of strong emergence, as well as areas of weak emergence. Special attention is also given to understanding outliers. This type of analysis allows for the tolerance of complexity in the data, rather than the reduction thereof.

Data results were then prepared visually, in relation to the conceptual framework developed in Chapter 3, to be presented for interpretation and scrutiny by subject matter experts in Phase 2 of the research project.

Sequential to Phase 1, Phase 2 is qualitative in nature, and is discussed in the next section of this chapter.

4.4 Phase 2: Interviews with subject matter experts – interpreting the outlying clusters

For the conceptual framework, as presented in Chapter 3, to assist managers, policy makers, and innovation drivers in general to make sense of the patterns produced by the neural

network Self-Organising Maps, a method of interpretation of the Self-Organising Maps is needed. Adding qualitative research to the research design can be valuable when attempting to gain understanding of quantitative results (Creswell & Plano Clark, 2018). Honouring the sequential explanatory mixed method approach this study uses, qualitative interviews were conducted after obtaining the quantitative results with the aim of contextualizing, elaborating on and interpreting the quantitative results. Qualitative research places the emphasis on meaning-making through the analysis of non-numerical data, for example, words, actions or pictures (Bryman & Bell, 2014).

4.4.1 Sample framework

This particular study seeks to understand the emergence of individual innovative behaviour as a vital part of corporate entrepreneurship, among certain organisational practices employed in the organisational context. The insight and interpretation of subject matter experts could prove useful in gaining greater understanding of the emergence mentioned above.

Participants in qualitative studies can be selected using various techniques based on their suitability in addressing the research objectives, and the practicality the method holds for the research process.

Four participants for this phase of the research were purposefully selected on account of their experience and expertise in the area of driving innovation, and specifically individual innovative behaviour in organisations.

An expert is a person who is considered to be someone who is very knowledgeable or very well skilled in a particular area or discipline ("Expert," 2001).

A summary of the participants' expertise and experience is presented in Chapter 6.

4.4.2 Data collection

Prospective expert participants were approached by the researcher, informed of the scope and purpose of the study, and invited to participate. Agreeing participants were then scheduled for

a semi-structured interview with the researcher. The semi-structured interviews were guided by a discussion guide as presented in Appendix 4.

4.4.3 Qualitative method of analysis

Interviews were recorded, transcribed and analysed for common themes. In qualitative research, a theme, often also referred to as a category, is a broad unit of information consisting of various codes that aggregate to a coherent idea (Creswell, 2013a). Thematic analysis is a fundamental method of qualitative data analysis (Welman, Kruger, & Mitchell, 2005), where texts or words are scrutinized for the extraction of recurring themes (Bryman, 2012). The purpose of conducting a thematic analysis is to group the data into a sensible and relevant group of themes (Creswell, 2013). Welman et al. (2005, p. 211) describe themes in qualitative analysis as “umbrella” constructs, that the researcher can identify at any time before and during the data collection. The researcher is then tasked with writing a narrative around that theme (Creswell, 2013).

The first part of the interview explored in general terms the participant’s understanding and experience of innovative behaviour within the organisational contexts of the participant’s career to date. Participants were then requested to interpret outlying patterns in the neural cluster results produced by the Self-Organising Maps in Chapter 5. Gladwell (2008, p. 3) defines an outlier as follows:

- “1: something that is situated away from or classed differently from a main or related body
- 2: a statistical observation that is markedly different in value from the others of the sample “

Discussion in this regard centred around a few key points, including:

- the expectations of the participants about industries they would consider, according to their experience, to strongly emerge innovative behaviour
- the interpretations of the participants of the unique combination of strength in the emergence of the variables in the different clusters
- the composition of the clusters, specifically with regard to management and business function composition

In addition to the interpretation of the clusters, general themes that describe the current corporate entrepreneurial context, and the participants' understanding of concepts related to this study, were extracted. Themes are presented in a discussion in Chapter 6 that explores the research participants' experience of the phenomenon of corporate entrepreneurship, and specifically individual innovative behaviour and the human capital practices that govern said behaviour.

4.4.3.1 Qualitative data validation: Ensuring trustworthiness

In judging the quality of qualitative research accounts, a greater emphasis is placed on validity than on reliability. Trustworthiness is often used as a measure for assessing the validity of a qualitative study (Bryman & Bell, 2014), and four criteria of trustworthiness are proposed, namely credibility, transferability, dependability and confirmability. Creswell and Plano Clark (2018) confirm that the aforementioned criteria assist in checking the accuracy of the research account. Various strategies are available to qualitative researchers to ensure validity. This study employed the following strategies as described by Creswell and Plano Clark (2018):

- Member checking: Sections of the findings as documented by the researcher in the report were presented to the participants to confirm that the findings were an accurate reflection of their experiences.
- External review: Interview transcripts were interpreted for themes by a peer of the primary researcher to confirm similarities in the interpretation of interviews and the extraction of themes.

In summary, the essence of validity in qualitative research is about the accuracy of the data and the results, and the researcher's interpretation thereof.

4.5 Conclusion

Sequential explanatory mixed method allows for the integration of qualitative and quantitative research methods by connecting the quantitative results to the qualitative data collection. Further explanation of the quantitative data is achieved through the qualitative phase of the research, adding to the richness and depth of the research results. This chapter described the

sequential explanatory mixed method of analysis as it was applied in the study. The next chapter presents the results of the quantitative data analysis in Phase 1 and the interpretations of possibilities for the results by the researcher.

Chapter 5

Research results: Mapping the Corporate Entrepreneurial territory with Artificial Neural Networks

The aim of this chapter is to present the output of the data in the form of a visual presentation of the produced clusters, accompanied by research observations and the researcher's interpretations.

5.1 Introduction

The research problem in this study relates to attempting to understand the emergence of corporate entrepreneurship as a non-linear, dynamic and complex phenomenon.

This chapter specifically addresses the empirical objective of mapping the emerging of individual innovative behaviour as part of corporate entrepreneurship using neural networks, specifically Kohonen's Self-Organising Maps.

As detailed in Chapter 4, Kohonen's Self-Organising Maps use the input data to organise the responses into clusters based on weighted averages. Data is presented to the network multiple times – at every presentation of responses the network becomes “smarter”, mapping the anticipated behaviour of the network. The cluster outputs represent areas of coherence in the strength of the emergence of the different variables within that cluster.

This chapter constitutes Phase 1 of the sequential explanatory research mixed method approach. Firstly, descriptive statistics of the data sample set is provided, in order to get a general feel for the composition of the entire sample. Secondly, the clustered network outputs are presented and discussed. Every cluster output is visually mapped and named according to the characteristics the cluster exhibits, and possible interpretations of said exhibited characteristics.

Analysing corporate entrepreneurship as a complex system and not a mere linear equation will enable the retention, rather than the reduction, of complexity in the system. In doing this it is

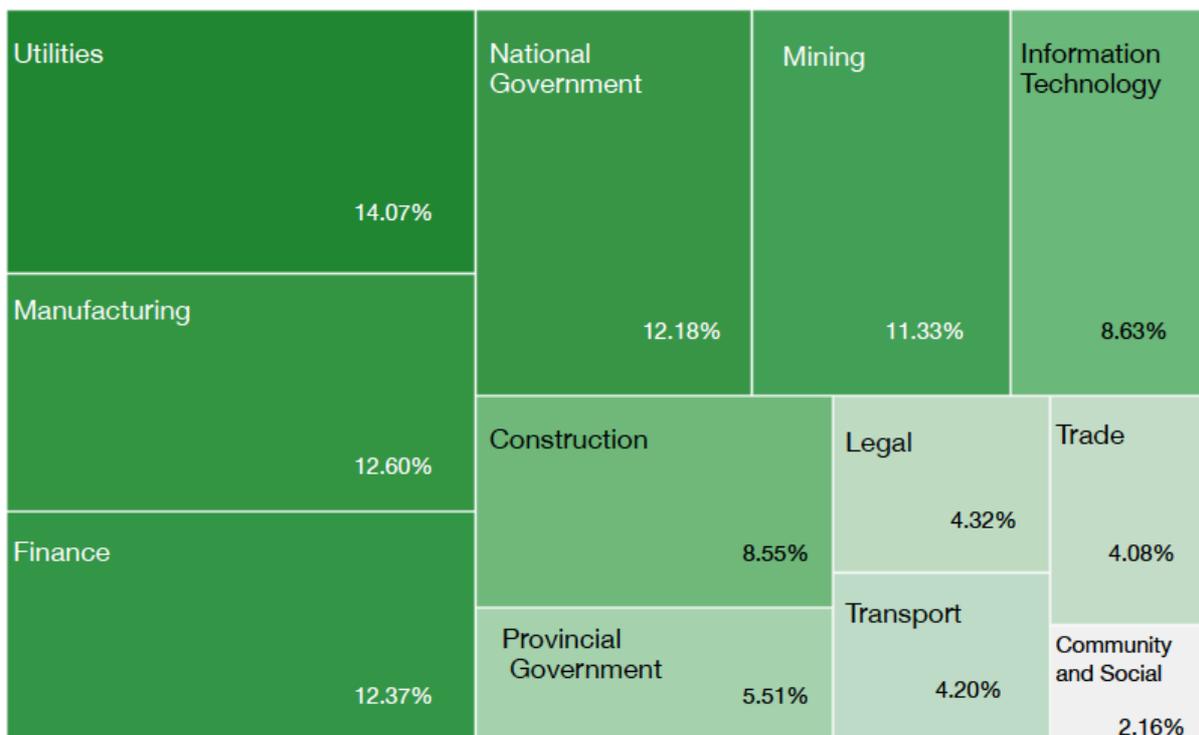
anticipated that the framework for the emergence of corporate entrepreneurship will provide a useful departure point from which to positively influence corporate entrepreneurship in organisational systems.

5.2 Population and sample frameworks

Employees working for organisations from different industries in the private and public sector took part in the research with the anticipation that distinct patterns of the emergence of corporate entrepreneurship might be observable.

The sample was randomly drawn from a population consisting of all employees in the targeted organisations. The population consisted of 3 600 targeted respondents in 60 organisations within the different industries. The non-probability sampling method resulted in returned and completed responses totalling 2 595 participants from 42 different organisations, representing 12 industries. The included industries and their relative contribution to the sample are presented in Figure 16.

Figure 16 Total Sample by Industry



In the total sample the Utilities industry enjoyed a slight majority representation. Organisations included in this industry sector relate to water and electricity supply and waste management. Manufacturing, Finance and National Government were almost equally represented, followed by the Mining industry. Information Technology and Construction enjoyed the 6th and 7th largest representation respectively. The Provincial Government, the Legal sector, Transport, Trade and Community and Social Services had the smallest representation.

5.3 Data collection

Data collection was done as part of a larger research group at the institution where the primary researcher of this thesis is employed. Sampling action was undertaken by 60 Masters students who acted as field workers, after completing training and information sessions related to research competencies and ethics. The primary researcher of this study was responsible for the capturing and analysis of all the data. Participants were approached by field workers in their specific organisations and requested to complete the research questionnaire (see Appendix 2 for an example of the questionnaire). Participants were only informed that research on organisational practices and employee innovation behaviour was being conducted for academic purposes, that participation was completely voluntary, that all information would be kept anonymous and treated as confidential, that they could withdraw participation at any stage during the questionnaire and that completing the questionnaire would take approximately 20-30 minutes. Participants were given brief instructions on how to complete the questionnaire and encouraged to ask for clarification or explanation of any term that they might not be familiar with. Care was taken not to influence their answers.

Four existing questionnaires were combined into one, and administered as the data gathering instrument. A total of 65 items constituted 14 variables. Items in relation to the variables measured are tabled below:

Table 3 Instrument Measures

Item/s	Variable measured
1-4	Management Support for Innovation
5-8	Work Discretion
9-12	Rewards and Reinforcement
13-16	Time Availability
17-20	Organisational Boundaries
21-30	Individual Innovative Behaviour
31-33	Training and Development
34-36	Compensation and Rewards
37-39	Performance Management
40-42	Supervision and Support
43-45	Appointment Process
46-48	Diversification
49-51	Communication and Information Sharing
52-65	Innovative Work Behaviour

A detailed description of the combined instruments can be found in Chapter 4 section 4.3.2.3.

Demographic information included in the questionnaire comprised age, tenure, business function type (core business or support services), management or non-management, level of schooling and level of position held in the organisation. The results of this output are presented in Tables 4 to 7 and described below.

Table 4 Sample composition by type of function

Type in Function in the Organisation	Percentage of the Total Sample
Core Business Function	46,55
Support Services Function	53,45

Respondents were asked to indicate if the function they fulfilled in the organisation was a core function or a support service function. By a small margin the majority of the sample indicated that they worked within a support services function in their respective organisations.

Table 5 Sample composition Management vs Non-Management

Management vs. Non-Management	Percentage of the Total Sample
Management	37,03
Non - Management	62,97

Respondents in the study were asked to indicate whether they held managerial or non-managerial positions in the organisation. More than half of the sample indicated that they were not part of the management in their organisations.

Table 6 Sample composition according to highest level of education attained

Level of Schooling	Percentage of the Total Sample
Less than 12 years	4,86
12 Years (Matric)	25,20
1st degree/diploma	39,88
Higher degree/diploma	30,60

The participants were asked to indicate the highest level of schooling that they had attained. Only a small portion indicated that they had fewer than 12 years of formal schooling. Most of the sample had at least a matric and some formal tertiary education. This could be expected as the random sampling was conducted by MBA students, and was likely to reflect the peer grouping of the MBA student acting as a fieldworker.

Table 7 Sample composition according to level of position held in the organisation

Level of Position held	Percentage of the Total Sample
Unskilled and defined decision making	3,08
Semi-skilled with discretionary decision making	19,77
Skilled technically and academically qualified, junior management, supervisor, foremen and superintendents	43,31
Professionally qualified, experienced specialists and middle management	29,13
Top management, Senior management	4,70

Respondents were requested to indicate the level of the position they held within their respective organisations. The options were based on level of skill and level of decision-making. Most of the sample indicated that they worked on a level somewhere between semi-skilled with discretionary decision-making to professionally qualified, experienced specialist or middle management level. A very small portion of the sample indicated holding a level at either end of the scale, that is, being either unskilled and defined decision-making or top or senior level management.

5.4 Data analysis process

Responses from the survey questionnaires were captured in an Excel spreadsheet. The data was standardised to accommodate differences in scales of the used instruments. Demographic descriptive analysis of the overall sample set was conducted using the STATA statistical software package. The data analysis, and the construction of the Self-Organising Maps, were done in collaboration with the University of Cape Town's Centre for Statistics, in order to ensure accuracy, reliability and validity.

The Kohonen package that is part of the RStudio software suite was used to cluster the data into Self-Organising Maps illustrating the strength of the emergence of the variables within each of the clusters. It is well documented that the Kohonen package offered by the R suite is

well suited to the creation of Artificial neural network Self-Organising Maps. The Kohonen package has the functionality of determining the optimum level of iteration suited to the size of the data set, in setting the ideal number of clusters. The output clusters were then analysed according to their descriptive characteristics and the strength or weakness of the emergence of the included variables. Insights were also gained into areas of coherence in relation to the emergence of the variables. Responses were analysed where outliers regarding the variables were observed within clusters, as well as between clusters.

The purpose of investigating the outliers is related to the outcome of this study, that is, mapping a framework for corporate entrepreneurship that allows for non-linearity, and patterns that reflect the complexity embedded in the phenomenon.

5.5 Results of the Kohonen Self-Organising Maps

First the overall means of responses by the entire sample are provided. This section then presents the resultant clusters as mapped by the network software.

5.5.1 Data description of overall responses

The unweighted average as per the STATA output of the ratings of all the variables by the overall sample is presented in Figure 17.

Figure 17 Overall Means of all responses of all variables



From highest to lowest, the total sample set rated their positive associations with a specific variable in the following order:

1. Training and Development
2. Individual Innovative behaviour
3. Rewards and Reinforcement
4. Diversification
5. Communication and Information Sharing
6. Time Availability
7. Appointment Process
8. Innovative Work Behaviour
9. Performance Management
10. Work Discretion
11. Supervision and Support
12. Rewards and Recognition
13. Organisational Boundaries
14. Management Support

Using this reductionist approach to modelling the phenomenon of corporate entrepreneurship, it is observed that respondents on average had a positive association with the presence of organisational practices related to the quantity and relevance of the training and development present in their respective organisations, the rewards and reinforcement received for their efforts, which came out 3rd highest, and also the level of diversification which was the 4th highest rated variable for the overall sample. The lowest positive ratings were awarded to the variable measuring the presence of acceptable organisational practices related to compensation and reward and organisational boundaries, with management support for innovation receiving the lowest recognition by the overall sample.

Looking at the initial data description as presented above, one can already observe areas of unexpected outcomes and contradiction. As shown in Figure 17, on average respondents awarded the highest ratings when indicating their level of satisfaction with rewards and reinforcement as a variable included in the Corporate Entrepreneurial Assessment Instrument. In comparison, the variable related to compensation and rewards included in the Human Resource Practice Scale received lower levels of satisfaction.

A similar pattern can be observed when looking at the ratings received by the two included variables measuring innovative behaviour - of which the emergence is of particular interest in this study. Individual innovative behaviour was rated second highest on average by this total sample, while innovative work behaviour only managed a spot at number eight in the overall ranking of the variables. This is interesting and begs further investigation - in both cases item questions are similar, thus one would expect the output to be similar.

Relating back to the research question posed in this study, it is interesting that initial observation, involving simple classical means comparisons, already speaks contradiction between similar variables, evidencing the presence of non-linearity and complexity. Classical research approaches would at this stage attempt to reduce even further or eliminate the contradiction and unexpected results using post hoc tests, often with the same or very similar analysis methods. These results, however, are ideal for the research methods proposed in this study - methods that allow for the deeper investigation of contradiction and surprises.

5.5.2 Clustering with Kohonen's Self-Organising Maps

The responses were presented to the Artificial neural network software for unsupervised clustering. The software determines the parameters for clustering through the experience of multiple exposure to the dataset. Parameters refer to the level of iteration and the number of clusters. Data is iterated through the network and clusters are added in an attempt to determine the initial point of variation and the point at which variation is saturated, in other words the point where adding another cluster yields no significantly new patterns within the cluster maps.

In this particular instance saturation occurred after 4000 iterations, and cluster addition to a maximum of five. The output illustrating the iteration and cluster determination, based on the weighted average vector scores, is presented in Appendix 4.

The five clusters are presented and discussed below in accordance with the strength of the emergence of variables in the cluster and the descriptive composition of the cluster. Clusters 1, 2 and 5 are of particular interest to the study, as the outliers with regard to innovative behaviour are found within these clusters.

The visual representation begins with a dimensional overview of the strength of emergence of all the variables within that cluster. Then emergence of the innovation variables is highlighted through the data visualisation. Next, variables of weakest and strongest emergence are highlighted in each cluster. Finally, visualisations of the descriptive composition of the clusters are presented and discussed for any additional insight.

Dimensional sizes of the variables are based on the weighted vector averages as computed by the neural network. Thus it is not the cluster sizes that matter most, as is often the case with classical reductionist methods. In this case, using this method of analysis provides useful insight into a unique group of individuals that clustered together based on coherences in the manner they experience the emergence of the measured variables. Even small clusters can add to the insight and understanding of the phenomenon, for they might represent a unique opportunity that might well have been missed if only large clusters were considered. These large clusters

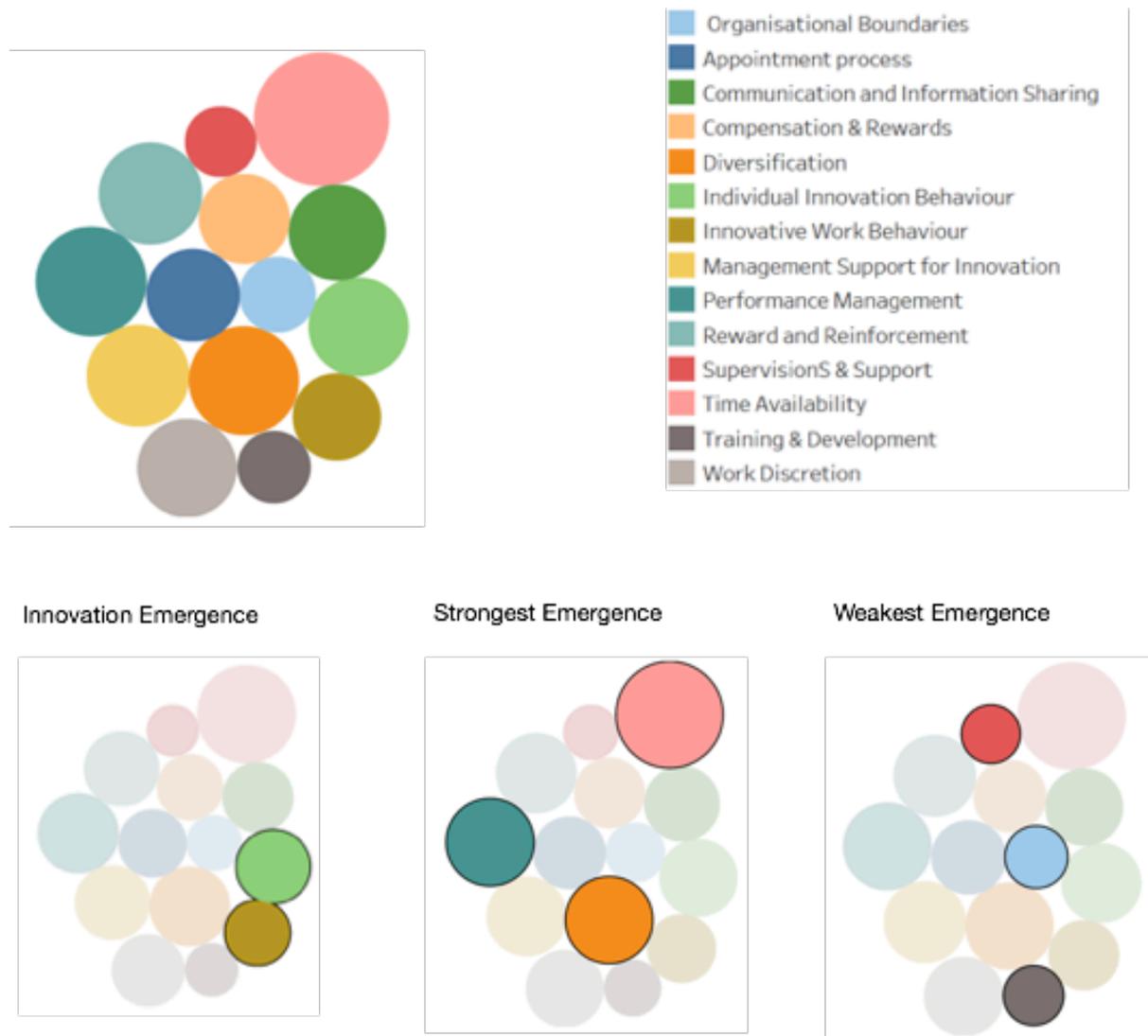
often represent nothing more than the norm or a state of equilibrium where there is little change or newness, and not necessarily an image of a state far from equilibrium, which is where change and newness occur.

5.5.2.1 Cluster 1 – “The Tipping Point”

Cluster 1 is the smallest cluster and comprises 4.12% of the total sample. However, as stated in the previous section, when using this method of analysis it is not the size of the cluster that matters most when interpreting the results, but the uniqueness of the coherence within the cluster. The average age of members in Cluster 1 is approximately 37 years, and on average they have had a tenure of 8 years with their current organisations. Members are predominantly from the Information Technology industry sector, followed by Utilities, then the Mining industry sector and then National Government. The cluster hosts more members that fulfil a support services function (61.7%), than members that fulfil a core function (38.3%) in the business. The composition of management to non-management comes to 30% and 70% of the total cluster respectively.

Cluster 1 produces an innovative behaviour emergence that is neither the cluster’s strongest variable, nor the weakest. Changes in the system could push innovative behaviour in either direction, hence the cluster is named “The Tipping Point”. Further observation and analysis follow in the next section.

Figure 18 Cluster 1: The Tipping Point



Observations on Cluster 1:

The two variables that describe innovative behaviour, namely individual innovative behaviour and innovative work behaviour, do not emerge as either part of the strongest emergent variables or the weakest.

Members of this cluster experience a strong emergence of time availability in their work day performance management and the level of diversification in their working environments. It is observed that this particular cluster produces the weakest emergence of supervision and support, organisational boundaries and the quantity and relevance of training and

development. Overall, the network vector weighted averages for Cluster 1 indicate the weakest emergence of all of the variables when compared to the other four clusters.

Interpretation of the emergence of the variables in Cluster 1:

It could be interpreted that innovative behaviour is a point of promising potential in this cluster. It is almost as if the variable is static yet strong enough to be awakened and enhanced, at a “tipping point”, if you will. In this instance policy makers within such a cluster might do well by considering intervention that improves the emergence of the weakest variables in the cluster, ensuring that the “tipping point” happens in the most favourable direction. This particular cluster experiences the most available time of all of the five clusters; it is also the only cluster of the five clusters where diversity within the environment emerges as a strong outlier. It shows the strongest positive experience regarding performance management, yet innovative behaviour is average. Supervision support, organisational boundaries and training and development are not only the weakest emerging variables in this cluster, but also the weakest in comparison to the other four clusters.

Investigating possible changes to the current levels of permeability between organisational boundaries could assist a cluster such as this with enhanced innovation. This cluster demonstrates the largest difference in the composition between members working in core business functions and members working in support services. Encouraging cross-departmental collaboration, or possibly a flatter organisational structure, could enhance idea formation and ownership. In Cluster 1 there is a difference of 40% in the composition of non-management vs. management. A reconsideration of the quality and relevance of training and development in a cluster like this might aid in enhancing employees’ innovation skills, and also contribute to fostering the type of mind-set or attitude necessary for creativity and eventual innovation.

Cluster 1 has the largest composition of workers in the Information Technology industry sector. This might be unexpected to some interpreters, as one might naturally and very directly associate information technology with innovation. A more insightful interpretation hereof might lie in understanding the task differentiation within this particular industry sector. Information technology could be divided into two general task categories, the first being

programmers and designers of new products and systems who inhabit environments where innovation is part of their daily task, and the second being practitioners who maintain the previously mentioned products and systems. Here, innovation is not inherently part of the task, and practitioners might have to look to other mechanisms that could enhance levels of innovation in their work environments. Examples might include new or better ways of servicing client queries.

The second largest represented industry in the “tipping point” cluster is the Utilities industry. As mentioned earlier, these are workers in the areas of water and electricity supply and maintenance and waste management. One would expect that managing tasks in this sector could prove to be an immense challenge, especially in a country like South Africa. Basic service provision is said to be a top government priority. However, factors including worker strike action, top level corruption and natural occurrences such as droughts have led to service disruptions and a severe lack of sustained quality. This particular sector could truly benefit from innovation and might be well served investigating and better understanding the dynamics of innovation emergence within their particular environment.

The third largest representation in the “tipping point” cluster is the mining sector. Mining is a large contributor to the South African economy, and also a sector that is deeply and emotionally embedded in the history and in many cultures of the country, for various reasons. Most actions in mining revolve around worker safety. Accidents and injuries in mines slow down, or even bring to a standstill, production, thus a safe mine is a productive mine and a productive mine is a profitable mine. Though not a predictable type of innovation, safety-related innovation could yield rich dividends for the mining sector.

Even in the analysis of the first cluster, the potential for innovation emergence is observed as being non-linear and complexly based in the uniqueness of all the elements that interact within a particular context.

5.5.2.2 Cluster 2 – “The Stalwarts”

Cluster 2 represents 22.31% of the total sample. Once again, the reader is reminded that the size of the cluster is by no means an indication of its significance or importance. On average, members hosted in this cluster are 36.54 years old, making Cluster 2 the youngest cluster. Respondents in this cluster indicated an average tenure of 8.09 years with their current organisations. The Utilities sector is the largest represented sector in this cluster, followed by the Finance sector and Manufacturing. National Government and Mining also enjoy a large presence in this cluster. Core business function roles are occupied by 45.4% of the cluster members, while 54.6% of the cluster members work in a support services role. Similar to Cluster 1, Cluster 2 comprises 40% more non-managers than managers; this might indicate a rigid hierarchical organisational system structure, making interconnections and the permeability of information, ideas and eventual innovation strenuous.

Cluster 2 produces the weakest emergence of Innovative behaviour of all five clusters. Initial exploration of the results hints that this cluster does not take well to change and newness. At the same time the cluster produces a strong emergence in most of the variables that are guided by organisational policy, affording this cluster the name “The Stalwarts”. In further analysis in the next section we explore the possible implications of this, and opportunities for innovation.

Figure 19 Cluster 2: The Stalwarts



Observations on Cluster 2:

Both variables related to innovation, namely individual innovative behaviour and innovative work behaviour, emerge the weakest in this particular cluster, and also the weakest of all five clusters. Members of Cluster 2 report a strong experience of the emergence of performance management, rewards and recognition, supervision and support, time availability and training and development.

Interpretation of the emergence of the variables in Cluster 2:

The strong emergence of performance management, rewards and recognition and supervision support could lead to the interpretation that this type of cluster could indicate an

organisational system that is grounded in structural tradition - a culture of loyalty, where action is clearly guided by policies and procedures.

Members in this cluster also report a favourable amount of available time for more than their prescribed tasks, and they experience a strong emergence of the availability and relevance of training and development in their organisational systems. Surprisingly, this cluster is weak at emerging innovation, considering the strong emergence of variables relating to organisational types of support, rewards and opportunities for innovation.

There could be many reasons for this. The characteristics shown by this cluster might be expected of organisations with a strong sense of identity. The results produced by this cluster could also be indicative of long standing traditions, rules and regulations that could either be a core part of the functioning of the organisation or simply something that has become a habit.

Another possibility is that the cluster characteristics might reflect an organisation that functions in a larger system with little or no competition, thus innovation is not perceived as an immediate priority.

Yet another possibility is that this type of cluster speaks of an organisational system that has become stagnant due to its well-founded and deeply-embedded sense of "this is how we have always done it". This philosophy might create the illusion that things are well when, in truth, things are just the same.

A particular type of person could find this type of environment very appealing. A person that enjoys structure and predictability should thrive in an environment where change is limited and infrequent. In the spirit of strategic human capital management, these types of employees should not be discounted when it comes to innovation, as they could serve the organisation well in the execution and maintenance or servicing of innovation.

An organisational system that is reflected by this type of cluster map, but that is seeking enhanced innovation action, might be well served by implementing slow transformation on a strategic level that foundationally changes policy. Change and newness need to become part of the organisational identity in organisations showing attributes similar to Cluster 2.

Introducing change and newness needs to be approached in a delicate, well thought-through, step by step manner.

Looking at the industry representation in this cluster, one might have higher expectations of the results produced by the cluster. Utilities, comprising electricity and water supply as well as waste management, makes up a large portion of this cluster. As with Cluster 1, it could be interpreted that the emergence of any type of new behaviour, or the practical implementation of change, could prove a significant challenge in the environments in which organisations in the Utilities sector operate, with specific reference to South Africa. As mentioned in the discussion in Cluster 1 about this sector, basic service provision in the South African context is in dire need of innovation. Taking into consideration the practical problems, challenges and constant interruptions, it is clear that this much-needed innovation has been extremely slow in emerging.

The second largest represented industry in the “stalwart cluster” is Finance. Discussing this sector could prove useful on account of the importance of rules, regulations and policies in the sector. As in the case of the Information Technology sector, the Finance sector comprises functions and actions that fall into at least two groups – one characterized by the need and drive for constant innovation of new products, and the other by the implementation and maintenance of new and existing products. Implementing and maintaining financial products involve a rigid adherence to certain processes and laws. Taking this into consideration the possibility that the finance sector represented in this cluster might very well be dominated by product implementation and maintenance type employees, as is indicative of the composition of core vs support services composition in the cluster, the low levels of innovation might be expected.

Concluding the discussion on Cluster 2, it is clear that, in line with the theory of complexity and the dynamics of non-linearity and uncertainty, researching an emerging phenomenon - in this case innovative behaviour as part of corporate entrepreneurship - is best served by a method that does not chase singular causality. A deeper and more valued contribution to understanding lies in the consideration of all patterns of possible connection, a feat that can only be achieved by allowing complexity and contradiction, rather than reducing it.

5.5.2.3 Cluster 3 – “The Independent Party”

Cluster 3 comprises 28.44% of the members of the total sample. It bears repeating that interpretation of the uniqueness in characteristics of the cluster and emergence of the variables within the cluster is of greater value to the results interpretation than the size of the cluster. Members within this cluster have an average age of 38.43 years with an average tenure of 8.66 years at their respective organisations. The Utilities sector is the largest represented sector in this cluster, followed by Mining and National Government. Slightly smaller representation is enjoyed by the Trade, Legal, Finance and Information Technology sectors. Members working in a core business function come to a total of 42.68% of the cluster, while those fulfilling a role in the support services of their respective organisations comprise 57.32% of the total cluster. Members on management level are 30% fewer than members on non-management level.

Cluster 3 shows a strong emergence of individual innovative behaviour, organisational boundaries, work discretion and time availability, while producing a low emergence of communication and information sharing, supervision and support and both variables related to rewards. One could deduce from the strong emergent variables that a preference for working alone or independently, as well as individual responsibility, is characteristic of this cluster, thus the cluster is named “The Independent Party”.

Figure 20 Cluster 3: The Independent Party



Observations on Cluster 3:

When one looks at the strength of the emergence of the two variables related to innovation, this cluster shows a strong emergence of individual innovative behaviour. Accompanying strong emergent variables are organisational boundaries, work discretion and time availability. Cluster 3's weakest emergence can be observed in the variables related to rewards and reinforcement, compensation and rewards, communication and information sharing and supervision and support.

Interpretation of the emergence of the variables in Cluster 3:

The strong emergence of individual innovative behaviour, organisational boundaries and work discretion could be indicative of an organisational system where individuals prefer to work independently on well-defined tasks within well-defined boundaries. This observation would also support the observation of weaker emerging variables. One would expect an individual who prefers to work independently, to prefer neither close supervision nor intense communication and sharing, and to not need constant support and guidance.

The weak emergence of communication and information sharing might also be expected in an organisational environment similar to that of Cluster 3, as it could be indicative of a context containing rigid departmental boundaries, or silos. Evidence for the previously stated interpretation could be the difference in composition of management and non-management in this cluster, although this difference is slightly smaller than in the “tipping point” and “stalwart” clusters. The “independent party” output produced a larger composition of support services than core business, an observation that could also highlight the existence of rigid structures and silos.

The weak emergence of both variables related to rewards, i.e. rewards and reinforcement and compensation and rewards, could be interpreted in various ways. One possibility is that this particular environment is characteristic of intense individual competition, leading to employees considering themselves innovative on an individual level, but being less open to sharing innovative ideas with others.

Another possibility is that levels or structures in the organisation are rigid and non-permeable. The organisation could also be very large, as is often the case with organisations in this type of service supply, leading to a disconnect in the absence of conscious connection interventions.

An organisational system resembling the “independent party” cluster that is looking to enhance its level of innovation, might be well served by encouraging the intensity and quality of information sharing and creating safe spaces where employees from different departments and levels can come together and share information and ideas.

An independent and strongly individualized employee might not be motivated by generic “one size fits all” rewards and recognition systems. The development and implementation of individually considered rewards and incentive schemes could very well be a lucrative option for enhancing innovation in this type of cluster.

5.5.2.4 Cluster 4 – “The Balancing Act”

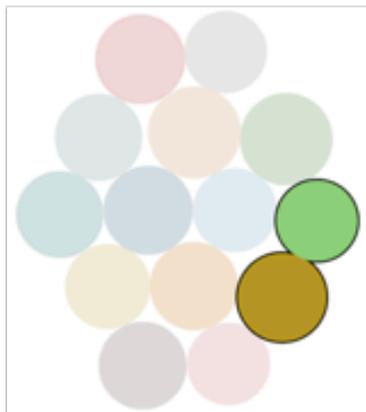
Cluster 4 consists of 22.70% of the population. Respondents in this cluster have an average age of 36.94 years and a tenure of 7.66 years with their current organisations. In this cluster, the Finance sector is observed as enjoying the largest representation, followed by Manufacturing and National Government. Construction, Information Technology and Mining were also well represented in this cluster. More members in this cluster fulfil an organisational role in the core business functions of their organisations (53.14%), than support services (46.86). The “balancing act” cluster comprises 30% more non-managers than managers.

An initial observation of the emergence of the variables in this cluster indicates a strong emergence of most of the variables, with a slightly superior emergence of compensation and rewards, communication and information sharing and innovative work behaviour. Emerging as slightly weaker than most of the variables were management support for innovation, organisational boundaries and individual innovative behaviour. Given the closeness in the sizes of the emergence of the variables in this cluster, it was thought apt to name the cluster “The Balancing Act”.

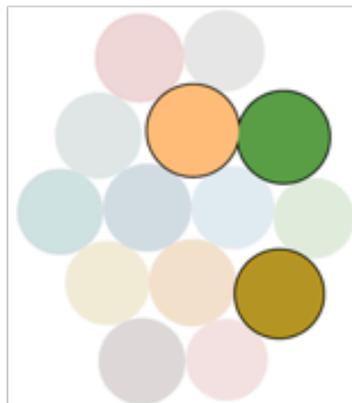
Figure 21 Cluster 4: The Balancing Act



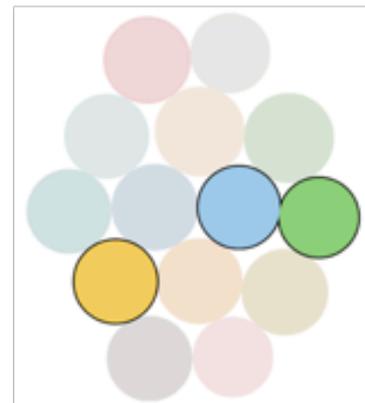
Innovation Emergence



Strongest Emergence



Weakest Emergence



Observations on Cluster 4:

Cluster 4 shows a strong emergence of compensation and rewards, communication and information sharing and innovative work behaviour. The variables with weakest emergence in this cluster, although only marginally weaker than the rest of the variables, are management support for innovation, organisational boundaries and individual innovative behaviour. Also noteworthy is that according to the weighted averages computed by the network, Cluster 4 produces the second strongest emergence of individual innovative behaviour and innovative work behaviour of all the clusters. Concerning the remainder of the variables, Cluster 4 produces the strongest emergence of all the other remaining variables.

Interpretation of the emergence of the variables in Cluster 4:

Somewhat contradictory to Cluster 3, in Cluster 4 we see a strong emergence of innovative work behaviour with compensation and rewards and communication and information sharing. Recall that in Cluster 3 the last mentioned variables show a weak emergence together with a strong emergence for individual innovative behaviour. Various interpretations can be made regarding the balance in the strength of the emergence of all of the variables in this cluster.

A cluster like “The Balancing Act” could be interpreted as an environment where balanced attention is paid to strategic human capital practices. It would seem that this balance favours the potential for innovative work behaviour. Once the basics are in place, in this case the human capital practices, an organisational system reflecting this type of variable emergence could be in a good position for even more enhanced innovation by focusing on programmes and platforms that encourage behaviour and time spent on innovation activities. It could be said that the climate in this type of cluster is ready for disruption towards greater innovation.

It is interesting to note that this is the only cluster where the presence of employees working in a core business position is greater than the presence of those working in a support services capacity. Perhaps a reason for the variables around policy emerging so strongly is that they were rated by the same people who had made them. Further sense-making around this observation could be found in looking at the composition of core and support types, together with the composition of industries in this specific cluster. Of all the included sectors, the Finance sector enjoys the largest representation. Recall in the previous section the discussion on the existence of two definitive task differentiations in the finance sector, that of innovations for new product design and development, and that of implementing and maintaining these innovations. If one takes into account the composition of employees working in a core business function, it would make sense that they are financial employees from the first task description, i.e. the developers and designers.

If one is to interpret the emergence of the variables in the “balancing act” cluster through solely classical methods seeking causality and reductionism, it might seem like this cluster is very healthy. All the variables are in place and well developed, so this might well be the case.

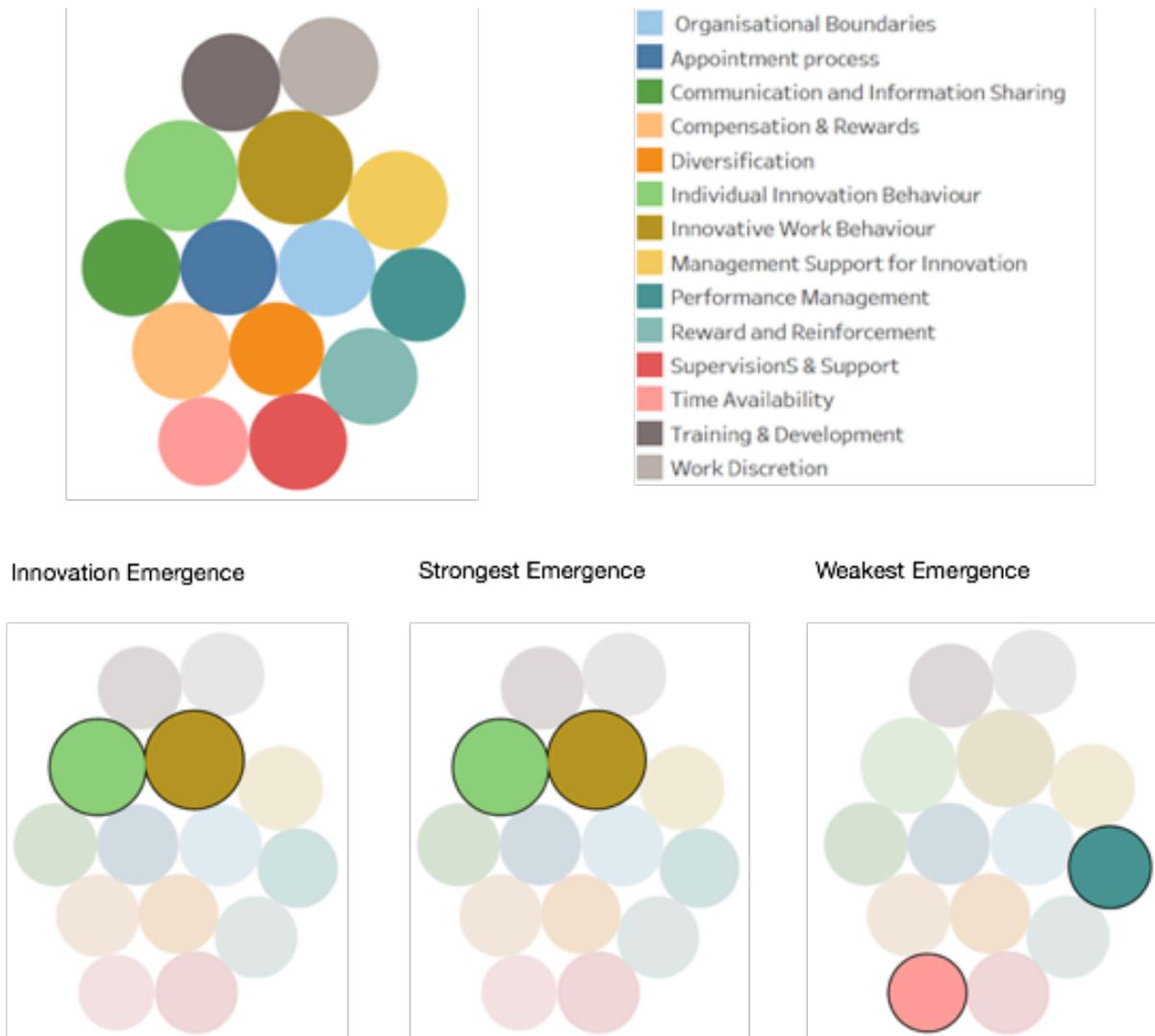
However, taking into consideration all the different possibilities for the results as discussed above, it is once again clear that in order to understand complex phenomena, one has to investigate and interpret them through lenses and analysis methods that allow for that complexity.

5.5.2.5 Cluster 5 – “The Innovators”

Cluster 5 represents 22.43% of the total population. One final time, bear in mind that the size of the cluster is not necessarily indicative of its significance in adding value to the interpretation of the results. Members in Cluster 5 report an average age of 38.71 years, making them the oldest cluster and also the cluster with the longest tenure, recording an average tenure of 8.75 years in the organisations where they are currently employed. Cluster 5 is largely made up of the Finance sector, the Manufacturing sector and National Government. While slightly smaller, the Utilities, Mining and Construction sectors are also well represented. Core business functions are performed by 47.42% of cluster members, while 52.58% of cluster members perform work tasks that are part of the support services in their respective organisations. The “innovators” cluster shows an interesting difference when compared to the other four clusters with relation to the composition of management and non-management members. In this particular cluster, the composition is just about equal, with only 2% more non-managers than managers.

Individual innovative behaviour and innovative work behaviour produce the strongest emergence in this cluster. For this reason, it was thought appropriate to refer to this cluster as “The Innovators”. Variables that produce the weakest emergence in this cluster are time availability and performance management. Further observation and analysis follow in the next section.

Figure 22 Cluster 5: The Innovators



Observations on Cluster 5:

The two variables that describe innovative behaviour, namely individual innovative behaviour and innovative work behaviour, are the variables with the strongest emergence in this cluster. It is also the strongest emergence of both of the measured innovation variables observed among all five of the clusters. Members of this cluster experience a weak emergence of time availability and performance management.

Interpretation of the emergence of the variables in Cluster 5:

The first interesting observation in this cluster is the small emergence, reported by cluster members, with regard to time that they have available beyond their daily tasks for innovation, yet they managed to record the strongest emergence of innovative behaviour. This observation could have a few interpretations. Firstly, if for certain employees innovation is part of the essence of their daily task, they might not consider innovative activities as “going above and beyond”, but simply as what they do. Aforementioned possibility would also explain the low emergence of the cluster members’ regard for performance management.

A second possibility relates to the type of person who could be a member of a cluster such as “The Innovators”. This type of person has an intrinsic drive to achieve more than is expected. Thus, “ticking the boxes” of time and performance management is irrelevant to this individual, who will endeavour to innovate despite the challenges posed by the organisational and environmental systems.

Although slightly weaker, the remainder of the variables reflect a similar balance in emergence as that of Cluster 4, indicating a possible healthy level of focus on, and activity in, strategic human capital practices in the organisational system.

The Finance, Manufacturing and National Government sectors enjoy the strongest representation in this cluster. Compared to the other four clusters, a different and interesting observation is made regarding the composition of management and non-management. In contrast to the other four clusters which are all characterized by a dominance of non-management, the “innovators” cluster produced an almost equal composition of these two types of employees. A cluster like this could possibly reflect an organisational system with a flatter structure and higher levels of permeability among levels and departments or teams. The equal nature in composition of management and non-management is also reflected in the composition in this cluster of members working in core services and support service functions.

The absence of levels and structures is one of the strongest distinguishing observations when comparing Cluster 5 to the other 4 clusters. Organisational systems could benefit from looking

to a cluster like “The Innovators” as an example of the advantages of interconnecting levels and functions for enhanced innovation. This makes for an extended discussion surrounding levels, structures, interconnectedness and permeability in an attempt to link it to the literature reviewed.

5.6 Discussion of results of Phase 1: Kohonen’s Self-Organising Maps

Classical linear methods of analysis are very useful when the researcher is attempting to deconstruct and reduce a simple system in order to influence it in some way or another. When the research goal is to understand systems that involve many aspects coming together, especially if these aspects include human behaviour, linear methods have proven to be less sufficient in capturing the unique and often unexpected patterns, interconnectedness and emergent properties inherent in dynamic and complex systems such as organisations.

The analysis of the means of the overall responses in this study produced several gaps due to unexpected, and even conflicting, output, not offering much information about the emergence of corporate entrepreneurship. The ANN Self-Organising Maps uniquely clusters input data and output that provide insight into the contextual dynamic of systems. This method of analysis is useful for identifying outlying patterns, as well as areas of coherence within and among systems, and provides a unique way of understanding complexity within organisational systems.

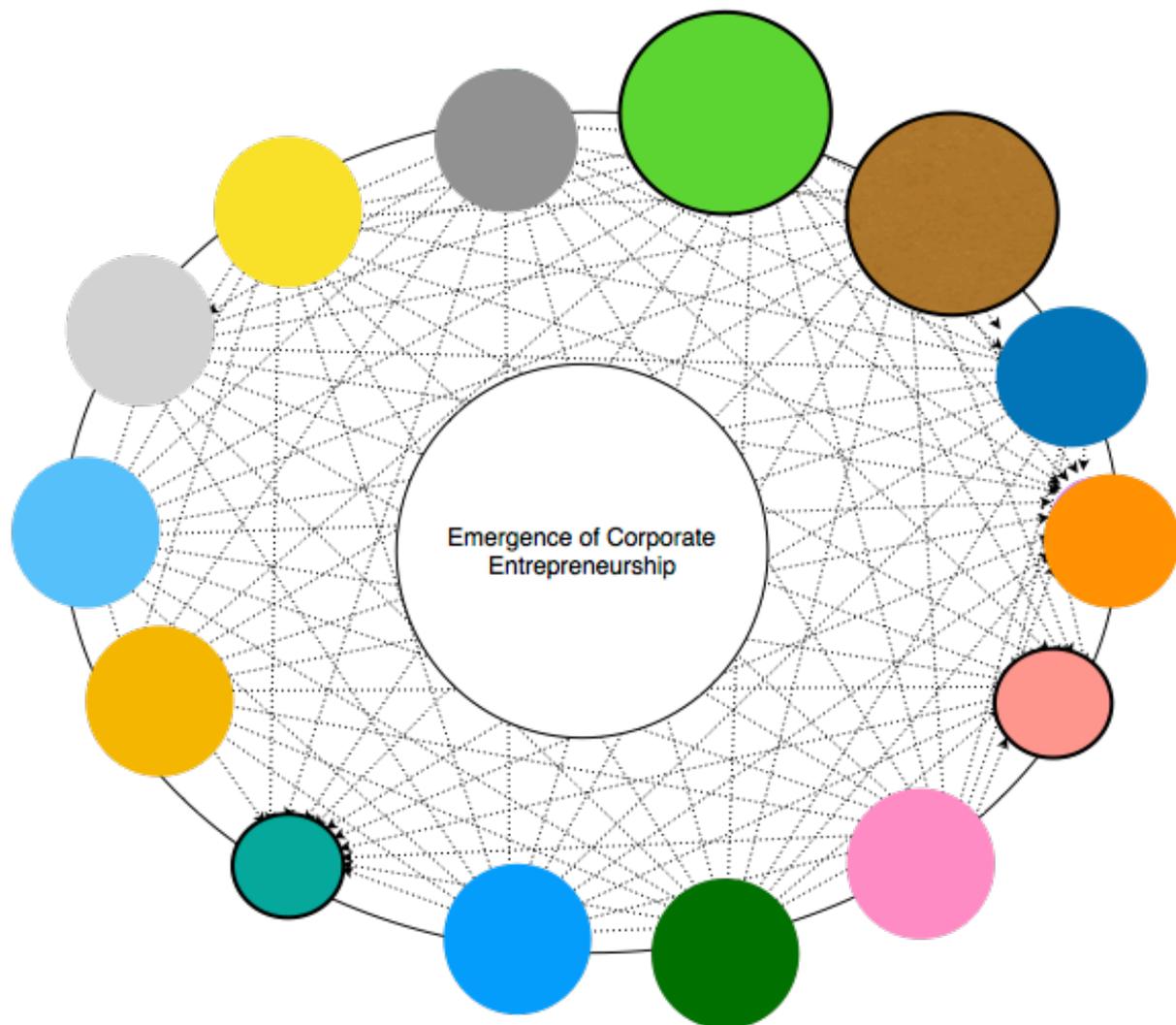
Outliers represent areas of particular interest and areas of potential for the development of innovative behaviour, that could ultimately enhance corporate entrepreneurship.

Adopting this type of non-linear research approach is beneficial in the sense that it has the capacity to provide a more realistic reflection of the true state of operating business in the “real world”.

Cluster 5, “The Innovators”, is used below in Figure 23 to illustrate how the preliminary conceptual framework can be utilised at this stage of the research to show visually the

interpretations made in 5.4.2.5 about the strength of emergence and interconnectedness of variables within a given context.

Figure 23 Adapted and still evolving preliminary conceptual framework applied to Cluster 5 to show the non-linear emergence of corporate entrepreneurship



The adaptability of the conceptual framework is important, as this honours the theoretical stance and the alternative method of analysis of the study. The preliminary conceptual framework as it is now, is resilient to incorporating different variables based on the unique needs of the context under investigation. The preliminary conceptual framework will be further adapted based on the incorporation of the results in Phase 2 of the research as reported in the next chapter. Chapter 6 will conclude with the final conceptual framework.

A non-linear conceptual framework for corporate entrepreneurship could provide a better representation of the composition and dynamic workings of the system, as it does not assume homogeneity or shared values. A non-linear conceptual framework would instead be a truer reflection of the diversity of individual skills, attitudes and contexts.

Models of corporate entrepreneurship built on reductionist principles attempt to decrease complexity. Hence these models find it difficult to deal with the dynamics of the complex reality of organisations. Generally, most models hosted in academic research are characteristic of reductionism, and have attracted much criticism from corporate practitioners. Business often finds models developed by academics impractical, as these models represent an inflexible and, more often than not, unachievable blueprint for doing business because business happens through the complex interactions of human beings in an ever-changing and uncertain environment.

Phase 1 of the research has shown that Kohonen's Self-Organising Maps as part of the Artificial neural network suite of analysis, can indeed be used as an alternative approach to understanding the emergence of corporate entrepreneurship as a non-linear phenomenon. This alternative approach has the potential of identifying patterns in particular groups of humans (in this case relating to innovative behaviour), within a specific context (in this case organisational practices).

The process explored in Phase 1 of the research could prove beneficial on a practical level for organisational leaders, managers and policy makers seeking to enhance corporate entrepreneurship within their organisational systems. Phase 2 of the research will explore the results of the Self-Organising Maps, as well as concepts related to other research objectives with industry and subject matter experts. The final conceptual framework and further analysis are presented in Chapter 6, after incorporating the qualitative research results into the overall research findings.

5.7 Limitations of Phase 1 of the research study

Self-reporting bias:

Respondents that took part in the study were requested to indicate their perceived strength of favourable presence of the variables in their organisations or attributes in themselves. Thus, this was a subjective evaluation by the respondents. Researchers are only too aware of the bias evolved in self-reporting; however, applying objective measures, for example MRI scans, or polygraph types of assessment is of limited scope and for the most part, impractical in the organisational context. Self-reporting measures have a wide range of potential applications and sequential limitations. It is important for the researcher to remain cognisant of the potential bias, and cautious in making conclusions. Given the non-reductionist manner in which the data for this phase of the study was analysed, the concern for the research limitation of self-reporting bias is not as significant.

Choice of human capital and corporate entrepreneurial variables:

The variables chosen for inclusion in the analysis of Phase 1 of the research are well supported by the literature on corporate entrepreneurship and human capital practices; however, the inclusion here is not exhaustive. Future studies using different variables of corporate entrepreneurship and possible organisational practices other than those included here, could yield very different results.

Sampling:

A consequence of the convenience associated with gathering data in an organised research group is that sampling was done only in certain industries. Although a variety of industries were included, the inclusion of other industries might yield different results. The measuring instrument was applied by MBA students who acted as field workers in their different organisations, possibly having an impact on the lack of spread in the sample with regard to level of position in the organisation and level of education. Future studies might benefit from focusing on specific levels of both position held and education.

The “black box” of Artificial neural network analysis:

Neural networks have encountered criticism regarding the network operating in a black box (Dayhoff & DeLeo, 2001; Vellido, 1999). What this means is that neural networks can be viewed according to their input and their output; however, the process for arriving at the output is impervious to the observer. Due to this, some critics call into question the meaning of the results. This type of criticism is unavoidable when venturing into non-linear analysis and visualisation methods such as Artificial neural networks. It is, however, justified in this particular study, as it is in line with the research problem and the epistemological stance of the study.

5.8 Conclusion

This chapter presented the neural clusters as produced by Kohonen's Self-Organising Maps. Clusters were described according to their unique characteristics, and the analysis was shaped by the researcher's interpretation of possibilities for the clusters' results. Specific attention was paid to outlying cluster patterns. Clusters were named according to the unique patterns of behaviour they presented. An example was also presented of how the research results could be plotted on the preliminary framework, as proposed in Chapter 3. The next chapter presents Phase 2 of the research results and the final conceptual framework produced by the study.

Chapter 6

A qualitative exploration of outlier patterns of innovative behaviour

The aim of this chapter is to present the findings of the qualitative phase of the study.

6.1 Introduction

In Phase 1 of the research as presented in Chapter 5, Artificial neural clustering was used to cluster the quantitative data based on the preliminary conceptual framework developed in Chapter 3. Part of the purpose of the neural clustering was to identify any outlying patterns relating to individual innovative behaviour within the context of human capital and other organisational practices. For the purpose of gaining deeper insights into the findings made in Chapter 5, alternative sources of interpretation could prove useful. One avenue for obtaining an alternative source of interpretation is the use of qualitative interviews. Phase 2 of the research completes the process of the sequential explanatory mixed method research design as committed to in Chapter 4. The chapter contains a brief description of the sample and the process of analysis, followed by the responses of participants to the outlying clusters. The presentation of the qualitative data findings concludes with an exploration of the themes that emerged in the participant interviews.

Participants for this phase of the study were selected based on their expertise and experience in organisational behaviour, and specifically the driving of innovative behaviour in organisational settings. This phase of the research addresses the following research goals as set out in Chapter 1:

Research question:

How are corporate entrepreneurship and innovative behaviour defined, understood and initiated by subject matter experts in business?

Research objectives:

EO₂: to determine the practical applicability of Artificial neural network Self-Organising Maps as a method of interpreting the contextual emergence of innovative behaviour

EO₃: to determine the face validity of the preliminary conceptual framework as perceived by subject matter experts in corporate entrepreneurship through a qualitative research approach

EO₄: to construct the final non-linear conceptual framework for corporate entrepreneurship

6.2 Sample selection and description

Participants for this phase of the study were purposefully selected, based on their experience and expertise in the area of organisational behaviour and driving innovation. Also referred to as purposive sampling, this particular method of sample selection involves the intentional selection of participants based on their experience of the central phenomenon and key concepts that the study aims to explore (Creswell & Plano Clark, 2018).

An expert is a person who is considered to be someone who is very knowledgeable or very well skilled in a particular area or discipline ("Expert," 2001). For the purposes of this study, 4 subject matter experts were purposively selected for participation based on their experience and expertise in the area of driving innovation in industry. These experts are engaged in enhancing and developing individual innovative behaviour and corporate entrepreneurship through various mechanisms or interventions, for example consulting or training.

The sample included four interview participants. A description of each participant's expertise is provided below in Table 8.

Table 8 Profile of participants

Participant A	Summary of experience	Industries worked in/with included in study *not included in study
	<p>20 years' experience as a whole brain creative specialist, training in organisational and educational settings. <i>Consulted by organisations to enhance creative thinking among employees, and to create environments that are conducive to creative thinking and innovation.</i> Holds a PhD in Educational Law and authored several books on creativity and innovation behaviour in various contexts. <i>Endorsed by peers for leadership development, coaching skills and change management.</i></p>	Utilities Transport Trade Provincial Government National Government Mining Manufacturing Legal Information Technology Finance Construction Community and Social Services *Sport *Education *Hospitality and Entertainment *Healthcare
Participant B	Summary of experience	Industries worked in/with included in study *not included in study
	<p>Entrepreneur for 21 years. <i>Executive director of one of Africa's largest travel innovation companies, designing and delivering full spectrum business and leisure travel innovations to organisations.</i> Innovations range from products to system solutions. <i>Winner of numerous international awards for service innovation.</i> Winner of numerous awards for entrepreneurship. <i>Growing a business from R1 million turnover to R 4.2 billion in 21 years, with a staff retention of 93%.</i></p>	Utilities Transport Trade Provincial Government National Government Mining Manufacturing Legal Information Technology Finance Construction Community and Social Services *Travel *Sport *Hospitality and Entertainment *Film
Participant C	Summary of experience	Industries worked in/with included in study *not included in study
	<p>Holds an international Post PhD in Creativity Studies. <i>23 years' experience in teaching creativity skills to employees in organisational settings and driving innovation in said organisations.</i> Internationally known speaker on creativity and innovation. <i>Author of more than 90 books on creative thinking and innovation behaviour.</i></p>	Utilities Transport Trade Provincial Government National Government Mining Manufacturing Legal Information Technology Finance

	<p>Organiser and host of numerous international conferences on creativity and innovation. <i>Creator of a number of television productions on creativity and innovation.</i> Recipient of many international awards for contributions made in the fields of creativity and innovation.</p>	<p>Construction Community and Social Services *Sport *Education *Hospitality and Entertainment *Film *Healthcare</p>
Participant D	Summary of experience	<p>Industries worked in/with included in study *not included in study</p>
	<p>12 years' experience as serial entrepreneur and business process consultant. <i>Corporate coach specialising in enhancing personal and organisational growth through creative thinking and innovative behaviour.</i> Corporate trainer and consultant, specialising in organisational communication, individual "soft skills", and overall organisational climate. <i>Other corporate experience relates to product development, sales and marketing.</i></p>	<p>Utilities Transport Trade Provincial Government National Government Mining Manufacturing Legal Information Technology Finance Construction Community and Social Services *Sport *Education *Hospitality and Entertainment *Film</p>

6.3 Data collection and analysis

Once potential participants were identified, they were contacted, informed of the purpose of the study and invited to participate. Four experts agreed to take part in this phase of the study. The consenting participants were ensured of confidentiality and the freedom to opt out of the research process at any time. The participants were then presented with the quantitative research results obtained in Phase 1 of the study, and asked for their interpretations. On average, the interviews lasted between 70 minutes and 100 minutes. Interviews were semi-structured, guided by an interview schedule. Interviews organically emerged in a flowing conversation about the experiences and observations in organisational settings related to the topics under investigation. Interviews were recorded and then transcribed, and the text was scrutinized for the identification of emerging themes in the discussions. Thematic coding was used to identify common themes in the responses of participants. Care was taken to protect the identity of participants and organisations.

6.4 Discussion of clusters exhibiting outlying patterns of innovative behaviour and presentation of emergent themes

Qualitative research favours treating theory as emerging from the research process rather than analysing the gathered data to test theory. The qualitative researcher is preoccupied with identifying patterns inherent in the data, rather than interpreting data through imprinting preconceived ideas on data (Bryman & Bell, 2011).

The first part of the discussion of findings reports on the section of the interviews where the expert participants were presented with, and asked to respond to, the clusters that produced outlying patterns of the emergence of innovative behaviour. The semi-structured interviews commenced with a discussion on the participants' general views and experiences of corporate entrepreneurship and innovation in organisations. A result of these discussions was the emergence of various themes that were emphasised by the expert research participants. The second part of the discussion of findings presents the themes that were extracted by the researcher based on their frequency of mention and their relevance to the research objectives. The next section concludes in honouring the qualitative method of thematic analysis, with a discussion on the themes that strongly emerged in the interviews with the expert participants. Finally, this chapter presents a refinement of the preliminary conceptual framework as proposed in Chapter 3.

Clusters 1, 2 and 5 were observed as the clusters with outlying patterns of innovative behaviour. The Artificial neural network Self Organising Maps analysis presented in Chapter 5 produced Cluster 2 with an outlying weak emergence of innovative behaviour, and Cluster 5 with an outlying strong emergence of innovative behaviour, while in Cluster 1 the two variables representing innovative behaviour were not observed as either the strongest or the weakest emergent variables in the cluster. It is interesting to note, though, that Cluster 1 had some of the smallest emergences of certain of the variables when compared to the other clusters. Results pertaining to these three clusters will be presented in the next section.

As set out by the research problem, it is the main aim of the study to gain a better understanding of the emergence of individual innovative behaviour as part of corporate entrepreneurship within organisational practices.

Responses to the different clustered results are presented in the following sequence: firstly, a brief recap of the neural clusters as detailed in Chapter 5 presented together with a general summary of the participants' responses to the neural clusters; secondly, the participants' interpretations of the industry composition of the cluster; thirdly, the interpretations of the core business and support services function composition, as well as the management and non-management composition of the clusters.

The researcher is aware of the possible presence of bias in conducting, and reporting on, this type of research. To mitigate this, the interview transcriptions were read by a co-researcher. For increased trustworthiness of the results, the independent interpretation of the co-researcher was compared to that of the researcher to identify any major differences. However, interpretations and the identification of themes were similar.

6.4.1 Expert interview results: Interrogation of clusters with outlying patterns of innovative behaviour

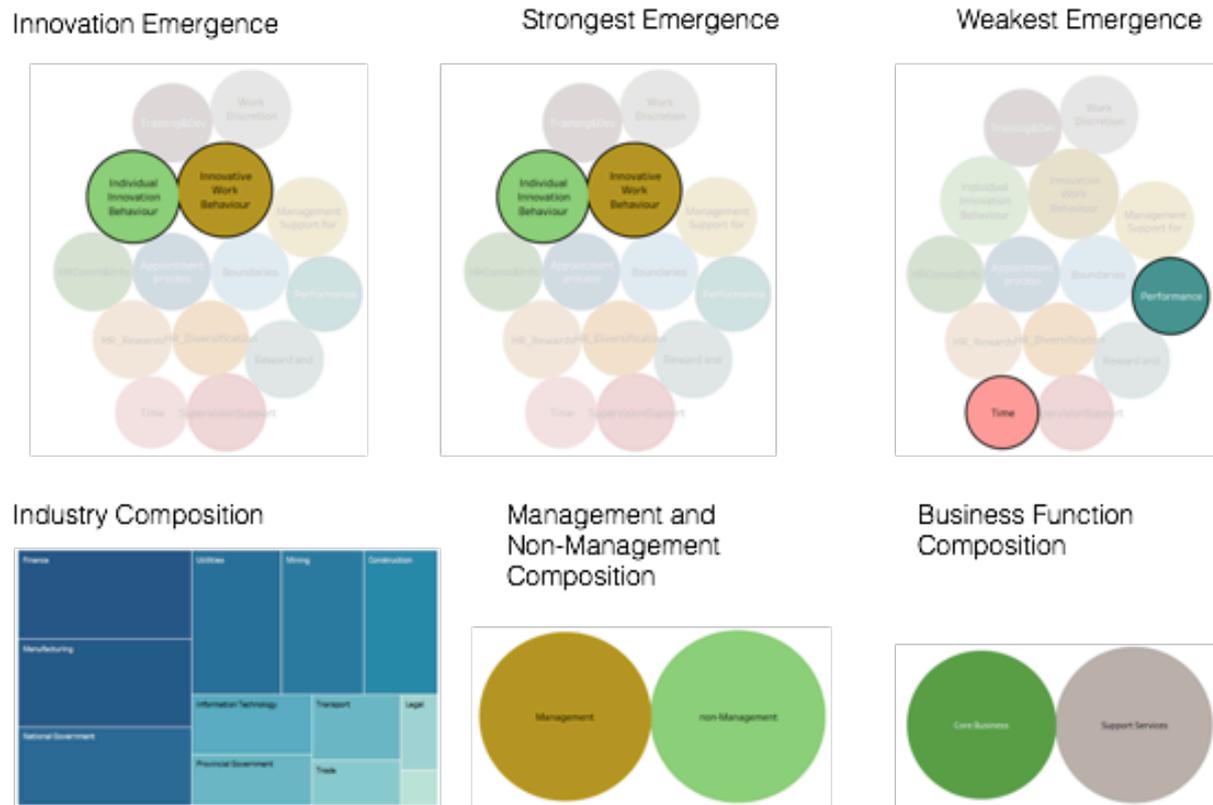
As mentioned, Clusters 5, 2 and 1 were presented to research participants for interpretation. Responses are summarized below in that sequence.

6.4.1.1 Cluster 5

Recall from the results presented in Chapter 5, that Cluster 5 produced the strongest emergence of both variables representing innovation behaviour, namely innovative work behaviour and individual innovative behaviour. In the same instance the weakest emergence was observed in the measurements of time availability and performance management (see Figure 22). The largest industry representation was the Finance industry, followed by Manufacturing and National Government. The composition of management and non-management, as well as the composition of core business members and support services members, was very close to equal.

Figure 24 Presentation of outlying variables in Cluster 5 and discussed compositions

Cluster 5



General insights from the interviews regarding an organisational system that reflects Cluster 5, included the benefit of competition within an industry in enhancing the strength of the emergence of innovative behaviour, and subsequent corporate entrepreneurship. From the responses, it also seems that disruption and turbulence in an industry or market are good for innovation. This finding is congruent with the theoretical stance of complexity. It is clear that emergence (in this case innovative behaviour) within a complex adaptive system (in this case the organisational system) occurs when the system is far from equilibrium.

6.4.1.2 Cluster 2

Revisiting the results observed in Chapter 5, the reader is reminded that Cluster 2 produced the weakest emergence of both variables representing innovative behaviour, namely innovative work behaviour and individual innovative behaviour. In Cluster 2 another interesting observation was the strong emergence of variables related to performance management,

rewards and recognition, supervision and support, time availability and training and development. Participants commented with interest on the number of variables that strongly emerged in this cluster where innovative behaviour is observed as exhibiting the weakest emergence.

Figure 25 Presentation of outlying variables in Cluster 5 and compositions

Cluster 2

Innovation Emergence



Strongest Emergence



Weakest Emergence



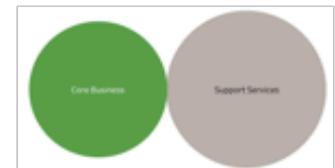
Industry Composition



Management and Non-Management Composition



Business Function Composition



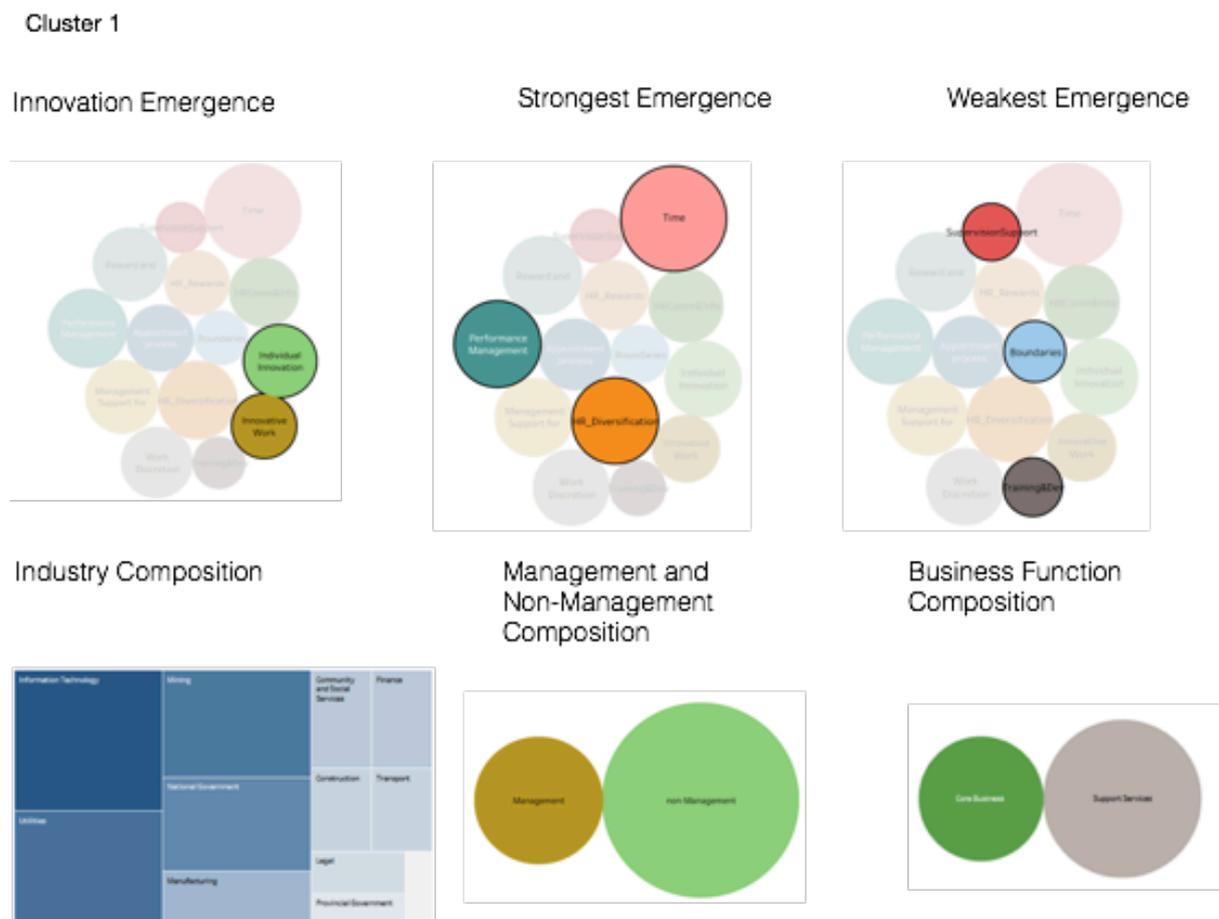
Participants commented on the strong emergence of a larger number of variables in this cluster compared to the other clusters. When contemplating the specifics of the strong variables, participants generally referred to a lack of focus on innovation or the organisational readiness for innovation related actions. The strong emergent variables were related to organisational and human capital practices, and interpreted as possibly being indicative of an organisation that focuses on basic task and process competencies. Another interpretation, related to training and development, is that this specific human capital function might be focused on enhancing basic task skills, not necessarily adding to the general creativity or innovation capability. Predictability was mentioned as a possible hindrance to newness in organisational systems. Organisations frequently fall into the habit of simply doing things

because they have always been done. It was suggested that reassessing the value-add of activities in organisational systems such as are reflected in this cluster, could hold promise for enhancing innovation.

6.4.1.3 Cluster 1

Cluster 1 produced average emergence levels of innovative behaviour when compared to the strength or weakness of the emergence of the other variables in the cluster, as presented in Chapter 5. Time availability was the strongest emergent variable, not only within this specific cluster but also in comparison to the other clusters. Performance management and diversification also strongly emerged within this cluster. Also interesting is that supervision support, organisational boundaries and training and development emerged as weak outliers both in this cluster and when compared with the other clusters.

Figure 26 Presentation of outlying variables in Cluster 5 and discussed compositions



Participants contemplating the strength of the emergence of the variables in Cluster 1 noted the irony in the strong emergence of time availability yielding little enhancement in the strength of the emergence of innovative behaviour. The irony here, according to the experience of participants, is that organisational members often use a lack of time as an excuse for not being able to engage in innovative activity. The experience of participants responding to this neural cluster combination offers the possibility that the weakest outlying variables clearly indicate an organisational system characterized by rigid boundaries, non-existing or irrelevant training and development initiatives, and a lack of supervision and support.

6.4.1.4 Participants' interrogation of industry composition

Most participants alluded to an expected high level of emergence of innovation in the Financial sector, prior to seeing the neural cluster output of Cluster 1. One reason given for this was the constant movement and change in the manner that financial products are consumed. Another reason was the frequent disruption in the Financial sector by determinant market factors. The intense level of competition in this industry was mentioned as another reason for an expected higher emergence of innovative behaviour in this industry. Here, innovation is consistently intense in both the product offering and the technologies driving the products. Participants noted that despite the current strong levels of innovation, the financial industry is nowhere near a level of saturation in innovation; for instance, the physical manifestation of a financial institution is expected to disappear in future. According to one participant, product innovation needs to put management and control of the product in the hands of the person who owns and consumes. All participants agreed that the above discussed factors, in a sense, force the financial industry to innovate.

The Manufacturing industry was also mentioned as an industry where a strong emergence of innovative behaviour would be expected, as this industry faces changes in consumer needs that impact both the products they manufacture and the methods they apply in producing these products.

National Government, which is the third largest sector represented in the innovator cluster, somewhat surprised some participants. However, participants B and C shed some interesting

light on this finding. Participant B posited that we may not perceive National Government as an area that prioritises innovation, because of the unique and possibly unfamiliar type of innovation it pursues. The particular participant alluded to an intelligence type of innovation, where systems need to be able to extract specific, relevant and accurate information in an instant. Participant C recalled the history of South Africa, where the transitional structures at the time successfully manifested reconciliation and transformation, despite expert predictions to the contrary. According to the participant, this was the innovation of an entirely new country.

Companies in the Utilities industry were interpreted by all participants as semi-governmental organisations, this being true for South Africa. Participants had not experienced corporate entrepreneurship in their dealings with most of these companies, and subsequently did not expect a strong emergence of innovative behaviour in this industry. Insight into the weak emergence of innovative behaviour related to an overall disconnect in the systems that drive innovation in infrastructure and technology in most companies operating in the Utilities industry. Mention was also made of the task-specific nature of jobs in the industry, that leaves little time or opportunity for the sharing of innovative ideas. The previously mentioned challenge is fuelled even more by a further disconnect and lack of trust between leaders in these companies and the employees actually doing the work on ground level, and a general ignorance of desperately needed innovation.

Finally, most other comments related to the Information Technology industry. Despite an expectation of a strong emergence of innovative behaviour in this industry, the results produced by the neural clusters indicate a dimensionally average emergence of innovation when compared to the strength of emergence of the other variables in Cluster 1 – of which Information Technology is the largest represented industry. There is some consensus among participants when considering emergence in innovative behaviour in the Information Technology industry. Firstly, there was a general expectation of a strong emergence of innovative behaviour in this industry. Secondly, there was agreement on at least two distinct areas in the industry, one related to the development of the technologies and the other focused on support. Thirdly, participants noted a possible misconception regarding the type of

innovation present in this industry, which may be a more systematic, left brain type of innovation, as mentioned by participant C.

Included in Table 9 below are some of the verbatim quotes from the interview sections that covered the different industries and innovative behaviour.

Table 9 Verbatim quotes in support of interpretations of industry and innovative behaviour

Participant A	Verbatim quotes
	<p>“... it is not really a surprise, because as I said, we worked a lot with banks and the whole of the financial area has moved into the 21st century probably more than the others, because of the way people bank.”</p> <p>“...having worked with many banking institutions, I think there is a lot of movement.”</p> <p>“I don’t think in earlier years there was too much competition in the finance, you know you had your bank, you were loyal to it. Now, people are chopping and changing for the first time ever, because of the offerings out there, so I have to innovate and create in order to attract.”</p> <p>“... IT is just one of the industries where renewal and keeping up is top priority...”</p> <p>“I think that what we have in IT, you have on the one hand the number crunchers, so the people that are working with data and they are crunching the data and analysing the data, so in that sense you have that group. On the other hand, you have the designers or programmers. So, I think you have this paradox in IT, where IT in one grouping, where yes, I think their focus is on the mundane and the repetitive and so on, where there is another grouping where we have to (innovate).”</p>
Participant B	<p>“... because finance can see (sic) exactly with the banking systems with the apps with the interaction the different ways *Bank A, *Bank B, those kind of guys, being innovative the whole time, not only with regards to technology, but also with regards to the product offering they bring into the market...”</p> <p>*Names of banks omitted due to confidentiality agreement</p> <p>“From what I have observed. If you look at Utilities and you look at, once again talking in the sense of a government department, Water</p>

	<p>and Sanitation, it is very clear that there is a major issue with regards to how they are managing their infrastructure the current technologies there is always, there is crises all over the place and it is becoming, like the crisis at the moment in Cape Town as well.”</p> <p>“Possibly the composition of IT was more support than development, that would explain the weak emergence (of innovation).”</p>
Participant C	<p>“If you talk about "futuring", and I belong to probably the biggest future type company based in London, and they have been saying now for years that banks as we know it now, will completely disappear. You may have little stuff that remains. But there is a pressure on them now. I think that is one of the reasons: they NEED to innovate now. Because there is no hope for them if they don't. They are going to lose. People won't go to banks anymore. Banks were buildings that people went into, banks are not that anymore, banks is a phone now. So they are in a sense forced to do that (innovate). And they are doing that, I know that, because we work with them.”</p> <p>“Very much in ‘the doing mode’ type of companies. They are in the action mode, there is no time for incubation and so on. They just have to go out and do it. They are not bothered by innovation. <i>*Should they be though?</i> I think they should be, it comes back to what you asked me earlier, should it be everywhere or should it be centralised? Even if they could have a centralised entrepreneurial think tank or whatever innovative focus to make sure that there is always innovation taking place then that is fine but that does not often happen.” – Commenting on the Utilities industry</p> <p>“Information Technology... They say that they are natural innovators, but often when you get involved with them, you find that they are very much left brain systematic thinkers. I think they see themselves, I think they have this desire to be that.”</p>
Participant D	<p>“Managing of financial products is being placed in the hands of the consumer.”</p> <p>“I also think that the finance environment currently is a very competitive environment. Having a look how people are marketing finance.... Credit agreements, how they do things differently to attract consumers, they have to be quite innovative, because finance is in essence linked to human behaviour. If I tap into human behaviour, I have a better chance of luring someone in to buying my debt.”</p> <p>“.... Semi government industries...I think the biggest problem that we currently have in our government environment is that there is no room for innovation and the reason for that is that there is no trust.” – Commenting on the Utilities industry</p> <p>Then obviously IT, as that is where we are currently, I think the biggest innovation currently happens in IT.... or perceived. The amount of</p>

	people... just looking at the South African context, the amount of people that now have access to IT. Where 10 years ago we didn't have that access. And today people are connected more than ever."
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6.4.1.5 Participants' interrogation of business function composition

The reader will recall from Chapter 5 that the composition core business versus support service organisational members in Clusters 1 and 2 consisted of a larger number of the latter, while Cluster 5 produced a composition that reflected a close to equal composition of human capital from these two types of business functions. Interpretations of this result by the expert research participants revealed themes relating to the type of required innovation, the value the particular organisation places on either of these functions and the level of connect or disconnect between said business functions.

Cluster 5, according to research participants, reflects an organisational system where support service members are valued as much by the organisation as core business members. An indication of said equality in value can be observed in the equality of training and development opportunities offered by the organisation, a sense of shared knowledge and responsibility throughout the organisation, and a general appreciation for the unique roles that all business functions play in the overall success of the organisation. Another possibility mentioned by most research participants is that Cluster 5 might be indicative of an organisational system that is focused on a service type of innovation. The previous observation is supported by the findings related to industry in this cluster.

Regarding the composition of business functions in Cluster 2 and Cluster 1, observations reflected the opposite of those made about Cluster 5. Organisational systems that have this type of business function composition might experience a sense of lack of inclusivity when it comes to opportunities for training and development, especially when training and development are related to creativity or innovation skills. This is exacerbated by the perception that the organisation does not have the time to expose some business functions to opportunities to innovate. Changing the aforementioned organisational mind-set, according to one participant, can potentially be a source of advancement for organisations in many areas, including innovation. Actively increasing inclusivity in opportunities to innovate and

consciously enhancing interconnectedness amongst business functions could prove useful to organisational systems similar to those of Clusters 2 and 1, if the greater goal is corporate entrepreneurship through increased innovative behaviour.

Included in Table 10 below are some of the verbatim quotes from the interview sections that covered matters concerning business function cluster compositions and the strength of the emergence of innovative behaviour.

Table 10 Verbatim quotes in support of interpretations of business function composition and innovative behaviour

	Verbatim quotes
Participant A	<p>“That is interesting because I have to say that in support services, many of the companies that we work on, they are the ones that get a lot of the brunt of the criticism, so you know, because they are in the middle so they have to in a way listen to everybody’s needs and also complaints, etc. I think in organisations, some of them, they in a way have to find ways to answer these complaints so they have to try to figure out how to help. In that sense, some of your support systems would come up with the ideas because they just have to, and especially if they are valued. So it in a way makes sense to me that they could be on par with your core business, absolutely.”</p> <p>“... in many companies they feel that training is also for certain groupings and for certain levels and for others, not so much. And the lower you go, the more it is on the very basic skills that we need, so the whole thing about innovation, creativity does not really come into the picture at all.”</p> <p>“Once again, I think that it is a mind-set that we don’t have time for that, because we have so many other things that we have to train people for, missing the point that we spoke about a few times now as well. In the 21st century, companies that flourish are those, I think, that have programmes with innovation and entrepreneurial and that kind of thing. So, training there is a lot of gaps in training programmes.”</p>
Participant B	<p>“...because if you look at the industry, finance is also service orientated. So yes, there is a focus on core business but the support services is very important because there is nothing tangible in that industry, so that is why these two (pointing to type of business) will go hand in hand and it is of utmost importance.”</p> <p>“... looking at tangible/non-tangible, that is where I come from because the service offering is totally different, innovation is totally different...”</p>
Participant C	<p>“They were listening and recreating all the time. So, innovation was everywhere and everyone had the opportunity.”</p>

Participant D	<p>“I would say that in Cluster 5 there is a shared sense of responsibility, that is what is making sense for me over there, so they understand both business types, that they contribute to the organisation is equally important to their success.”</p> <p>“... the support (services) is the most difficult and also the most important part. And what we tend to see, I sometimes feel that our sales get more recognition than our support staff. So, if we consider something like recognition of the two business types...”</p> <p>“So, if we value both, it will contribute to the greater good of the organisation. “</p>
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6.4.1.6 Participants’ interrogation of the composition management and non-management

Similar to the previous results on the composition of core business and support services, the cluster compositions of members of management and non-management in Clusters 2 and 1 reflect a skewed tendency towards members of non-management, while in Cluster 5 an almost equal composition was observed. Themes mentioned by participants about these compositions related to organisational openness, trust and organisational hierarchy. Participants highlighted the possibility of a lack of openness in Clusters 2 and 1, adding that this could be representative of an organisational system where innovation is controlled by a select few and there is limited opportunity for all members of the system to engage in emerging newness. Leadership lacking the ability to encourage through setting an example, supporting employee ideas and innovation endeavours and engaging all human capital in innovation related activities, is in effect hampering the organisational system’s corporate entrepreneurial ability. Deep hierarchical structures exacerbate the aforementioned by increasing barriers to communication and decreasing levels of trust.

Regarding the composition of Cluster 5, all participants identified the possibility of a flat organisational structure. Participants were in agreement that a flat type of organisational structure holds positive potential for the emergence of innovative behaviour. Moving away from hierarchy potentially increases the quality and frequency of organisational communication and encourages a shared sense of responsibility. An open organisational system characterized by high levels of trust lays the foundation for the emergence of innovation. A final observation is that this type of cluster could be representative of an

organisational system occupied by members that manage themselves and are equipped and trusted with the necessary resources to behave independently in an innovative manner.

Included in Table 11 below are some of the verbatim quotes from the interview sections that covered matters concerning the composition of management and non-management and innovative behaviour.

Table 11 Verbatim quotes about the composition of management and non-management and innovative behaviour

Expert	Verbatim quotes
Participant A	<p>“...that is interesting, because I think I see one thing, I see probably that there is a stronger trust going on and that is why it is very equal, so innovation is very often then inspired if you will in others and this is a pre-shaded(sic). So there is this trust and openness and I think that is maybe why in this cluster that is very equal. So where innovation is low, I think there is maybe less, can I use the word respect, maybe, these people aren’t showing the example. That could be something. Like, look at these guys... I am living what I am talking, I am inspiring new thinking, this is who I am in myself...”</p> <p>“I would in a way think that this is maybe in a way a more flat organisational structure. Cluster 5, in other words, we are closer to together.”</p> <p>“So, where innovation is low, I think there is maybe less, can I use the word respect.” – Mentioned meaningfully with trust</p> <p>“So, I am looking for that leadership, I am looking for inspiration, I am looking for encouragement to do this different or better, but it is not there.” – Points to clusters 1 and 2</p> <p>“Where here maybe a more hierarchical structure, where there is more distance, maybe less trust, less communication. That could be one of the reasons for the difference there.”</p>
Participant B	<p>“So, my consultants need to be innovative in the sense of being flexible, thinking on their feet, but they are not on management level. That is why it’s important for them to be able to think out of the box. Obviously, we give them the tools, but they need to make the decisions...”</p> <p>“... because the service offering is totally different, innovation is totally different... “</p>
Participant C	<p>“When it comes to creativity and innovation, it leads to self-management.”</p>

	<p>“You can sort of manage “light” but not manage in the old sense of the word. Because I can actually.... I should manage myself, and not constantly be managed, I mean it is 2017, you know. So that to me makes absolute sense.”</p> <p>“It has to lead to a flatter structure as I said, it comes to this inner working of who we are...”</p> <p>“... my point with the waste removal people if they knew that they had an idea here and someone would listen to them and change it, then they would come up with ideas, but it does not happen, and that is why I say innovation gets stuck in these environments, because there is no hope that anything that comes up, that someone will take it and do something with it.”</p>
Participant D	<p>“I would think that the cluster with the highest innovation is possibly more of a flat structure – Refers to Cluster 5</p> <p>“A flat structure for me is about increased shared responsibilities. It is about moving away from titles and positions on organograms to a greater sense of shared responsibility.”</p> <p>“...the old school thinking of 1 manager for 40 employees is changing, and should change, you can have 1 manager for 3 employees... It is then conducive to coaching, training, and just more direct contact.”</p> <p>“...we might have more hierarchy over here.” – Points to Clusters 1 and 2</p> <p>“I think management kills innovation. It looks like management in Cluster 1 and 2, although a smaller group, they control innovation more strict (sic)... “</p>

The most frequent observation made by the expert participants in their interpretation of the equal composition management and non-management members in his cluster was that it is telling of a flat organisational structure.

The next section explores the themes that emerged in discussions with participants. Themes are titled and then elaborated on by the researcher. Throughout the exploration verbatim quotes in support of the themes are provided.

6.4.2 Theme 1: The robot has a heartbeat.

In this particular study, understanding the dynamics of innovative behaviour within the context of organisational practices is key to addressing the research objectives of the study. It is

interesting to note that in Phase 2 of the study the role of humans in the organisational manifestation of any type of innovation, progress or change was mentioned very frequently. Consequently, the first theme discussed here relates to the humans or employees that are tasked with the responsibility of innovative action and eventual corporate entrepreneurship. This theme links to the foundational literature discussed in Chapter 2 of this study, that explored the theory of humans at work.

Responses by participants referring to aspects of humanity or human-beingness as a central part of innovation were categorised under this theme.

Metaphorically the robot in this theme is a representation of innovation and general progress. Responses from participants as presented below, place humans at the centre of innovation and general progress. This human aspect as integral in innovation is symbolised by the robot in the title having a beating heart.

*“Innovation is about **people**.” – Participant B*

*“... specifically with our employees, was to develop our technology in such a way that **we keep our humanity through technology**.” - Participant B*

*“innovation for us happens on a **personal level**, it represents a **personal growth** in our employees. This is really important. It goes hand in hand.... **technology and the human side** of the employee.” – Participant B*

*“... they had doubled their production. This was attributed to technology, yes, but more to the **human factor now understanding the technology**. So, the integration of the two, not the one or the other.” – Participant C*

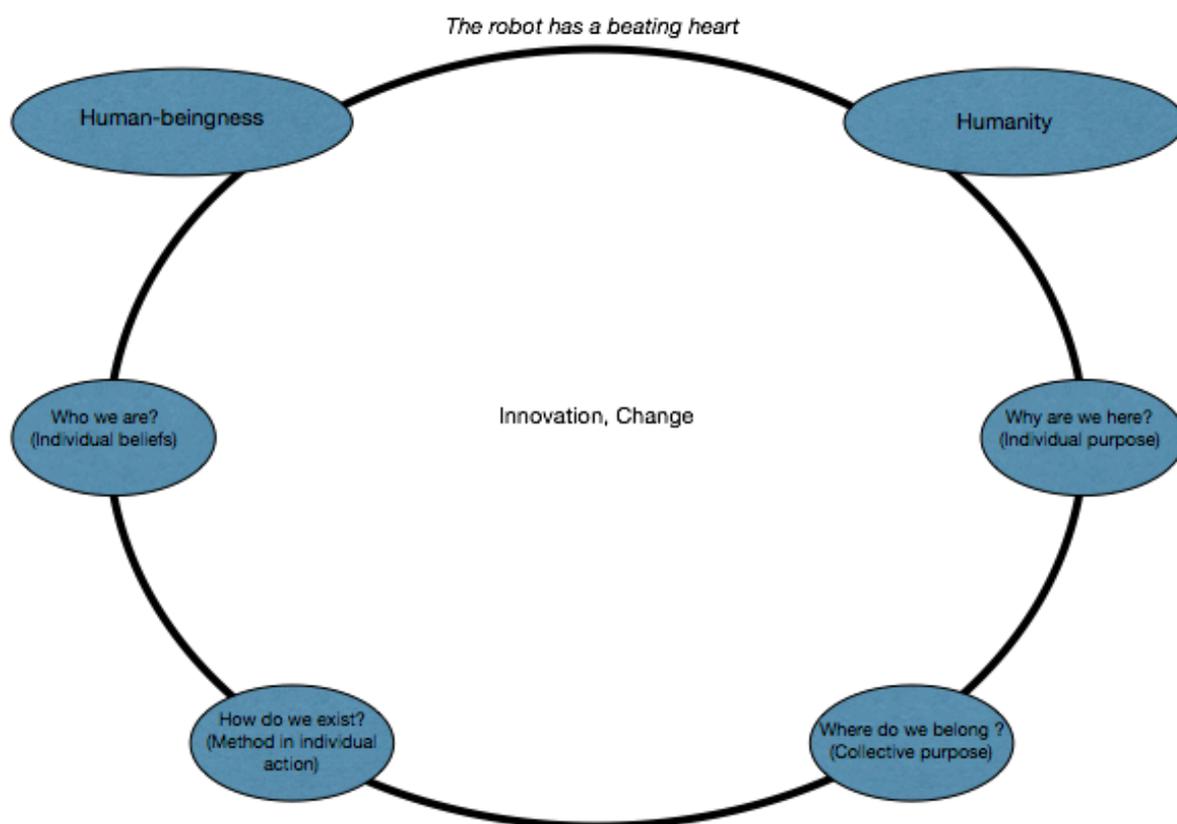
Although there are still many discoveries to be made, and much to be understood about humans - whether in the workspace or any of the many other spaces we occupy - one thing is certain: very few phenomena can be totally separated from the human element. It is thus important to constantly pursue a deeper understanding of the dynamics of interconnectedness and interaction between human beings and the context in which they function and create. Participant C makes the point that *“we have a terrible understanding of human-beingness”*.

6.4.3 Sub-themes to Theme 1: Human-beingness within Humanity

The theme discussed above is interpreted further by distinguishing two sub-themes identified as key components of the process and context of producing innovation in the organisational context. The first sub-theme relates to the human tasked with innovating, and is titled “human-beingness”. The second sub-theme relates to the organisational context the human functions in, and is titled “humanity”.

Participant responses that shaped the conceptualising of this theme, dealt with the employee as innovator within the organisational environment where these employees are expected to innovate. A holistic illustration of the theme is provided by Figure 27 and elaborated on below.

Figure 27 Theme 1



Human-beingness, in this context, refers broadly speaking to the belief systems the individual has about herself or himself. More specifically it is about who we are, or what we believe about ourselves and how we exist, or the method in our actions. To summarise: understanding

human-beingness lies in gaining insight into themes that describe the sum of the individual human being. It is important for organisational leaders and managers expecting a certain type of behaviour from an employee, in this case innovative behaviour, to understand the human-beingness of the employee.

*“It does not matter how good the innovation is, it is about the **person’s ability to adapt**; the individual has to think of innovative ways how to adapt to the best of your ability.” – Participant B*

*“... whatever innovation process you need, you need to **start with your own creativity**.” – Participant C*

Humanity, in this context, describes the system/s in which the human being operates. Here we seek to understand why we are here, and where we belong. This particular sub-theme is concerned with defining our role or contribution to the tribe or the system and understanding what makes us feel at home in this tribe or system. This system or tribe is often mentioned in organisational studies as culture. Understanding the interconnectedness of this organisational humanity with the human-beingness of employees that make up the organisation, is important for enhancing the innovative behaviour of existing employees and also potentially increases the possibility of attracting like-minded employees.

*“Getting the right person to **fit** the culture.” – Participant B*

*“People want to be there because there is an **attraction**.” – Participant C*

Individual beliefs, or what we believe about ourselves, undoubtedly form the foundation of that which guides our behaviour and interactions. Responses from research participants contributing to this sub-theme focused on individual thinking, mind-set and attitude. According to participants, the success of training and development, for example, depends on the employee’s willingness to engage in, and develop from, the training or development intervention.

Another variable from the cluster process in Phase 1 that was linked by participants to the sub-theme of individual beliefs is that of the appointment process. Regarding the appointment of candidates to an organisational position requiring some form of innovative behaviour,

participants agreed that it comes down to the type of attitude exhibited by the candidates, as their attitude reveals what they believe about themselves. Specific clues, such as the “language” of the candidate, were highlighted in the responses of participants. “Language”, in this instance, refers to a language of possibility. Participant A, for example, mentioned the identification of “a very specific open language” because according to the participant they have found that “people that are innovative have an open language”.

Courage was mentioned as a fundamental self-belief in an individual who exhibits creative thinking and innovative behaviour. One particular respondent actually defined creativity as “the courage to shake hands with tomorrow”. Courage as a self-belief naturally links to what we believe about failure. Picking up on language cues relating to taking responsibility for goals versus coming up with excuses for not reaching goals is, according to Neethling, Rutherford and Black (2005), a good indicator of the strength of the emergence of courage in an individual. The authors add that starting any task with a conviction of imminent failure, leads to paralysis in any form of action, and no possibility of innovation.

*“That is the difference between creative people who are successful and those who are not. They might both be creative, but it is the one with the **high courage level** that will make it happen. That is basically the difference in people throughout the world.” – Participant C*

Method in individual action, or how we believe we exist, is guided by our self-beliefs and manifests in the nature of our actions. Participant C alludes to a certain level of maturity in human action and the ability to manage oneself. The participant links the ability of self-management directly with the clustered variable performance management, by proposing that on an ideal level of maturity in action, individuals manage themselves. Being aware and committed about what is expected of them, employees functioning on said higher level of maturity in their actions naturally perform in their jobs, because it is the way they believe they exist.

Diversification and the variables measuring rewards and recognition are worthy of discussion under this theme, as various participants alluded to this particular theme in discussions about the clustering of these two variables. Participant A, in discussing rewards, noted that not all

employees are inclined to behave in an innovative manner based on the rewards they receive. All participants generally agreed that traditional reward systems need to be relooked, as these systems are prone to producing only a few winners, and “a hell of a lot of losers” (Participant A). One can understand that this is discouraging for any type of positive behaviour that might lead to innovation. Participant C again emphasised the importance of understanding human-beingness when setting targets for employees.

*“The point is when we set these targets for individual people, it is again according to a million years ago sort of **understanding of the human being.**” – Participant C*

Diversity within a workforce was noted as paramount to eventual innovation in organisational systems. Employees are not the same. Their different individual beliefs, as discussed in the previous section, give rise to different methods of action. Communication plays a pivotal role in linking these diverse parts into a greater whole that is able to produce valuable newness for the organisations. Participant A emphasised, “...an important message is of how different we are, we don’t think the same, even if we think of innovation, creativity, we have different strengths, we have different ways of looking at it (a problem) and that is ok, because that is what you really need in organisations”. The successful delivery of innovation requires diversity of participation in the process of innovation.

*“And the people who often ideate are not the people who innovate. And that is often where the mistake happens. **It is most cases not the same people.**” – Participant C*

Individual purpose relates to individuals’ beliefs and feelings around their reason for being. An awareness of the importance of having a purpose in life is just about as old as human existence itself. Purpose provides the reason for action. To a certain extent purpose creates value in human action. This particular study looks at the organisation as a complex adaptive system. Complexity implies an interconnectedness in the eventual contribution of all the parts that create the whole. It is exactly this interconnectedness in contribution that provides the individual in the complex organisational system with a sense of purpose. The individual’s purpose is also connected with the purpose of the organisation. A common understanding of “what it is we do here” is vital to the possibility of innovation emerging in organisational

systems. Participants, in particular Participants A and C, spoke of the importance of the awareness and understanding of essence finding in creativity, problem solving and eventual successful innovation. In this regard, Participant D noted, for example, that although an organisation might be active in the financial sector, it needs to be cognisant of the fact that in essence it “works with changing human lives”, thus understanding the essence of human behaviour is as important as understanding finance when it comes to product innovation in this sector. This is true for most other sectors as well.

Collective purpose, in this context, could be described in a tribal sense. A tribe can be defined as “a social division in a traditional society consisting of linked families or communities with a common culture and dialect” (“Tribe,” 2001). Families and communities could be compared to teams or departments within the greater organisational system, as well as the organisational system itself. Here, a collective purpose implies a system where the individual experiences a sense of belonging in these teams, departments and the greater organisation due to common values, goals and a shared language. On an organisational level, much of the success in understanding the essence and achieving a collective purpose lies in the formulation, communication and follow-through of the organisational vision, mission and accompanying policies and practices.

*“If you have a culture in your organisation, to say **“this is how we like to do it”** then you can create miracles there.” – Participant C*

*“innovation or corporate entrepreneurship can only work in an organisation that is **open** for it and that allows new ideas or allows people to grow in an organisation”
– Participant D*

The second theme that emerged in the analysis of the interviews relates to trust and the role of management in interconnecting all the aspects that allow for change, innovation and eventual corporate entrepreneurship.

6.4.4 Theme 2: The speed of trust = The distance of innovation

The title of this theme is borrowed from the author Steven Covey. Covey (2006) comes to the conclusion in his book “The Speed of Trust” that things like progress, change and innovation

happen faster in organisational systems characterized by high levels of trust, and throughout his writing places management and leadership at the centre of building trust within these systems.

Discussions with research participants that led to the emergence of this theme highlighted the role of top and middle management in connecting organisational practices with the employees as agents of innovation, and specifically the role of trust in the success of this interconnection. Trust and management were frequently and meaningfully mentioned by research participants.

*“... unfortunately, in a **toxic** environment, so an environment where there is a **lack of trust, lack of openness**, where people have to look around over their shoulders, entrepreneurship will basically never happen, so I think that is a key, key ingredient is the leadership and the corporate environment, the culture that is created.” – Participant A*

6.4.4.1 Organisational trust, and the relevance of management

Organisational trust: Covey (2006) describes *trust* as “The one thing that changes everything”. Based on his research on the topic of trust, Covey states that trust or its absence is a consideration in the quality of all of our systemic relationships as humans. In the absence of trust, systems are destroyed. However, according to the author, once trust is properly developed and sustainably maintained, trust in a system has the potential to promote performance and overall success in any organisational system. Considering the above statement, it comes as no surprise that trust emerged as a theme embedded in the non-linear and dynamic system that is the organisation.

*“... that is interesting, because I think I see one thing, I see probably that there is a stronger trust going on... So, there is this **trust and openness** and I think that is maybe why in this cluster that is very equal.” - Participant A, commenting on the management composition and strong emergence of innovation in Cluster 5*

*“... communication for me goes hand in hand with **trust**. If you don't have an environment where the employee feels trust and feels listened to, communication does not flow.” – Participant D*

*“It comes back to that **trust** thing again. Trust for me, when it comes to organisation, is possibly for me a bit of a passion. So, I would say that one of the*

tools as well is to foster trust as a part of the culture, as a value in your organisation.” – Participant D

*“there is no room for **innovation** and the reason for that is that there is no **trust**.” – Participant D*

The relevance of management: Referring back to section 2.6.4.3 in Chapter 2 of this study, a review of the current literature produced evidence of an increasing interest in the *role of management* in corporate entrepreneurship. These findings in the literature, that higher levels of trust could potentially speed up innovative behaviour and increase levels of corporate entrepreneurship, are confirmed in both Phase 1 and Phase 2 of this research project.

*“... their role is unbelievably important. To be quite honest it can **stop** everything. You can have a great leader up there, but if this manager, supervisor is a **block** then it is a **disaster**.” – Participant A*

*“You can sort of manage ‘light’ but not manage in the **old** sense of the word. Because I can actually.... I **should manage myself**, and not be constantly managed.” – Participant C*

*“the managers must be **people that attract other people**.” – Participant C*

*“All the directors were trained in all systems and exposed to every aspect in the business because **we were hands on**, and we still are.” – Participant B*

*“... the management role in an innovation driven culture is more of a **coach** than what it is a manager” – Participant D*

*“... constant **coaching, quality** assurance is very important for us.” – Participant D*

*“The second thing is that if they make the **mistakes**, they need to know that you as a manager have got their backs.” - Participant D*

*“You are not going to **encourage** you are not going to **inspire**, if you are not inspiring yourself... “ – Participant A*

*“Now leaders and managers they are crucial in **creating the environment** in the corporate culture within an organisation... where this (innovation) is encouraged...” - Participant A*

It is clear from the responses above that management competency can either be the death knell of change, innovation and eventual corporate entrepreneurship, or it can be a catalyst for the enhanced and sustained emergence of the aforementioned.

6.4.5 Theme 3: Father Time and the Clock-watching Cousins

Confirming the strength of the emergence of time availability observed in the findings of Phase 1 of this study, Phase 2 produced a significant interest by participants in the concept of time in the workplace and its relevance or lack of relevance to innovative behaviour.

Time as a noun is described as a “continued progress of existence and events in the past, present and future regarded as a whole” (“Time,” 2001).

Time is often spoken of as a commodity. People describe time in terms of availability, allocation and usage, and often in business the phrase “time is money” is uttered.

As with money, it seems that when it comes to time, it is not necessarily the owned amount that is important, but rather the owner’s attitude towards it. This classification, by means of an attitudinal perspective towards time, is evident in the responses of all of the participants in Phase 2 of this research, and is categorised and discussed next.

*“... the one thing when you start talking about innovation and talk about creativity, the response from many people is that: yeah, but **we don’t have the time**. There is always this thing of “we are always so busy” And to get into their psyche that very often you **save** a lot of time in the end, if you spend time on creativity.” – Participant A*

*“Companies miss a lot of wonderful **ideas**, wonderful entrepreneurial venture because people in a nutshell don’t have the **time to be creative**. It is like people working too hard to be rich. It is that kind of thing.” - Participant A*

*“was it Drucker who said, ‘there is nothing as **wasteful** as doing something efficiently that shouldn’t be done at all’? And I think that is what happens in the workplace... we are always busy doing rubbish things, you know there’s this **repetitive** stuff, so people always think they are extremely busy at work but then we find they are very often busy with things that shouldn’t be done at all.” - Participant A*

*“Most people should not **go to work**, the technology allows them to be **doing** their work in their homes. But that is another **mind-set**, that is directly linked to the whole thing of time, of finding time. **The going and the doing...**” – Participant A*

*“... it is getting the right people not just to fill seats but getting people into those seats that are able to carry the business **forward**.” – Participant B*

*“**Time is money** in our industry so we need to make sure that all processes are done and working and that we monitor these performances from the individuals in our organisation.” – Participant B*

*“...If it is **open** (systems), it saves a lot of **time and effort** in finding the issue.” – Participant B*

*“They are in the **action mode**, there is **no time for incubation** and so on. They just have to go out and do it.” – Participant C*

6.4.5.1 Going Time, Doing Time and Being Time

This report categorises attitudes towards time in three perspectives. The perspectives of time are named according to the unique usage of time that they exhibit. The three categories are: “Going Time”, “Doing Time” and “Being Time”, and are explored below.

Going time literally describes time spent going somewhere, in this concept specifically, going to work. Respondent A argued, for example, that the solution to the problem of severe road traffic congestion experienced by most cities, lies not in increasing the capacity for traffic or availability of public transport, but in the realisation that most people should not actually be going to work. The going in this sense implies a wastage of time – time that could have been used for practising innovative behaviour. Organisational contexts governed by *going time* are often the organisations where people can be found simply taking up space from a specific time to a specific time. Additionally, these types of organisational contexts are guided by a culture that enforces the belief that working is all about physically going to a specific place of employment. Although certain jobs do require the physical presence of an employee at a specific place of employment for a specific duration of time, this is not true for all jobs. Going time, however, refers to time that is spent unproductively. Thus, time that is simply “sat out”. The type of employee that is comfortable in a *going time* organisational context, would be one who is constantly “clock watching”. This employee may be punctual in arriving *at* work, but may not necessarily be arriving *for* work. With the rise of technology, and more specifically the capability of the internet, physical places are instantaneously connected to one another, making the traditional office space obsolete in many industries. Early prediction of the death

of the office can be traced back to the 1970s (Ratti & Claudel, 2016). It is surprising, then, to still observe a substantial amount of resistance to people not *going* to work.

Doing time describes time that is spent in a focused manner completing a specific task. This can be of great value in raising the levels of productivity in the organisational context. Participant A warned, however, against falling into the trap of spending time on doing things efficiently, that should never be done in the first place. Policy, regulations and procedures relating to human capital practices have the potential of falling into this category of simply doing for the sake of doing, and not necessarily adding value to the holistic innovation goal. This observation speaks directly to the results shown in Cluster 2 as presented in Phase 1 of the research results, where the emergence of human capital practices seems to be a priority, but somehow the emergence of innovative behaviour is mediocre. Time spent in a focused way, as is the case with human capital practices, should be judged according to the value that the completion of the task is adding to the larger goal; in this case that goal constitutes higher levels of corporate entrepreneurship through increased individual innovative behaviour. Participant A noted the importance of cultivating a holistic attitude towards time, one that views creativity and innovation as mechanisms that have the potential of freeing up much time. Participant C agreed when specifically referring to the Utilities industry and its weak emergence of innovative behaviour, in stating that these types of industries are in a constant focused “doing mode”, leaving little to no time-budget for the creation and incubation of new ideas. All participants warned that operating in only *doing* mode only holds potential for predictability, leaving organisations vulnerable in terms of obtaining a competitive advantage. Participant B emphasised the importance of the effective use of resources that support employees in doing their jobs, stating that this type of efficiency freed up time for innovation.

Being time describes a way of thinking and acting that is constantly adapting to allow for the optimal use and flow of time. Participant D referred specifically to the role of management in creating an organisational environment that embraces change, stating that otherwise employees will not behave innovatively, despite having more than enough time to do so. An organisational context where practices such as human capital practices are structured to allow for easy adaptation to the dynamic nature of unavoidable change in both the internal and external environment, could hold much promise if the goal of the organisation is corporate

entrepreneurship through innovative behaviour. Respondent B alluded with much conviction to transparency and openness, and the role these practices play in freeing up time for employees. In this sense, openness and transparency relate directly to reducing the response time in dealing with issues or glitches that tend to interrupt the flow of being in time.

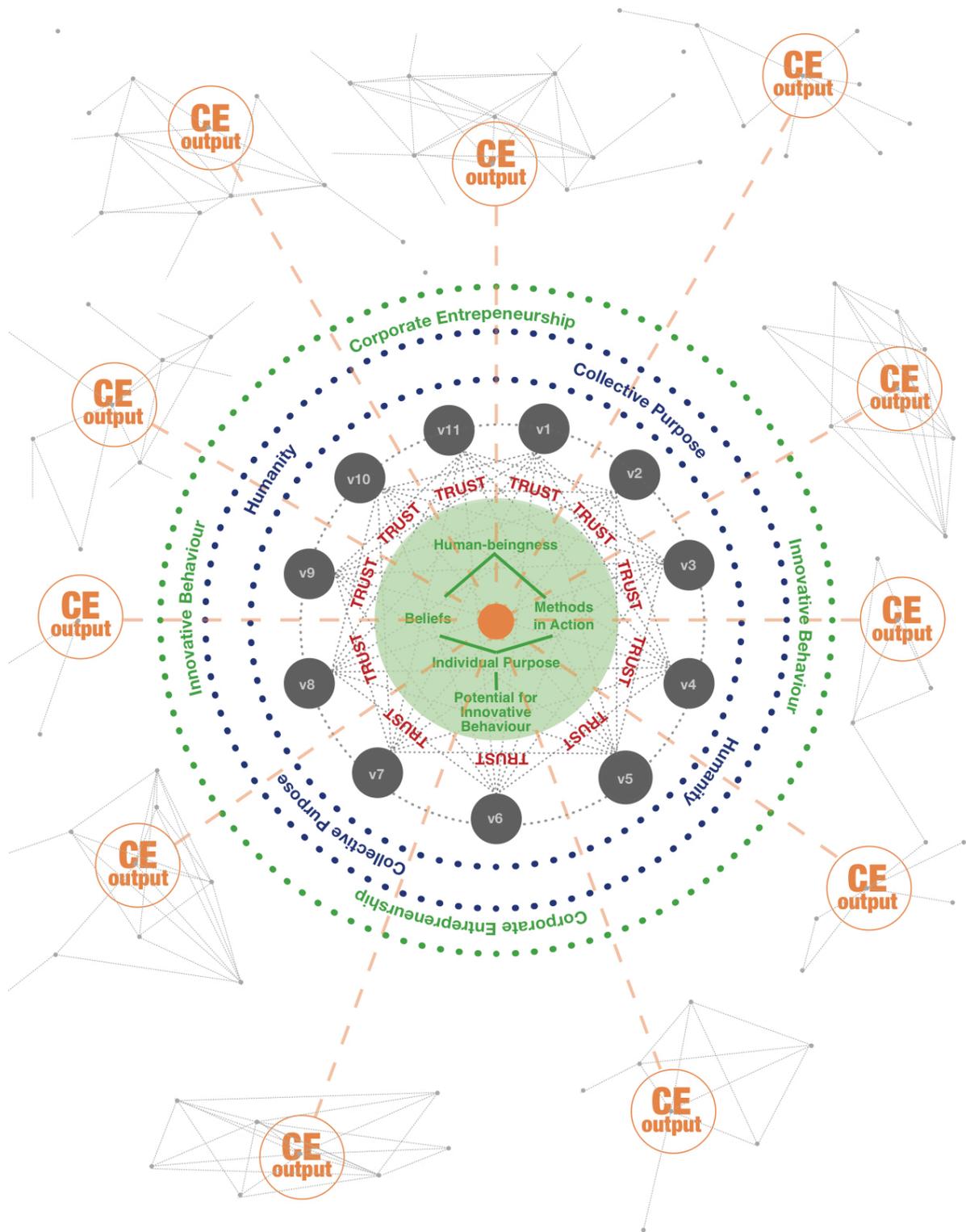
Hansen and Trope (2013) state that the experience of time depends greatly on the number of changes that happen in a given situation. The more frequent the changes in a situation, the less the amount of time perceived. This observation is in line with the results in Phase 1 of the research where innovative behaviour, which is strongly related to change, seems to emerge weak in the same cluster where the perception of available time emerges. strong. As can be seen in the summary of the participants' responses above, the findings in Phase 2 of the research also agreed with both the observations made by Hansen and Trope (2013) and the findings in Phase 1 of this study regarding the theme of time.

6.5 A conceptual framework for corporate entrepreneurship

Taking into consideration the interpretation of the clustering results produced by the Self-Organising-Maps in Chapter 5 by the researcher, and the further interpretation thereof by subject matter experts in this chapter, the preliminary conceptual framework presented in Chapter 3 is refined into the conceptual framework and presented in Figure 28.

The preliminary conceptual framework presented in Chapter 3 was constructed based on gaps identified in the current literature on understanding the emergence of corporate entrepreneurship and the theoretical stance of the researcher. Work towards a final conceptual framework drew inspiration from the method of analysis applied in sense-making of the data, as well as the themes that emerged during interviews with subject matter experts, in adding to the framework essential parts of the corporate entrepreneurial whole.

Figure 28 A Non-linear conceptual framework for the emergence of corporate entrepreneurship



Explanation of the final conceptual framework starts at the centre and moves outward towards the edges of the framework. At the centre of the conceptual framework for the emergence of corporate entrepreneurship is the theme of human-beingness. Referring back to the literature, the reader should recall that humans were described as the agents of innovation. Linking to the thematic analysis, it is clear that the human as an employee needs to be understood from various dimensions if she/he is to be expected to be a successful agent of innovation. The conceptual framework proposes levels of human-beingness related to what the individual believes about her/himself and how these beliefs reflect in her/his methods of action. The uniqueness of the composition of that which people believe about themselves and the manner in which they do things, emerges a certain individual sense of purpose within the human being; ultimately this purpose could hold potential for innovative behaviour.

Moving outward towards the organisational variables (represented as v1-14), this part is what makes the framework truly adaptable to contextual changes and unique needs. Here, variables that are included could be a number of different organisational practices. Thus, that which is contextually important can be included in the framework, and applied to the method of analysis employed in this study, to better understand the emergence of corporate entrepreneurship, even in the most unique of organisational contexts.

The area between the human-beingness and the organisational practices on the framework represents the level of trust present that guides the quality of interconnections of the non-linear dynamics in the organisational system. It is proposed that the nature of the interconnection between the individual innovation agent and the organisational practices is determined by the level of trust in the organisational system.

The next level of the framework represents the theme of humanity and specifically that of a collective purpose between the employee or innovation agent and the system she or he functions in. Having a collective purpose creates the sense of belonging, as previously discussed. When the collective purpose is one of change, growth and renewal, the possibility for innovative behaviour is enhanced. An enhanced level of individual innovative behaviour, supported by a system that is guided by policy and procedures that are relevant and helpful in

the endeavour towards progress, has the potential of emerging corporate entrepreneurship with increased magnitude, frequency and positive impact.

Each level of the framework synergistically emerges. from the interconnections of the previous levels, eventually leading to the creation of new unique corporate entrepreneurial systems, represented by the outer circles titled CE. Each of these systems continues to create new systems. The dynamic of this framework is embedded in Complexity theory, in that it honours the principles of openness, interconnection, self-organisation, emergence, multi-dimensionality, unpredictability and changes in levels of equilibrium.

The preliminary conceptual framework included only the organisational variables, and provided a good illustration of the interconnectedness of these. The addition of the themes that emerged during the research process not only gives the framework significantly more depth, but also addresses aspects that are unavoidable, such as individual and collective purpose and trust; the positive presence of these in organisations pursuing corporate entrepreneurship is non-negotiable.

6.6 Conclusion

This chapter presented the findings of the qualitative phase of the study. Clusters as produced by the neural Self-Organising Maps displaying outlying patterns of behaviour were presented to subject matter experts for interpretation. These interpretations were incorporated in constructing the final conceptual model, which was presented at the end of this chapter. The next chapter concludes the study with a summary of insights gained in the study, conclusions, limitations and recommendations for further research.

Chapter 7

Conclusions, recommendations and limitations

The aim of this chapter is to present the conclusions pertaining to the study, the recommendations that the findings of study hold for organisational policy makers, the possibilities for future research and the limitations of the study.

7.1 Introduction

Corporate entrepreneurship is a positive organisational phenomenon in an increasingly competitive market. A deeper understanding of the dynamics involved in the emergence of corporate entrepreneurship may assist practitioners and policy makers to raise the level of corporate entrepreneurship within their organisational systems. The literature discussed in the study concludes that organisations are in essence ecosystem systems. Ecosystems are bounded in complexity and should be investigated as such, if a deeper understanding of their dynamics is to be gained (Capra, 1996). Conventional classical reductionist research methods have not contributed substantially to the understanding of the process of the emergence of corporate entrepreneurship.

7.2 Conclusions

In addressing the identified gap left by conventional research methods in this area of study, this research firstly dealt with theoretical research objectives in describing the concepts relevant to complexity, corporate entrepreneurship and organisational practices. Achieving said objectives formed the building blocks for accomplishing the final theoretical objective – mapping a preliminary non-linear conceptual framework.

Attaining the theoretical objectives transitioned to undertaking the empirical research objectives. This study applied Artificial neural network clustering as an alternative method of analysis for the emergence of corporate entrepreneurship. Complex adaptive systems theory was adopted as an appropriate lens for interpreting the analysis findings. The clustered results were interpreted by the researcher and further explored by presenting the results within the

preliminary conceptual framework to subject matter experts for their interpretations. Insights gained from the subject matter experts were aligned with the literature reviewed to achieve the empirical objective of constructing the final non-linear conceptual framework for corporate entrepreneurship.

The primary research question for this study was formulated as: How may a non-linear framework for the emergence of corporate entrepreneurship be described best? Two secondary research questions were articulated as follows:

- How can emerging patterns of corporate entrepreneurship be described through the application of Self-Organising Maps and the principles of Artificial neural network clustering?
- How are corporate entrepreneurship and innovative behaviour defined, understood and initiated by subject matter experts in business?

The research questions have been successfully answered and the theoretical and empirical research objectives as stated in Chapter 1 will consequently be discussed.

7.2.1 Theoretical research objectives

The theoretical objectives as stated below were met in the study:

TO₁: to describe the relevant concepts of complexity theory as they pertain to this study

The concepts and principles of complexity were explored in Chapter 3 as the foundation of the theoretical perspective followed in examining the reality of the emergence of corporate entrepreneurship. Complexity as the theoretical paradigm of the study allows in principle for the co-existence of dissimilar, or what may seem to be unrelated, concepts. In honouring the theoretical paradigm of the study, concepts, either in isolation or in combination, that have been traditionally investigated in a reductionist manner or for the sole purpose of determining causality, are used in this study in a manner that allows for the observation of unique emergence.

TO₂: to describe the relevant concepts of corporate entrepreneurship as they pertain to this study

Concepts that describe corporate entrepreneurship as depicted in the literature on current theories on the subject matter were presented in Chapter 2. The literature review is covered early in the study, as it elucidates the research gap addressed in the study - that of the lack of an alternative method of understanding the emergence of corporate entrepreneurship while allowing for complexity and non-linearity instead of attempting to reduce it. Corporate entrepreneurship emerges within the organisational system and is driven by a unique group of innovative employees within the system, and thus has to be investigated as part of the integrated systemic whole in which it emerges.

The concepts of corporate entrepreneurship gave rise to the next theoretical objective involving the governing elements of the system in which corporate entrepreneurship is pursued.

TO₃: to describe the relevant concepts of strategic human capital management and organisational practices as they pertain to this study

This objective was met concomitantly with the previous objective as part of the current literature reviewed in Chapter 2. Strategic human capital practices that were highlighted by the literature included practices related to rewards, training and development, processes of appointment and performance management. Organisational practices explored by the literature included management support, boundaries within the organisation, time availability and work discretion.

TO₄: to map a preliminary non-linear conceptual framework for corporate entrepreneurship based on the identified concepts

The collective insights gained from research objectives TO₁, TO₂ and TO₃ were used to construct the preliminary conceptual framework as presented in Chapter 3. The understanding of phenomena within organisational systems has generally been limited to a mechanistic explanation of the separate parts and their isolated causal effects on

one another. Through attempting to understand the organisational system as complex adaptive where interactions of parts are dynamic and non-linear, this study offers an alternative method for a more holistic understanding that reflects a more truthful reality.

7.2.2 Empirical research objectives

The following empirical objectives were pursued and met in the study

EO₁: to explore the emergence of individual innovative behaviour by using Kohonen's Self-Organising Maps as an Artificial neural network method of analysis on an existing data set

Measurement instruments were selected based on the explored concepts relating to corporate entrepreneurship, human capital practices and organisational concepts. The measurement instruments applied in the study are all existing instruments borrowed from their developers and combined into one survey, as detailed in Chapter 4. The Corporate Entrepreneurial Activity Instrument (CEAI) is the only instrument in the selection that was specifically developed to measure corporate entrepreneurial activity. This study is unique in that it combines the CEAI with other conventional instruments measuring the practices in which corporate entrepreneurial activity takes place, providing a more holistic picture of the organisational system. The data gathered through the measurement instruments were presented to the Kohonen Self-Organising Map software for Artificial neural network clustering and formed the first phase of a two-phase fieldwork endeavour. The results from the Artificial neural network clustering are presented in Chapter 5. Insights gained from the research results in Phase 1 of the fieldwork were used to further refine the preliminary conceptual framework originally constructed in Chapter 3. The evolved conceptual framework is presented in Chapter 5.

EO₂: to determine the practical applicability of Artificial neural network clustering as a method of interpreting the contextual emergence of innovative behaviour

Chapter 5 presents the insights gained into the importance of considering contextual uniqueness when attempting to understand the emergence of innovative behaviour and sequential corporate entrepreneurship in different systems.

EO₃: to determine the face validity of the preliminary conceptual framework as perceived by subject matter experts in corporate entrepreneurship through a qualitative research approach
Phase 2 of the fieldwork involved presenting the research results gained from Phase 1, as set out in Chapter 5, to subject matter experts for their interpretation. These subject matter experts were selected based on their recognised expertise and experience as innovation drivers in organisational systems. The insights gained from Phase 2 of the research were used to further evolve the preliminary conceptual framework.

EO₄: to construct the final non-linear conceptual framework for corporate entrepreneurship
Insights gained from meeting the theoretical objectives as well as the empirical objectives attained in the two-phase fieldwork endeavour, provided valuable insights into corporate entrepreneurship as an emergent process. The final conceptual framework, which combines all the acquired insights, is presented in Chapter 6. Current endeavours towards understanding the emergence of corporate entrepreneurship in organisational systems have for the most part produced reductionist results that are structured into “one size fits all” types of models. Furthermore, these models mostly disallow for the consideration of less tangible issues like individual and collective purpose and the influence of trust in organisational systems aiming for higher levels of corporate entrepreneurship. The conceptual framework presented in this study allows for a much more holistic consideration. The presented conceptual framework is adaptable to different organisational contexts in that it is not bounded in specific variables, but allows for the purposeful selection of variables depending on the unique context of the organisational system under investigation.

7.3 Contribution to the body of knowledge

The study contributes to the body of knowledge in that it presents a method of understanding the emergence of corporate entrepreneurship that allows for non-linearity. The method

pursued by this study provides a more truthful representation of the complex nature of organisations as we find them in the reality of business science, something that is less achievable through classical reductionist research methods.

From the literature reviewed, a strong argument was built that the emergence of corporate entrepreneurship is too complex to be realistically explained by fixed linear models. Contrary to this, existing models of corporate entrepreneurship are characterized by boxes and arrows and leave very little room for the observation of any non-linear behaviour or contextual adaptability. This study produces a framework for the emergence of corporate entrepreneurship that differs from existing models in that it does not seek to determine causal relationships among variables related to corporate entrepreneurship. Rather, the adaptive capability and non-linear nature of the conceptual framework are advantageous to the researcher and practitioner in that they allow for the prioritisation of variables in different ways by individuals or groups in different contexts.

Research in the field of corporate entrepreneurship has to date not seen the application of Artificial neural networks in grouping common patterns of emergence or the identifying of outlying patterns of emergence of the phenomenon. Applying an Artificial neural network process may prove useful in understanding diverse patterns of the emergence of corporate entrepreneurship in different contexts, allowing for the unique structuring of policy and interventions best suited to a particular context. In enhancing the emergence of corporate entrepreneurship, the method applied in this study steps away from a “one size fits all” approach, seeking to discover the uniqueness in different contexts.

7.4 Recommendations for policy makers

Organisations of all types and in all industries are in essence complex adaptive systems, and should be researched as such if they are to be understood for what they truly are – complex systems ever-evolving through non-linear and dynamic interconnections. Classical research methods, more often than not, can only provide a one-dimensional observation of reality because they are grounded in establishing linear, causal relationships among variables that interact in a non-linear manner. The conceptual framework based on the findings of this study

offers promising insights and direction for policy makers in their unique organisational systems if pursuing corporate entrepreneurship though the individual innovative behaviour of their human capital is a goal.

The method of analysis followed in this study produced a framework that can be applied to both understand the uniqueness of different organisational systems and also harness the singularity of the particular system to align actions for competitive innovation and corporate entrepreneurship.

The Artificial neural network clustering provided insights that could be advantageous for practitioners who advocate individual innovative behaviour and overall corporate entrepreneurship in systems reflecting similar characteristics as those portrayed by the respective clusters.

The types of clusters categorised below are merely an example of insights that can be gained into different systems by using neural network clustering, and are by no means a limited list of options. A key advantage in using neural network Self-Organising Maps as a method of clustering analysis lies in the intelligent adaptability that allows for the observation of unique attributes in systems - attributes that might have otherwise been overlooked through the investigative lenses of more classical research methods.

Systems reflecting The Innovators type cluster

From the results yielded by this particular cluster titled The Innovators, it can be deduced that innate innovators have little consideration for that which non-innovating employees might consider a barrier to their behaving in an innovative manner. Referring to the centre of the conceptual framework, it can be said that innovative behaviour is an innate part of the employees' individual purpose in this type of system. This insight has valuable implications for the criteria dictating recruiting and hiring the type of employee that could positively contribute to an organisational system pursuing corporate entrepreneurship. Furthermore, a flat organisational structure was observed in this type of highly innovative cluster. Adding to the previous insights, employees in this type of cluster seem to have little regard for traditional

types of organisational policies. Organisations seeking to reposition as highly innovative entrepreneurial systems might profit from reconsidering the rigidness of their structures and the values embedded in their traditional policies.

Systems reflecting The Tipping Point type cluster

The Tipping Point cluster reflects a system characterized by a strong emergence of available time for innovation; diversity; and a positive association with performance management. At the same time, innovative behaviour was observed as an average emerging variable when compared to the other clusters. This could be reflective of an organisational system that is still in the early stages of growth. If one, however, considers the weak emergence of supervision support, favourable organisational boundaries and training and development, another possibility is that it is reflective of an organisational system that is becoming complacent in generating stimulating innovation practices. Policy makers in such a system should notice that innovation in the organisational system can be enhanced by consciously initiating practices to stimulate innovation. Complacency from policy makers and management in a system such as this could potentially lead to the reduction of innovative behaviour and the eventual loss of a core competitive advantage for the organisation.

Systems reflecting The Stalwart type cluster

A system reflecting The Stalwart type cluster is identifiable by well-founded traditional organisational structures, policies and procedures, as is often observed in large and established organisations. Much time is spent on managing the system towards a state of predictability or equilibrium, as it is termed in systems theory. A system that is constantly in equilibrium has little potential for emerging newness, as is confirmed by the weak emergence of innovative behaviour in this cluster. Policy makers need to be aware of the potential danger for innovative behaviour in predictable and rigid organisational systems. The act of “doing the things right” does not necessarily have the same outcome as “doing the right things”. Organisations like these will be well served in reviewing the effectiveness of their systems, if innovation is an organisational goal.

Systems reflecting The Independent Party type cluster

Similar results to those produced in this cluster might be observed in organisational systems that place a strong emphasis on employee independence and task autonomy. In this particular case individuality seems to favour the emergence of innovative behaviour. However, the weak emergence of communication and information sharing could be troublesome in further attempts to enhance innovation. Highly competitive working environments could fall victim to compromising the greater organisational goal in pursuit of individual achievement. Policy makers in a system such as this might consider pursuing a balance between individual and group rewards. Adding to that, increased efforts to improve the frequency of internal communication initiatives could promote an even stronger emergence of innovative behaviour in the organisational system. Increasing the focus on the holistic goals of the organisation, without compromising acknowledgement of individual ambitions and achievements, could be advantageous to Independent Party type systems in pursuit of even higher levels of innovation.

Systems reflecting The Balancing Act type cluster

The Balancing Act cluster was the only produced cluster in this particular study that yielded neither a strong nor a weak outlying variable. This particular cluster could be an example of an organisational system where equal attention is paid to organisational and human capital practices. The Balancing Act cluster could be a good illustration of the advantages for a system of refining the basic organisational and human capital practices when pursuing enhanced levels of innovation or when attempting to maintain innovative behaviour as an organisational culture. An organisational system driven by a culture of trust cannot be underestimated. Members of the organisation need to trust the purpose of organisational practices in order to meaningfully engage with these practices.

A non-linear conceptual framework for Corporate Entrepreneurship

The usability and value of the neural network clustering method of analysis are further enhanced by the conceptual framework proposed in this study. The conceptual framework consists of certain “non-negotiable” elements present in any organisational system and certain

elements that may be adapted according to the unique context of the organisational system. The first element, the human element, is metaphorically placed at the centre of the system. Organisational leaders who realise that innovation starts with the recruitment and appointment of human capital reflecting individual purpose loaded with a potential for innovative behaviour, are well on their way to enhancing the emergence of corporate entrepreneurship in their organisations. The adaptability capability of the framework lies in the choice of organisational variables one wishes to include in the neural cluster analysis of the organisational system. The results stemming from the strength in emergence of the variables provide leaders and policy makers with a good indication as to the interconnected role and effectiveness of the chosen individual organisational practices in the overall organisational system pursuing the goal of corporate entrepreneurship. The nature of the interconnected relationship of the individual and the organisational practices provides insight into the trust narrative in the organisational system. Trust is proposed in the conceptual framework as another one of the “non-negotiable” elements of an organisational system pursuing corporate entrepreneurship. It is important for organisational leaders and policy makers to realise that the positive creation of valuable newness is manifested in systems characterized by low levels of trust with great difficulty, if at all. The parts, in this case employees, each with their unique individual purpose, and the applied organisational practices, come together in a collective purpose. The collective purpose is indeed a product of the quality and type of interconnections of the separate parts. It is because of the interconnected nature of the parts, as complexity theory has shown, that the holistic collective purpose of the organisational system is greater than the simple sum of its parts. Thus, gaining insight into the underpinnings of the collective organisational purpose cannot be achieved through causal methods that reduce the answer to the question of what makes the whole, to a mere sum of its parts.

7.5 Limitations of the study

The value of this research study is in the evidence provided for how Artificial neural network clustering can be used as a non-linear method of analysis for understanding the emergence of corporate entrepreneurship within the practices that govern organisations. The organisational practices included in the study were selected based on the literature drawn from previous studies, and by no means constitute an exhaustive list. A more truthful reflection of the

emergence of corporate entrepreneurship may be gained by excluding certain organisational practices and including others.

The measurement instruments used in the quantitative phase of the study have clear limitations as they are self-assessment tools and thus respondents may provide an inaccurate and biased reading of the state of affairs based on their own perceptions. Self-reporting bias as a limitation is not easily overcome. Outcomes of the survey questionnaire can further be influenced by the scales used or even the phrasing of the actual questions and statements. Some respondents that took part in the survey questionnaire did restrict their answers towards the middle of the rating scales. Removing the middle options in the scales may have forced more meaningful answers from respondents.

Considering Phase 2 of the research: expert interviews may be in-depth and based on proven expertise and considerable experience; however, the interpretations and meanings attached to the outlying variables offer but a snapshot based on the experience and interpretation of only a few people. Strong associations with certain industries, organisations or demographic types may lead to the distortion of answers and interpretations of meaning.

The size of the dataset in Phase 1 of the research allowed for overall generalisability of individual innovative behaviour within the realm of organisational practices; however, the scope of variety in relation to different industries, functions and demographics could not be fully explored due to practical reasons. In terms of Phase 2 of the research, an increase in sample size and possibly even a change in research design, for example using focus groups or different types of participants, might potentially yield richer results.

7.6 Future research

The study holds various potentialities for future research. The first source of future research lies in addressing the limitations of the study as they currently stand. A further possibility is to test the non-linear conceptual framework for its practicality and effectiveness in enhancing innovative behaviour in employees. This could be done by using the conceptual framework and adapting the selection of organisational practice variables based on relevance together with

the Artificial neural networks to probe and gain insight into the particular systemic dynamics of corporate entrepreneurship. Findings from this probe should then be used as the starting point of the design and implementation of targeted interventions. Research results produced by such a study may be compared to those of studies pursuing linear research methods and interventions in similar areas of interest. A comparison such as this could provide valuable insight into the effect of non-linear methods and interventions compared to the more classical linear approaches.

The adaptability of the conceptual framework allows for various other future research opportunities. By experimenting with different organisational variables, one could attain numerous visualisations of the interconnectedness involved in the emergence of corporate entrepreneurship.

7.7 Criteria for a scholarly contribution

Trafford and Leshem (2012, pp. 16-17) state that the following scholarly features (all mutually exclusive) should characterize a doctoral theses:

1. The application of conventional research instruments in new fields of investigation
2. The combination of disparate concepts in new ways to investigate a conventional issue
3. The creation of a new understanding of existing issues
4. The design and application of new field instruments in a contemporary setting
5. The identification of new and emerging issues worthy of investigation and explanation
6. Originality in using the work of others

From the outset, this study was preoccupied with applying an alternative theory and method in understanding corporate entrepreneurship as a complex, dynamic and non-linear phenomenon. The combination of insight derived from the work of scholars in disparate fields and the application of an alternative method of analysis is what makes this study an interesting and valuable contribution. For many business scholars, lenses like those of complexity are applicable only in the natural sciences. Few scholars venture to lenses from different disciplines in an attempt to better understand their own. This study saw the integration of scholarly work

from the natural, behavioural and even quantum science with that of organisational studies and the application of a less classical research approach honouring the original problem statement. This integration of the diverse work of others produced a truer reflection of the organisation as it is in reality - an organic system based in complexity and characterized by the non-linear and dynamic interactions of its parts, where the whole is very different to a mere sum of the value of its parts.

7.8 Conclusion

This chapter presented the conclusions that pertain to the results produced by this study, and consequential recommendations for organisational policy makers. The chapter also considered the limitations of the study and suggestions for future research. The chapter concluded with an answer to a set of criteria for that which constitutes the scholarly contribution of a doctoral thesis.

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Appendix 1: Ethical clearance



UNIVERSITY OF CAPE TOWN

FACULTY OF COMMERCE

Igniting Knowledge and Opportunity



Please note that you will be required to upload a scanned copy of this form in order to submit your online ethics application. Please ensure that all the required signatories have signed the form in their respective blocks.

By submitting this form I certify that I have read the the Commerce Faculty Ethics in Research policy found on <http://www.commerce.uct.ac.za/Pages/ComFac-Downloads>

I hereby undertake to carry out my research in such a way that

- there is no apparent legal objection to the nature or the method of research; and
- the research will not compromise staff or students or the other responsibilities of the University;
- the stated objective will be achieved, and the findings will have a high degree of validity;
- limitations and alternative interpretations will be considered;
- the findings could be subject to peer review and publicly available; and
- I will comply with the conventions of copyright and avoid any practice that would constitute plagiarism.

Signed by:

	Full name and signature	Date
Principal Researcher/Student:	<i>Colene H. Ing</i> <i>[Signature]</i>	20/04/2016
This application is approved by:		
Supervisor	<i>Prof Walter Baets</i> <i>[Signature]</i>	20-04-2016
HOD (or delegated nominee – for all Honours Projects):	<i>[Signature]</i>	20-04-2016
Chair: Faculty EIR Committee (only for postgraduate research at Master and PhD level)	<i>[Signature]</i> Prof U Rivett, Chair Ethics Committee Commerce Faculty	31.05.2016

The approval of this application is based on the researcher ensuring that all requirements regarding the permission to interview staff at the various organizations have been fulfilled prior to any surveys being conducted

[Signature]

Posted note to above attached approval:



Marked as completed by UCT Ethics in Research.

5/31/2016 (1 year, 7 months ago)

Email:

Dear Researcher

We are pleased to inform you that your ethics application has been approved.

Please be aware that you need to notify the Ethics Committee immediately should any aspect of your study regarding the engagement with participants as approved in this application, change. This may include aspects such as changes to the research design, questionnaires or choice of participants.

We wish you well for your research.

Prof U Rivett, Chair Ethics Committee, Commerce Faculty UCT



Appendix 2: Survey questionnaire used in Phase 1 of the fieldwork



PARTICIPANT INFORMATION SHEET

<date>

Organisational practices and individual innovation behaviour: A non-linear approach to modelling the emergence of Corporate entrepreneurship.

Dear Prospective Participant

The aim of this study is to explore the unique interactions of organizational practices in the emergence of innovation behaviour within the workplace. Knowing how these interactions influence innovation behaviour will guide managers and business leaders to positively structure practices as to aid in increasing innovation behaviour in the workplace.

You were selected to participate in this study as an employee of <insert name of organization or institution>. <insert contact persons name> from <insert contact persons department> granted permission for the study to be conducted. Your name was randomly drawn from a list of employees. In total 60 employees from your organization will be approached to participate in the study, which minimize the possibility that anyone could be identified.

Your role in the study is to complete the attached questionnaire about organizational practices and certain employee behaviours. The expected duration of your participation will not be longer than 60 minutes. Your participation in this study is voluntary and you are under no obligation to consent to participation. If you decide to take part you will be given this information sheet to keep for future reference. You are free to withdraw from the study at any time and without giving a reason. As the project involves the submission of non-identifiable material, it will not be possible to withdraw once you have submitted the questionnaire. There is no penalty or loss of benefit from non-participation.

You will not benefit directly from your participation in the research. You will receive no payment or reward, financial or otherwise. The results of the research, however, be of scientific and practical value in understanding how organizational practices can be re-looked to foster greater innovation behaviour.

There are no foreseeable physical or psychological risks involved in participation in this study.

Any information that is obtained in connection with this study and that can be identified with you will remain confidential. Confidentiality is however not a concern in this research as the questionnaires will be answered anonymously and individual identifiers will not be requested.

The data collected will be used to write research reports, which include but may not be limited to a doctoral research report, journal articles and conference presentations. Your privacy, and that of the organization you present, will however be protected and no identifiable information will be included in any of these reports.

This research has been approved by the Commerce Faculty Ethics in the Research Committee.

If you would like to be informed of the final research findings or should you require any further information please contact the researcher; Colene Hind on 083 589 5186 or hindc@unisa.ac.za

CONSENT: I understand the procedures described above. My questions have been answered to my satisfaction, and I agree to participate in this study.

Please note that you will not be required to sign this declaration, but that you will be indicating your consent by completing the questionnaire. (A signed copy is not required, as this may identify you).

Thank you for taking the time to read this information sheet and for considering participating in this study.

General information

		Official use
Batch #	(your student number – you complete this)	A1
Industry:	(your industry– you complete this)	A2
Company name:		A3
Section name:		A4
Gender:	Male / Female / Prefer not to answer	A5 0/1
Your role:	Core Business / Support services	A6 0/1
Your role:	Management / Non-management	A7 0/1
Age:		A8
Number of years with company:		A9
Years of formal schooling:	Less than 12 years 12 years (matric) 1st Degree / Diploma Higher degree / Higher diploma	A10 1/2/3/4
Race:	Asian / African / Coloured / White, Caucasian /Prefer not to answer	A11 1/2/3/4

Post level

Indicate with a X ↓	Semantic Scale	Job evaluation system			
		Patter-son	Perom-nes	Hay	Equate (Government)
5	Top Management, Senior Management	F E	1+ and 1++ 1, 2 and 3	1 and 2	16 14 and 15
4	Professionally qualified, experienced specialists and Middle Management	D	4, 5 and 6	3 and 4	11, 12 and 13
3	Skilled technical and academically qualified workers, junior Management, supervisors, foremen and superintendents	C	7, 8, 9, 10, 11 and 12	5, 6, 6A, 7 and 8	7, 8, 9, 10 and 11
2	Semi-skilled and discretionary decision-making	B	13, 14, 15 and 16	9, 10 and 11	4, 5, 6 and 7
1	Unskilled and defined decision-making	A	17, 18 and 19	12 and 13	1, 2 and 3

PS: These conversions are only approximations

When thinking of your organisation, please rate how much you agree with the following statements using the provided rating scale.

Strongly Disagree	Disagree	Not sure (uncertain)	Agree	Strongly Agree
1	2	3	4	5

Question	Answer
1 Individual risk takers are often recognised for their willingness to champion new projects, whether eventually successful or not.	_____
2 People are often encouraged to take calculated risks with new ideas around here.	_____
3 Many top managers have been known for their experience with the innovation process.	_____
4 This organisation supports many small and experimental projects realising that some will undoubtedly fail.	_____
5 It is basically my own responsibility to decide how my job gets done.	_____
6 I almost always get to decide what I do on my job.	_____
7 I have the freedom to decide what I do on my job.	_____
8 I have much autonomy on my job and am left on my own to do my own work	_____
9 My manager would tell his boss if my work was outstanding.	_____
10 My supervisor will increase my job responsibilities if I am performing well in my job.	_____
11 My supervisor will give me special recognition if my work performance is especially good.	_____
12 The rewards I receive are dependent upon my work on the job.	_____
13 I have just the right amount of time and workload to do everything well.	_____
14 I feel that I am always working with time constraints on my job.	_____
15 I always seem to have plenty of time to get everything done.	_____
16 During the past three months, my work load was too heavy to spend time on developing new ideas.	_____
17 I clearly know what level of work performance is expected from me in terms of amount, quality and timeliness of output.	_____
18 On my job I have no doubt of what is expected of me.	_____
19 There is little uncertainty in my job.	_____
20 In the past three months, I have always followed standard operating procedures or practices to do my major tasks.	_____

Never Almost Never Rarely Sometimes Often Very Often Always
 0 1 2 3 4 5 6

Question	Answer
1 As an employee how often do you pay attention to issues that are not part of your daily work?	_____
2 As an employee how often do you wonder how things can be improved?	_____
3 As an employee how often do you search out new working methods, techniques or instruments?	_____
4 As an employee how often do you generate original solutions for problems?	_____
5 As an employee how often do you find new approaches to execute tasks?	_____
6 As an employee how often do you make important organisational members enthusiastic for innovative ideas?	_____
7 As an employee how often do you attempt to convince people to support an innovative idea?	_____
8 As an employee how often do you systematically introduce innovative ideas into work practices?	_____
9 As an employee how often do you contribute to the implementation of new ideas?	_____
10 As an employee how often do you put effort into the development of new things?	_____

Using the provided rating scale, please indicate how much you agree with the statements below. These statements relate to the performance appraisal system of your organisation.

Strongly Disagree	Disagree	Not sure (uncertain)	Agree	Strongly Agree
1	2	3	4	5

Question	Answer
1 My company is committed to the training and development needs of its employee.	_____
2 Employees are encouraged to accept education and training opportunities within the company.	_____
3 This organisation has provided me with training opportunities enabling me to extend my range of skills and abilities.	_____
4 My salary and benefits have been an adequate return for the time and energy demanded of me.	_____
5 I am satisfied with my company reward system to compensate good performance.	_____
6 The company's compensation and reward system encourages team and individual contributions.	_____

7	My company's performance management system is fair and based on clear objectives at the beginning of the term/year.	_____
8	The company has provided enough information regarding specific methods of the performance evaluation system.	_____
9	Employees are allowed to formally communicate with supervisors/managers regarding the appraisal results.	_____
10	My supervisor would personally use his/her power to help me solve my work problems.	_____
11	My supervisor always gives credit and encourages employees for a job well done.	_____
12	My supervisor often lets me know how well he/she thinks I am performing the job.	_____
13	Proper company procedures and processes are always followed when staffing/recruitment decisions are made.	_____
14	Interview panels are used during the staffing process in this organisation.	_____
15	All appointments in this organisation are based on merit (i.e. the best person for the job is selected regardless of their personal characteristics)	_____
16	The company spends enough time and effort on diversity awareness related to race, gender and religion.	_____
17	Management is supportive of cultural difference in this organisation.	_____
18	People living with disabilities have the employment opportunities in this organisation.	_____
19	My company regularly provides information sharing sessions to all employees.	_____
20	Continuous improved communications between management and staff is stated as an important company objective and is being practiced.	_____
21	My company's communication channels are opened and effective in dealing with matters that are relevant to employees.	_____

Working at your current organisation, please use the provided rating scale to indicate how often you exhibit the stated behaviours.

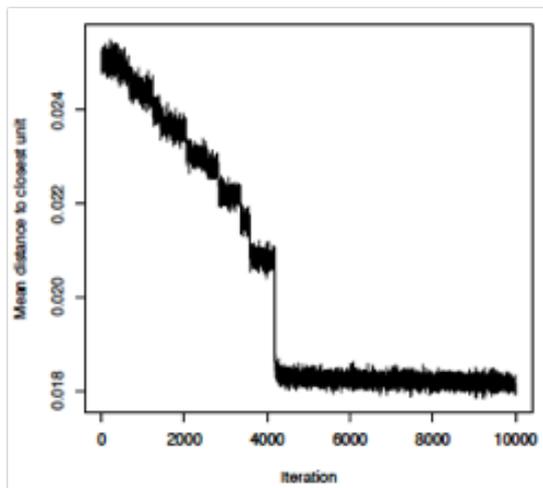
	Never 1	Almost Never 2	Sometimes 3	Fairly Often 4	Very Often 5	Always 6
Question						Answer
1	In your current job, how often do you ... look for opportunities to improve an existing process, technology, product, service or work relationship?					_____
2	In your current job, how often do you ... recognise opportunities to make a positive difference in your work, department, organisation or with customers?					_____
3	In your current job, how often do you ... pay attention to non-routine issues in your work, department, organisation or the market place?					_____
4	In your current job, how often do you ... generate ideas or solutions to address problems?					_____
5	In your current job, how often do you ... define problems more broadly in order to gain insight into them?					_____

6	In your current job, how often do you ... experiment with new ideas and solutions?	_____
7	In your current job, how often do you ... test-out ideas or solutions to address unmet needs?	_____
8	In your current job, how often do you ... evaluate the strengths and weaknesses of new ideas?	_____
9	In your current job, how often do you ... try to persuade others of the importance of a new idea or solution?	_____
10	In your current job, how often do you ... push ideas forward so that they have a chance to become implemented?	_____
11	In your current job, how often do you ... take the risk to support new ideas?	_____
12	In your current job, how often do you ... implement changes that seem to be beneficial?	_____
13	In your current job, how often do you ... work the bugs (imperfections) out of new approaches when applying them to an existing process, technology, product or service?	_____
14	In your current job, how often do you ... incorporate new ideas for improving an existing process, technology, product or service into daily routines?	_____

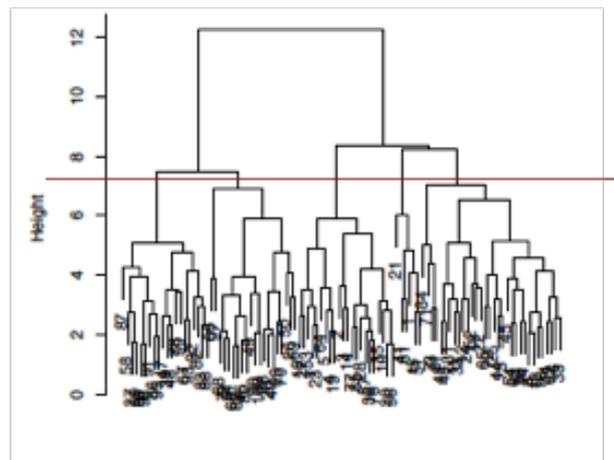
End of survey questionnaire

Appendix 3: Self-Organising Map output as per Rstudio

Training Progress (Iteration)

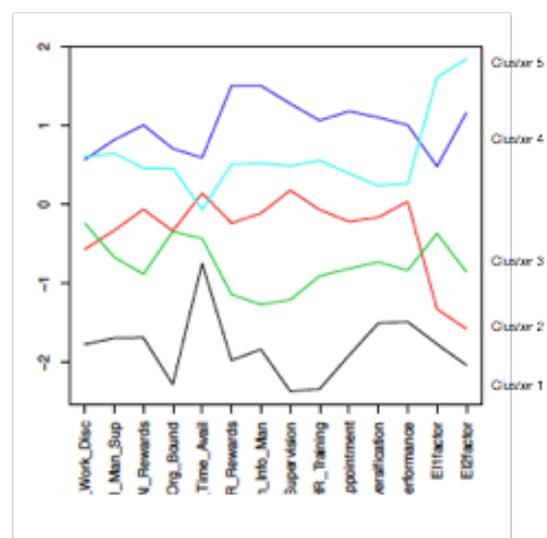


Cluster dendrogram - Illustrating the justification for neural network mapping 5 clusters



Weighted average vector scores per cluster

	1	2	3	4	5
CEAL_Work_Disc	-1.78	-0.57	-0.23	0.57	0.61
CEAL_Man_Sup	-1.70	-0.33	-0.67	0.82	0.65
CEAL_Rewards	-1.69	-0.06	-0.88	1.01	0.46
CEAL_Org_Bound	-2.28	-0.33	-0.34	0.71	0.46
CEAL_Time_Avail	-0.75	0.14	-0.43	0.60	-0.06
HR_Rewards	-1.98	-0.23	-1.14	1.51	0.51
HR_Com_Info_Man	-1.84	-0.11	-1.27	1.51	0.53
HR_Supervision	-2.37	0.18	-1.21	1.28	0.49
HR_Training	-2.34	-0.07	-0.90	1.07	0.56
HR_Appointment	-1.92	-0.21	-0.81	1.19	0.40
HR_Diversification	-1.51	-0.16	-0.73	1.11	0.24
HR_Performance	-1.49	0.04	-0.83	1.01	0.27
EI1factor	-1.77	-1.33	-0.37	0.49	1.62
EI2factor	-2.04	-1.58	-0.85	1.17	1.85



Appendix 4: Discussion guide for Phase 2 of the fieldwork

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- Background to participant:
 - **Thank** the participant for their time.
 - Indicate that the interview will take approximately an **hour to an hour and a half**.
 - State the **purpose** of the study
 - Mention **confidentiality** and the option to opt out at any time during the interview
 - Obtain verbal **consent**
-
- Background of participant
 - Ask the participant about her/his **career experience** in order to establish the participant as a subject matter expert.
-
- General insights about: **(In YOUR experience....)**
 - Corporate Entrepreneurship
 - The innovative individual
 - Who are they?
 - How do we identify them?
 - How do we develop them?
 - The innovative environment/organisation
 - What does this organisation look like?
 - On what level in organisations does innovation happen?
 - The role of management
 - How would you describe the role of management in innovation in organisations?
 - How can policy makers assist managers to enhance innovative behaviour?
 - The process that drives innovation:
 - Is there a process that drives innovative behaviour and ultimate corporate entrepreneurship?
 - Can a process be applied to all contexts and people?
 - On the point of context: (Show participant the list of industries)
 - In which of these industries do you have working experience? Probe further into the participants experience of each of the industries mentioned.
 - Probe about the participants expectations around the strength or weakness of the emergence of innovative behaviour in the different industries...
-
- Give a description of the method of analysis, and present the research results.
 - Allow the participant to identify outlying clusters and variables.
 - Probe for the participants' interpretations of what they observe (outlying clusters and variables)
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