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UNIVERSITY OF THE WITWATERSRAND FACULTY OF COMMERCE, LAW AND MANAGEMENT

Innovation Strategies of Small Firms in South Africa

By

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ABSTRACT

Small firms form the majority of firms in many countries. There is evidence that small firms are highly innovative, contribute to economic growth and job creation. Yet, despite their importance and levels of innovativeness, small firms are largely treated as 'black boxes', meaning that very little is known about their innovation strategies and distinctiveness as compared with larger firms. This relative scarcity of conceptual treatment and the dearth of empirical evidence apply globally, particularly to low and medium income countries such as South Africa. This study, therefore, explores the innovation strategies of small firms in South Africa, their implications and the extent to which these strategies enable small firms to achieve their goals or objectives.

Innovation studies and entrepreneurship theories argue that innovation is influenced by characteristic and contextual factors interacting at individual, firm, and industry levels, as well as local, regional, national and global levels. This presents a challenge as well as a motivation for small firm owner-managers in low and medium income countries to fashion responses, and also design and devise appropriate innovation strategies under severe operating conditions. The conceptual framework argues that innovation strategies in small firms are a dynamic interplay between three elements (1) initial conditions for innovation (2) the motivations and intended outcomes of innovation and (3) the specific innovation process. This framework anticipates considerable variation of these elements among firms.

This study seeks to contribute to the understanding of innovation in small firms from the point of view of low and medium income countries such as South Africa. The findings of this study will equip small firm owner managers with usable and intelligent information for managing and organising innovation activities. In addition, these findings will provide relevant insights and recommendations to stakeholders wishing to promote and facilitate innovation in small firms.

The research method is a qualitative, exploratory cross sectional study of ten small firms either based at The Innovation Hub, a facility in Pretoria, South Africa that provides ancillary support in the area of innovation or have benefited from related support programmes such as Technology Innovation Agency (TIA). Semi-structured

interviews were conducted with small firm owner managers serving as primary participants and public innovation support programme managers as key informants respectively. The participants were selected using purposive sampling involving both criterion and convenience sampling. The data was analysed through an interpretive paradigm using the Ritchie and Spencer's (1994) framework analysis.

The key findings of the study reveal that the aforementioned conceptual framework rings true. It shows that innovation strategies in small firms are a dynamic interplay of three main elements (1) initial conditions for innovation, (2) the motivations and intended outcomes of innovation and (3) the specific innovation process. The findings highlight that while some characteristic and contextual factors facilitate innovation, innovation in small firms, particularly start-ups, is generally constrained due to limited internal resources and a hostile external environment. As a result, small firms are limited to ideas from the owner managers and their personal networks. In response, they are likely to develop products and services in-house but seek vertical cooperation with external partners, mainly established large firms, in order to take their products and services to market.

The implications of these findings suggest that if small firms are expected to successfully perform innovation activities, owner managers must adopt a number of important practices. These include having a long term strategic orientation, using formal planning tools, being open to other sources of ideas beyond themselves and their personal networks, and willingness to improve their business skills. Interested stakeholders should consider tailor made interventions that support and address the specificities of small firms close to the point of action. Furthermore, policy makers must design coherent policies that make it easier for small firms to operate.

The limitation of this study is that this is a cross sectional study of only ten firms and thus no generalisations can be made about small firms in South Africa. The study is also unable to ascertain the long term impact of the findings. In addition, the research focuses mainly on product innovation with less emphasis on other types of innovation. Future studies should consider a large cross sectional study representative of small firms in South Africa and/or a longitudinal study of one, few or more firms, other types of innovation as well as the unintended consequences of innovation.

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DEDICATION

“I am because of other people around me”, African Proverb.

This report is dedicated to my family and friends, my country of descent, birth and nationality, Zimbabwe, the country of my residence for almost a decade, South Africa, its hospitable people and their Ubuntu. I also dedicate it to the African renaissance, the hope for all humanity and that innovation can promote the economic, social and environmental good.

DECLARATION

I, Jonathan Muringani, declare this research report to be my own work except where indicated in the references and acknowledgements. It is submitted in partial fulfillment of the requirements for the degree of Master of Management in Innovation Studies at the University of the Witwatersrand, Johannesburg. It has not been submitted before for any degree or examination in this or any other university.

Jonathan Muringani

Signed at ……

On the …….. Day of …… 2015

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I stand on the shoulders of giants and would like to thank all those who made it possible for me to submit this research report. My heartfelt appreciation goes to Professor Gillian Marcelle for her passion and insistence on “academic rigor” and her unwavering commitment to the scholarship of innovation in the Global South. The same goes for Dr. Diran Soumonni for supervising such a difficult student and guiding the process to its very end. My appreciation also goes to the Wits Business School academic and support staff for their patience and support during this endeavour.

I am grateful to my work colleagues and companions in the innovation ecosystem who endured both fruitful and fruitless debates, offered their advice, guidance, encouragement and many gestures of kindness. I am forever indebted to the small firm owners and managers of public innovation support programmes, who remain anonymous but voluntarily participated in my research, and selflessly gave their time, offering many insights that anchored this research report.

I thank my family, who missed me so much but nonetheless supported me. Their understanding and endurance during this journey of my life, I cannot repay. Assuredly, their sacrifices for such a cause were not in vain.

Lastly, within the visionary vein of President Thabo Mbeki’s “I am an African” and to quote the timeless wisdom from the African idiom, “I am because of other people around me”. I submit to the timeless values of Ubuntu, the commitment to an African Renaissance, a desire for a better world and the call of an eternal divine purpose, without which, life is not worth living.

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ACRONMYNS

HRSC- HUMAN SCIENCES RESEARCH COUNCIL

ICT-INFORMATION AND COMMUNICATION TECHNOLOGIES

OECD-ORGANISATION FOR ECONOMIC COOPERATION AND DEVELOPMENT

SBP- SMALL BUSINESS PROGRAMME

SME-SMALL TO MEDIUM ENTERPRISES

TIHMC-THE INNOVATION HUB MANAGEMENT COMPANY

CHAPTER 1: INTRODUCTION

1.1 PURPOSES OF THE STUDY

There is arguably a dearth of literature and evidence on the innovation strategies and practices of small firms in South Africa. This study is intended to contribute to academic discourse and new knowledge on the issue. Specifically, the purpose of the study is to explore the innovation strategies of small firms in South Africa, their implications and the extent to which these strategies enable small firms to achieve their goals or objectives. The chapter also identifies research issues and states the significance of study, delimitations, assumptions, key terms, structure and outline of the study.

Prior studies contend that innovation is a broad concept which has been interpreted and applied in different fields and contexts (Pavitt, 2004, Marcelle, 2004; Adams *et. al.*, 2006; Eveleens, 2010). The findings from this study will assist the researcher to make recommendations to both small firm owner managers and interested stakeholders on what can be done to facilitate innovation in small firms in order to enable them to realise their business objectives. The next sub-section provides the specific context within which this study is conducted.

1. 2 CONTEXT OF THE STUDY

This study is approached from an innovation management perspective. Innovation management is a relatively young and developing discipline (Eveleens, 2010). According to Edwards et al(2005, p1119), "... despite increasing attention being given to the role of SMEs and innovation there is a hiatus between what is understood by way of the general innovation literature and the extant literature on innovation in SMEs."

Extant literature associates innovation largely with big firms and high income countries (Audretsch & Fieldman, 2003; Adams, *et al*., 2005; Tidd and Bessant, 2009). This has been compounded by the fact that small firms, until recently, have been under-researched (D' Amboise & Muldowney, 1988; Audretsch & Fieldman, 2003; Mazzarol & Reboud, 2011). Tan *et al* (2009) cited in Mazzarol & Reboud (2011) contend that

there is lack of an underlying theory on innovation in small firms as a result of prior research tending to focus primarily on testing theories. Consequently, scholars (Edwards *et. al.*, 2005; Tang *et al.,* 2009 in Mazzarol & Reboud ,2011; Mazzarol & Reboud*,* 2011) argue that there remains a number of unresolved issues in innovation theory, and between theory and practice in small firms.

Empirical evidence reveals that small firms have been neglected in research and academic studies. Studies have paid scant attention and appear to have no quantification of innovation in small firms (D'Amboise & Muldowney, 1988; Di Tommaso & Dubbini, 2000; Acs & Audretsch, 1990, Tidd & Bessant, 2009). Traditional measures of innovation activity, which focus largely on large firms, are thought to have contributed to the under-estimation of innovation in small firms (Baldwin, 1995, Acs & Audretsch, 1990). Another reason for neglect is the perception that small firms are seen as transient, eventually growing into large firms (Tidd & Bessant, 2009). Birch (1987) cited in Tidd & Bessant (2009) notes that information on small firms is generally difficult to find and as a result, small firms do not feature in innovation or general surveys.

However, in contrast to the afore-mentioned perspectives, some authors posit that small firms can no longer be considered a transient phenomenon unsuitable for economic attention (Di Tommaso & Dubbini, 2000; Mazzarol & Reboud, *et al*., 2010; Mazzarol & Rebound, 2011). Anecdotal evidence proves that small firms are innovative, contributing to economic growth and job-creation in a majority of countries (Acs & Audretsch, 1990; OECD, 2002; Garnsey & Stam, 2008 cited in Tidd & Bessant 2009). Acs & Audretsch (2005) argue that small firms, specifically start-ups, introduce technical change or new combinations into the economy and therefore act as agents of change. Furthermore, studies on small firms have been noted to contribute to the understanding of business phenomenon. Consistent with this view, Baldwin (1996, p2) contends that "small firms are good candidates for studies that compare business strategies because there is a large amount of strategic variation within the small-firm community."

Yet, scholars argue that there has been very little effort into investigating how small firms actually perform innovation activities (Hoffman *et al.*, 1998; Edwards *et al.*, 2005;

Tidd & Bessant, 2009; Tan *et al.*, 2009, Mazzarol & Reboud, 2011). This reinforces the need to understand the internal functioning of small businesses in diverse situations, in particular, in the context of low and medium income countries (D'Amboise & Muldoweny, 1988; Marcelle *et al.,* 2013). Traditionally, innovation literature has focussed on large firms in high income economies (Hobday, 2005; Tidd & Bessant, 2009). Such a narrow conceptualisation does not consider that small firms constitute the majority of firms in high, medium and low income countries (Tidd and Bessant, 2009).

While in recent years there have been efforts to understand innovation in small firms, the majority of the studies have focused on high income countries and neglected low and medium income countries (Hadjimanolis, 1999 in Radas & Bozic, 2009; Cetindamar *et al.*, 2009). The extent to which the findings have been applied to low and medium income economies is currently not known (Radas & Bozic, 2009). Unfortunately, the impact of this dearth in literature is that policy-makers promoting innovation in small firms from low and medium income countries often draw upon such studies (Radas & Bozic, 2009). Most small firms in low and medium income countries are not high-technology firms; they do not conform to the 'silicon model' and therefore undertake innovation activities differently (Marcelle *et al.*, 2013; Veuglers, 2008). Marcelle *et al* (2013, p3) affirms that 'innovating under conditions of scarcity is very different from doing so under abundance."

In South Africa, the role of small firms in contributing to economic growth, job creation and equity have been acknowledged (Marcelle, 2011). This is confirmed by National Treasury's 2011 Budget Review which states that "Small businesses create jobs. Firms with fewer than 50 workers account for about 68 per cent of private employment and 77 per cent of all hiring that takes place (in South Africa)." (SBP, 2011, p2). Hence, there is a protracted interest from various stakeholders to promote and support small firms. These stakeholders include government (ministries and policy makers), universities and higher technological institutions, including research and development institutions, intermediaries (consultants, foundations and associations), industrial, entrepreneurial and financial institutions (Mohannak, 1999).

Despite the affirmation that small firms are a vibrant part of the job creation landscape in South Africa, the SBP admits that "South Africa, at present, lacks a coherent understanding of the characteristics associated with a high-growth small businesses and what it takes to be such a business" (SBP, 2011, p7). Studies in South Africa show that small firms face a number of challenges including owner-manager's motivation, internal dynamics of the firm and systemic factors which are external to the firm (Rogers, 2001; Bayene, 2002; Ahwireng-Obeng, 2003; Musengi, 2003; Cant *et al*, 2003; Pretorius & Shaw, 2004; Marcelle, 2011). Thus, whilst a rich amount of information exists about challenges facing small firms, firm level innovation remains an under-researched phenomenon (Marcelle, 2011). Hence, this study seeks to explore innovation strategies of small firms in the specific context of South Africa.

1.3 RESEARCH PROBLEM

Preliminary investigation reveals that there is dearth of information about innovation strategies of small firms in South Africa. Prior studies on small firms in South Africa (Rogers, 2001; Bayene, 2002; Musengi, 2003; Cant *et al*, 2003; Pretorius & Shaw, 2004) have focused on entrepreneurship, access to finance and general obstacles faced by small businesses. Although this forms part of the broader understanding of innovation, there appears to be paucity in the literature as it negates firm level innovation (Marcelle, 2011).

The micro processes of innovation in small firms remain under-researched (Edwards *et al*., 2005; Tidd & Bessant, 2009; Tan *et al.*, 2009; Marcelle, 2011; Mazzarol & Reboud, 2011). Scholars (e.g. Edwards et al., 2005; Tidd and Bessant, 2009; Tan et al, 2009, Mazzarol & Reboud *et. al.*, 2010, Mazzarol & Reboud, 2011, Marcelle, 2011; Marcelle *et al.*, 2013) contend that lack of information on innovation in small firms has wider implications, specifically when considering the specificities of the geography of innovation looking at low and middle income countries such as South Africa.

Consequently, owner-managers wishing to perform innovation activities in small firms are not equipped with the information they need in order to strategise for innovation activities. Therefore, this causes a dilemma as to whether or not their efforts would be

successful and lead to desired innovation outcomes. Similarly, interested stakeholders wishing to promote innovation in small firms do not have sufficient information to respond to specific needs of these types of organisations. This creates a situation where the interested stakeholders are neither adequately informed nor understand the pertinent issues affecting the majority of firms in the country. As a result, they are likely to develop interventions that are irrelevant and disconnected to the needs of small firms. It is against this background and its wider implications that the following main research issue emerges and subsequent research issues arise:

What are the innovation strategies adopted by small firms in South Africa, their implications and the extent to which they enable small firms to meet their goals?

1.3.1 Research issue 1

What are the factors that influence innovation in small firms?

1.3.2 Research issue 2

What are the motivations and the intended outcomes of innovation in small firms?

1.3.3 Research issue 3

What are the innovation processes followed by small firms?

1.4 RESEARCH AIMS

Firstly, this study seeks to explore the following;

- The initial conditions for innovation in small firms in South Africa.
- The motivations and intended outcomes of innovation in small firms.
- The innovation processes followed by small firms in South Africa.

Secondly, the study will make recommendations on what can be done to facilitate innovation in small firms in South Africa.

1.5 SIGNIFICANCE OF THE STUDY

This study is significant to both small firm owner managers and interested stakeholders including policy-makers. Prior research shows that innovation in small firms is an under-researched phenomenon in general, and in South Africa in particular (Edwards *et al,* 2005; Tidd & Bessant, 2009; Tan *et al,* 2009; Marcelle, 2011; Mazzarol & Reboud, 2011). Therefore, this study will make significant contribution on the subject of innovation strategies of small firms, specifically, in low and middle income countries such as South Africa.

It is expected that this study will provide information and a better understanding on the wealth generating activities of innovation that take place in small firms. This will likely prove very useful to both the owner-managers and interested stakeholders wishing to perform and promote innovation in small firms respectively. Thus owner-managers of small firms will be able to plan, make informed decisions and effectively perform innovation activities in a systematic and formalised approach. At the same time, interested stakeholders including policy-makers, government agencies and private investors will be able to design and implement interventions and support programmes that are relevant, coherent and aligned to the needs of small firms in South African.

1.6 DELIMITATIONS

Delimitation refers to the planned and justified scope of the study beyond which generalisation of the results was not intended (Perry, 2002). This study identifies two important delimitations.

- The study explores innovation strategies of small firms from an innovation management perspective (Eveleens, 2010).
- The study is limited to ten innovative small firms that are either based at The Innovation Hub in Pretoria, South Africa or beneficiaries of innovation related support programmes from government agencies such as Technology Innovation Agency (TIA).

1.7 DEFINITION OF KEY TERMS

Definitions adopted by researchers in different fields of study are not uniform and, consequently, terms are often open to different interpretations. The following key terms are defined as they are intended to be applied in this study:

1.7.1 Innovation

Innovation is a problem-solving process of generating, acquiring and/ or applying new knowledge for economically and socially beneficial purposes through efficient unfolding of various learning processes involving trial and error under conditions of uncertainty and complexity (Marcelle, *et al,* 2013).

1.7.2 Innovation process

The innovation process, also referred to as “innovation management”, is the active and conscious execution and control of activities such as search, selection, implementation and capturing value that lead to selection of ideas and the transformation of these ideas into innovation in an organisation. This consist of a series of problem solving activities and managerial decisions in which the optimisation of financial resources and other assets take priority over other considerations (Marcelle, 2004; 2011; Crossan & Apaydin, 2010; Tidd & Bessant, 2009; Jacobs & Snjiders, 2008 cited in Eveleens 2010).

1.7.3 Innovation strategies

Innovation strategies relate to the purposive or intentional choices, resource allocation decisions or investment decisions and adopted courses of action by small firms as they carry out innovation activities in order to meet their goals. (Adams et al, 2006; Marcelle , 2004; Ramanujam and Munch, 1985 cited in Adams et al, 2006; Edelman et al , 2005 cited in Mazzarol, 2009).

1.7.4 Small firm

There is no universally accepted definition of small firms and no single definition can capture all the dimensions of small firms (Mazzarol & Reboud, 2010). In South Africa, the definition of small firms is adopted to mean a firm employing less than 50 people (South Africa, 2004).

1.8 ASSUMPTIONS

The research will be based on inputs from interviews with ten owner-managers of small firms and six managers of public innovation support programmes. It is assumed that:

- Owner-managers of ten small firms and six managers of public innovation support programmes will be honest and forthright about their understanding of innovation in small firms.
- The interview protocols and the process of data gathering is secure and confidential and offers a trusting environment which is a prerequisite to obtaining relevant information about innovation in small firms in South Africa.
- Innovation in this discussion is both economically and socially beneficial and does not consider the negative or unintended consequences of innovation (Barret & Sexton, 2006; Marcelle *et al.,* 2013).

1.9 THE STRUCTURE AND OUTLINE OF REPORT

This chapter provides a synopsis of the entire study. The research report is structured and presented in the following five chapters:

Chapter 2: Literature review. This puts into perspective the theoretical and empirical considerations involving innovation in small firms. It aligns the study with existing theories in the discipline of innovation management studies and identifies themes as well as areas requiring further research.

Chapter 3: Research design and methodology. This presents and justifies the research design and strategy, techniques for data collection, presentation and analysis.

Chapter 4: Presentation of the data. This presents results of the study in different formats such as tables, verbatim statements and a narrative as they relate to the findings.

Chapter 5: Analysis of the data. This analyses the results as they relate to the literature review and addresses the research problem.

Chapter 6: Conclusions and Recommendations. This chapter gives conclusion, recommendations, and limitations of this study and suggests areas of future research.

Chapter 1 laid the foundation of this study. The study proceeds with a detailed review of relevant literature in Chapter 2.

CHAPTER 2. LITERATURE REVIEW

2.1 INTRODUCTION

A review of a cross-section of literature on innovation strategies in small firms in general from low and middle income countries such as South Africa is offered here. The discussion adopts the lens of innovation management in exploring this subject (Barret & Sexton, 2006; Adams *et al.*, 2006; Tidd &Bessant, 2009; Eveleens, 2010;

Marcelle, 2011; Marcelle *et.al*, 2013). However, where necessary, reference is made to other disciplines such as entrepreneurship. The rationale for this lies in the assertion that "studies in the field of innovation management are located in the broader 'schools' of management science, strategic management and innovation studies" (Marcelle, 2004, p26).

The review will firstly provide a theoretical and conceptual understanding of innovation in general and narrows down to small firms. It will examine the literature on innovation in small firms with specific focus on the initial conditions for innovation, the motivations and intended outcomes of innovation, and the innovation process. This will be followed by a summary of key themes that provide a framework or dimension of analysis against which the research is conducted and research questions are derived.

2.2. THEORETICAL AND CONCEPTUAL UNDERSTANDING OF INNOVATION

Innovation is a broad subject with multiple interpretations and perspectives (Adams *et. al*, 2006). As such, "the innovation literature is a fragmented corpus, and scholars from a diversity of disciplinary backgrounds adopt a variety of ontological and epistemological positions to investigate, analyse and report on a phenomenon that is complex and multidimensional" (Adams *et. al*., 2006, p20). According to Dodgson, (1993) cited in Barrett and Sexton (2006, p 332), "the scale and complexity of the subject negates any one form of analysis providing a 'complete' picture." Drain and Schoonhoven (1996) cited in Edwards *et al* (2005) argue that there is a general absence of theoretical basis for innovation research. In fact, innovation research has been following a normative-variance approach which interprets knowledge as an economic transaction. This approach negates that innovation involves learning over time as well as the knowledge aspect of technology and in the absence of a solid theoretical framework, opts to concentrate on theory testing rather than theory building. (Edwards *et al.*, 2005; *Tan, et al*., 2009).

In an effort to contribute to theory building, several scholars propose a number of frameworks and conceptual models for examining innovation management (Mitchell &

Goffin, 2005; Edwards et al., 2005; Adams *et al.*, 2006; Tidd & Bessant, 2009; Tan *et al.* 2009; Eveleens; 2010; Crossan & Apaydin; 2010; Spruijt *et al.,* 2013). One such framework as shown in Fig 1 is given by Cross & Apaydin (2010).

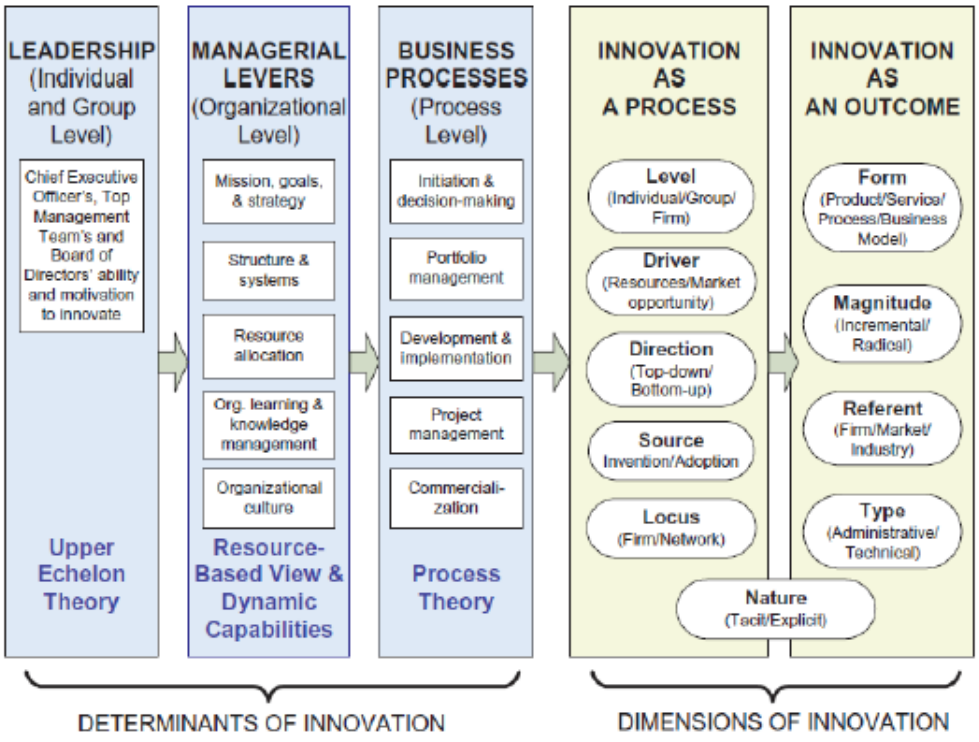


Figure 1: Framework of Innovation, Crossan and Apaydin (2010, p1167)

The framework by Crossan and Apaydin (2010) gives a useful critique of the innovation process by considering innovation as consisting of two elements: determinants and dimensions. However, the schematic presentation might be construed to mean that innovation is a sequential process, whereas in reality these elements in Fig 1 interact with each other randomly, forming a milieu or soup of controlled chaos (Quinn, 1985). Spruijt *et al.* (2013), in review of this, propose another framework known as "the golden circle of innovation" and ask three fundamental questions about innovation management, "Why?", "How?" and "what?" The framework focuses on leadership and its components, management and processes, and treats innovation as both a process and an outcome (Spruijt *et al*., 2013). The different perspectives on innovation have implications on the theoretical and empirical understanding of innovation as further discussed.

2.2.1 Definitions of innovation

There is no universally accepted definition of innovation since it is highly contextual and this has implications on the definition and understanding of innovation. (Tidd & Bessant, 2009; Marcelle *et al*, 2013). Firms undertake a number of innovation activities which can be defined according to forms, dimensions, degrees and types of newness (Crossan and Apaydin, 2010; Tidd and Bessant, 2009; Mazzarol & Reboud, 2011).

Innovation is the introduction of something new to a firm but not necessarily new to the world on a continuum of newness or novelty: new to the firm, new to the market of the firm, new to the country and new to the world (HRSC, 2011). This "newness" varies by degree as incremental, radical or disruptive (Tidd & Bessant, 2009).This "newness" or "novelty" can be technical, technological, administrative or organisational (Ngutshane, 2012).

Tidd & Bessant (2009) proposes four dimensions of innovation:

- Product innovation
- Process innovation
- Position innovation
- Paradigm innovation

Innovation can also mean product/service related, marketing innovation, process technology innovations, and administrative innovation (Mazzarol *et al,* 2010). It can be either platform innovations or architectural innovation, with changes to the components and the whole platform respectively. (Henderson & Clark, 2002 in Tidd & Bessant, 2009).

According to Dosi (1988a), all definitions tend to agree on one thing - that innovation involves problem-solving. This study adopts a definition by Marcelle *et al* (2013) which views innovation as a problem-solving process of generating, acquiring and/ or applying new knowledge for economically and socially beneficial purposes through efficient unfolding of various learning processes involving trial and error under conditions of uncertainty and complexity. This definition appears to be appropriate

since it encompasses a number of innovation types and forms when applied to small firms in the context of low and middle income countries such as South Africa.

2.2.2 Conceptual understanding innovation in small firms

Innovation management literature which focuses on small firms is relatively new (Mazzarol & Reboud, 2011; Eveleens, 2010). Notwithstanding this newness, innovation research on small firms, until recently, has only been concerned with the contribution of small firms to economic growth and job creation, treating the small firm as a "black box" with little or no interest in the internal dynamics of small firms (Edwards *et al*., 2005; Tan *et al*, 2009; Mazzarol & Rebound, 2011). In view of this background, scholars have proposed a number of frameworks and models (Edwards *et al*, 2005; Barret & Sexton, 2006; Mazzarol & Reboud, 2011) which could be useful in examining innovation in small firms. Some of these frameworks and models include:

- **Theorising innovation in a small firm (Edwards et al, 2005)**

  In Fig 2 below, Edwards *et al* (2005, p1124) argues that instead of looking at only the individual entrepreneur and structural characteristics of the small firm, "there is a need for a shift from a mere static interpretation to an effort to explain innovation by exploring the links between strategic choices and mediating effects on institutional structures and processes."

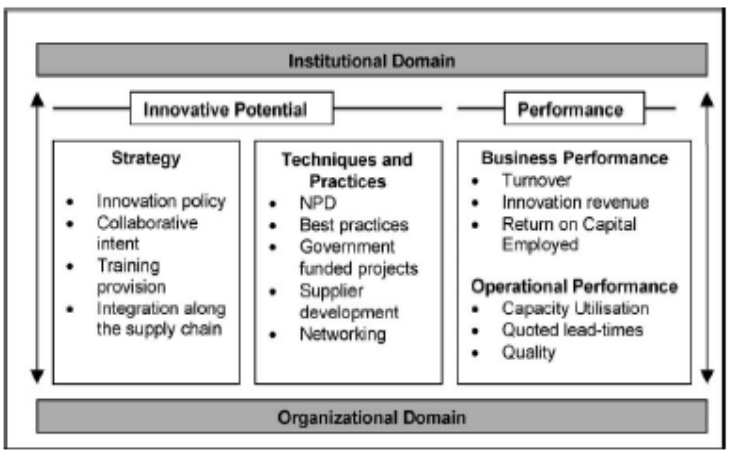


Figure 2: Theorising innovation in a small firm (Edwards *et al.*, 2005, p1124)

Thus, innovation in small firms is presented as a milieu of factors, linkages, processes and actors through an approach that attempts to provide a holistic

understanding, negating any one form of representation (Edwards, 2005; Adams *et al*, 2006; Barret and Sexton, 2006).

- **Generic innovation model (Barret & Sexton, 2006)**
  Barrett and Sexton (2006) propose a generic innovation model consisting of five elements namely: innovation focus, organisational capabilities, contextual factors, innovation process and enhanced innovation outcome. Barret & Sexton (2006) argue that successful innovation outcomes are achieved through an appropriate innovation focus in response to contextual factors supported by right organisational capabilities through an effective and efficient innovation processes.
- **Unit of analysis of innovation in the small firm (Mazzarol & Reboud, 2011)**
  Mazzarol and Reboud (2011) propose a framework for analysing innovation in small firms at:

  (1) the individual level - focusing on the role of owner managers, issues of leadership, entrepreneurial orientation and strategic partnering

  2) the organisational level - focusing on the seven key dimensions of innovation management of processes as highlighted by Adams et al (2006).

  3) the systemic level - focusing on the external environment.

2.3. INITIAL CONDITIONS FOR INNOVATION IN SMALL FIRMS

A number of scholars argue an understanding of the initial conditions that constrain or facilitate innovation in small firms needs a multi-level analysis (D 'Amboise & Muldowney, 1988; Hunger & Wheelen, 2003; Mazzarol & Reboud, 2011). This is because innovation is influenced by characteristic and contextual factors interacting at individual, firm, and industry levels, as well as local, regional, national and global levels (Foxall & Johnston, 1987; Dampour, 1991; Cooper *et al.,* 1994; Tidd & Bessant, 1997; Dahlqvist *et al.*, 2000; Edwards *et al.*, 2005; Barret & Sexton, 2006; Crossan & Ayapadin, 2010; Marcelle *et al.,* 2013). Table 1 below shows a multi-level analysis of small firms.

Table 1: Multi-level analysis of small firms looking at three levels.

Level	Authors		
	D'Amboise & Muldowney(1988)	Hunger & Wheelen (2003)	(Mazzarol & Reboud 2011)
1	Managerial characteristics	Micro-level	Individual level
2	organisational configuration	Task environment	Organisational level
3	The task environment	Macro-environment	Systemic level

Adapted from: D'Amboise & Muldowney (1988), Hunger & Wheelen (2003) and Mazzarol & Reboud, (2011).

The framework offered by Mazzarol & Reboud (2011) is adopted for the purpose of this discussion. Thus, it is useful to examine small firms looking at three levels: individual, organisational and systemic (Tan *et al*, 2009; Mazzarol & Rebound, 2011) In the next sections, the three levels are discussed in detail.

2.3.1 The individual level

Literature on small firms argues that small firms are characterised by the dominant personal figure of the entrepreneur (Nooteboom, 1994; Di-Tomasso & Dubbini, 2000; Mazzarol & Reboud, 2011). However, this literature focuses on the characteristics of the entrepreneur or owner-manager with little effort given to study their behaviour (Venkataraman, 1997; Davidsson, 2008). Yet, organisational theory highlights the nexus between an individual and organisational goals since members bring into their organisations attitudes, values and goals (March & Simon, 1958). Hence, D'Amboise and Muldowney (1988) recommend the need to examine the behaviour of small firm owners with a focus on their attitudes, perceptions, motivations, goals and objectives.

Small firm owners start businesses for a number of reasons including self-employment, autonomy, the need for self-actualisation, necessity or opportunity and disagreements with employers on the choice of technological paths (McClelland, 1965 and Kermelgar, 1985 in D'Amboise & Muldowney, 1988; Nooteboom, 1994; Lumpkin & Dess, 1996; Driver et al, 2001; Klepper & Thompson, 2005; Witt & Zellener, 2007). The small firm

owner–manager, usually the founder, is considered to possess entrepreneurial orientation, particularly in the form of innovativeness, reactiveness, risk taking, autonomy and competitive aggressiveness (D'Amboise & Muldowney, 1988; Venkataraman, 1997; Davidsson, 2008). Thus, the role of small firm owner managers and founders as entrepreneurs is to, "fulfil a function, that of combining new things or innovating, including introducing new product or a new quality in a product, a new method of production, a new market, a new organisation within an industry" (Morlacchi, 2007, p341). Although this focuses on the individual entrepreneur, it is important to consider the dimensions of entrepreneurship as an economic function, creation of a new venture, form of behaviour and set of characteristics (Morlacchi, 2007). This is consistent with Schumpeter (1934) who acknowledges the role of individuals and entrepreneurship as a function that can be performed by a multi-actor agent like the government. The entrepreneur interacts and collaborates with other factors such as other entrepreneurs, firms, professional associations and support institutions (Morlacchi, 2007).

Entrepreneurial orientation involves both entrepreneurial and management action, with the former argued to involve a creative component or cognitive processes different from the latter (Morlacchi, 2007). Organisational theory recognises the role of individuals in organisations as problem solvers, searching for alternatives to solve specific organisational goals (Cyert & March, 1963). This involves making casual links, recognising patterns and making connections, and also differs depending on the conditions of scarcity requiring owner-managers to come with specific solutions to specific problems (Gaglio & Katz, 2001; Sarasvathy, 2001; Srinivas & Sutz, 2008). Managerial action involves perception, awareness, anticipation, reactiveness, risk taking, autonomy and competitive aggressiveness (Foxall & Johnston, 1987; D'Amboise & Muldowney, 1988; Venkataraman, 2004; Davidsson, 2008).

Entrepreneurship is a social process involving learning and embeddedness of social capital. It is a process whereby owner-managers use networks to acquire resources such as information and knowledge, and to supplement the education, experience and financial capital of owner managers or founders (Granovetter, 1985; Burt, 2004; Dobson *et .al*, 2013; Urban and Shaw, 2010; Sefalafala, 2012). These networks can

either be informal involving mentors, professional forums, industry contacts and trade exhibitions or formal constituting a business network involving business partners, business associations, customers and suppliers (Ellis 2008 in Kontinen & Ojala, 2011; Ojala 2009; Urban, Van Vuuren & Barriera, 2008). However, the ability to network is important and not merely the presence of networks (Sefalafala, 2012). This requires boundary spanning characteristics to access a broader and diverse set of skills, information and knowledge critical for problem-solving and creativity (Bercovitz & Feldman, 2006; Tijssen, 2006).

Literature shows that training and education have an influence on creativity and the ability to act on opportunities (Venkataraman, 1997; Shane, 2000). Educational background, experience and skills training are key success factors for entrepreneurs and owner-managers of small firms (Venkataraman, 1997; Shane, 2000; Naidoo. & Urban, 2010; Bercovitz & Feldman, 2008; Marcelle, 2011). Thus, general human capital and managerial know-how from the educational background, work experience and experience from past ventures (including failures) form the initial capital for success of small business ventures (Cooper *et al.* 1994 in Dahlqvist *et al.* 2000; Westhead *et al*, 2003).

The literature on business performance in South Africa identifies key success factors that define entrepreneurs (Marcelle, 2011). These factors range from individual characteristics, attitudinal and experiential changes, personal management and involvement, support from external parties, managerial skills and capabilities. This is coupled with internal technological resources as well as entrepreneurs' strategic orientation, innovativeness and responsiveness to the environment (Marcelle, 2011). Nothwistanding these key success factors, the literature argues that owner-managers of small firms have weaknesses such as lack of business skills, time, expertise, trust and openness (D'Amboise & Muldowney, 1988; Marcelle, 2011). Furthermore, small firm owner managers do not want to relinquish control of their businesses and are less likely to seek or listen to professional advice (Marcelle, 2011). In addition, they are not easily accessible nor do they easily disclose information and this makes it difficult for appropriate institutional intervention (Davidsson, 2004).

The literature identifies other weaknesses perceived as “the dark side” of the entrepreneur (Kets de Vries,1985). Thus small firm owner managers deliberately falsify information, exaggerate their position(s) or success(es) and under report shortcomings to gain the confidence of key stakeholders, a phenomenon known as legitimacy lying or fabricated structure (Carrol,1984 in D’Amboise & Muldowney, 1988; Rutherford *et al.*, 2009). In addition, critical self-evaluation is a blind spot for owner-managers as they are unlikely to see their shortcomings nor admit that they are poor managers (Baumback, 1979 in D’Amboise & Muldowney, 1988).

2.3.2 The organisational level

Scholars argue that specific features such as structure, culture and processes either facilitate innovation or constrain innovation within organisations (Amabile, 1988 and Hamel, 2000 in Ngutshane, 2012). According to Dampour (1991) in Ngutshane (2012, p41)., the determinants of innovation within firms include:

- General firm characteristics (firm age, size, ownership status and capital);
- Firm structure (intellectual capital and firm culture); and
- Firm strategies (collaborations, knowledge management, investments strategies and operational priorities).

In addition, leadership, strategy, resources, organization, creative climate, culture, internal and external linkages influence innovation within the firm (Lofqvist, 2014).

Although the above argument applies to both large firms and small firms, small firms do not conform to the paradigms nor stereotypes developed for large fims (Mazzarol & Reboud, 2011). There are several differences in the successful innovation approaches between small and large firms. Small firms place less emphasis on routine of activities and specialised technical functions such as research and development (Tidd *et al,* 2003 cited in Marcelle, 2004). Furthermore, they exhibit unclear multifunctional roles for employees and departments (Pilemalm, 2002 in Lofqvist, 2014). Small firms are organic whereas large firms are likely to be mechanistic (Lofqvist, 2014). On one hand, organic structures are more appropriate for innovation when technology or commercial change is taking place due to their horizontal structures for fast communication (Burns & Stalker, 1961 in Lofqvist, 2014). On the

other hand, mechanistic structures are ideal where there is stability and innovation is incremental due to vertical communication (Burns & Stalker, 1961 in Lofqvist, 2014). Small firms have behavioural flexibility whereas large firms are materially rich, conferring different advantages and disadvantages respectively when it comes to innovation (Rothwell & Dodgson, 1994). In addition, small firms rely on more specialised knowledge in certain industries and are more locally embedded than their large counterparts (Hutter *et al.,* 2013).

A number of scholars argue that small firms are characterised by size, age, and limited internal resources, close interaction with customers and employees, flexibility and niche strategies (Nooteboom, 1994; Rothwell & Dodgson, 1994; Moller *et al.*, 2007; Mazzarol & Reboud *et. al,* 2010; Hutter *et, al.,* 2013; Saunila & Ukko, 2014; Lofqvist, 2014). Nooteboom (1994) notes that small firms exhibit the following core characteristics: size, personality and independence. At the same time, Tamasso and Dubbini (2000, p5) suggests the following characteristics of small firms;

- The dominant personal figure of the entrepreneur
- More informal structure
- Very manual and less systematic
- Positive family involvement with generational or succession problems
- Few incentives to retain workers due to limited resources
- Flexibility
- Innovative contrary to the Schumpeterian theory on the firm

Small firms are seen as a countervailing force to evils of monopoly by offering flexibility, quality of time and customer taste (Rothwell & Zegveld, 1982 cited in Rothwell, 1989). However, small firms do struggle against particular difficulties. Moller *et al* (2007) argue that small firms are characterised by three forms of liability: smallness, newness and unconnectedness which places constraints on innovation. In addition, scarcity of resources including human resources, financial capital, time and security are common features of small firms (Singh *et al.,* 2008 cited in Saunila & Ukko, 2014; Antes & Bititci, 2011cited in Saunila & Ukko, 2014). Small firms are also very sensitive to disturbances in cash flow which is key to survival and often lack buffers against these disturbances (Welsh & White, 1981 and Mazzarol & Reboud, 2005 in Lofqvist, 2014).

In spite of the several advantages offered by small firms, Scott *et al* (1996) note that small firms have limited opportunities and resources to develop new technologies and this ties them to existing technologies. As a result, small firms either use simpler technology or just do incremental innovation (Dallago, 2000 and Subrahmanya, 2005 in Lofqvist, 2014). At the same time, there is a narrow or limited portfolio of products making the costs and risks of innovation are higher in small firms compared to large firms (Lofqvist, 2014).

Despite generalisations on the lack of strategic planning in small firms as noted by Nooteboom (1994), there is empirical evidence that small firms that do so are likely to have better performance, less likely to fail and tend to become more innovative when compared to firms that do not (Wang *et al.,* 2007; Marcelle, 2011). Furthermore, empirical evidence shows that most firms active in exploring and exploiting emerging technologies are small firms and start-ups (Audretsch & Fieldman, 2003). The high involvements of small firms in emerging technologies show that organisations are shaped by their environment and vice versa (Thompson & McEwen, 1958; Lumpkin & Dess, 1996).

The above argument disputes the Resource dependence theory (Pfeiffer & Salancik in Lofqvist, 2014) which suggests that small firms are shaped by their environment and are too small to shape their own environment. This presents the paradox of size; on one hand size is a weakness that makes small firms vulnerable to both internal and external constraints, while on the other hand it is a strength that favours a flat structure allowing flexibility, adaptability and responsiveness (Ghobadian & Gallear, 1997; Garengo *et al.,* 2005, Laforet, 2008; Hutter *et al.,* 2013).

Notwithstanding the above arguments, there seems to be a tendency to consider small firms as homogenous, with bias on some categories and the neglect of others for the purposes of analysis (de Jong & Marsili, 2006). Yet scholars contend that small firms come in all sizes and this reality is important for the presence and nature of innovation in small firms (Welsh & White, 1981; Vossen, 1998; de Jong & Marsili, 2006). Furthermore, small firms differ from each other in resource positions, goals of founders, maturity stages, and potential outcomes and to some extent the context in which

innovation occurs (Mazzarol & Rebound, 2010; Barret & Sexton, 2006). Thus, despite the notable similarities, small firms are characterised by heterogeneity or variation (Audretsch and ACS, 2003).

2.3.3 The systemic level

Tidd et al (1997, p98) argue that the innovativeness of a small firm "is conditioned by the regional and national context in which it finds itself embedded. Thus, "the role of SMEs cannot be appreciated outside of the contextual characteristics of the innovation process, including technology, industry and the marketplace" (Edwards *et al*., 2005, p1121). According to some authors (Autio 1998; Doloreux 2002; Cooke, 2004; Venkataraman, 2004; Mazarrol & Reboud, 2011; Ndabeni, 2008; Marcelle, 2011; Marcelle *et al.,* 2013) the context and its contextual characteristics including tangible and intangible dimensions that stimulate innovation are:

- Enabling conditions
- Market conditions
- Technological regimes and trajectories
- Industry structure
- Institutions
- Actors, activities and functions
- Knowledge flows
- Linkages and interactions
- Policies, regulations and incentives
- Cluster innovation environment

One of the key elements of the intangible dimensions is social capital which either constrains or facilitates networking (Burt, 2000; Jack, 2010; Molina-Morales & Martinez-Fernandez, 2010; Ulhøi, 2005; Urban & Shaw, 2010). A number of researchers concur that both private and public intermediaries play a bridging role in creating social capital (Uzzi, 1997; Venkatamaran, 2004; Diener & Piller, 2010; von Nell &Lichtenthaler, 2011). Social capital has been acknowledged by Venkatamaran (2004) as one of the most misunderstood and overlooked ingredients behind the success of the Silicon Valley in United States of America.

Technological regimes and trajectories are recognised as some of the most important systemic elements (Pavitt, 1984; Dosi, 1988b; Perez, 1983 cited in Freeman and Perez, 1988). According to Phaal *et al (2008)* in Pretorius & De Wet (2008), technology plays a central role in the activities of a firm. Emerging technologies such as biotechnology, green or climate innovation technologies and information and communication technology (ICT) have been classified as techno-economic paradigms, creating disruptive market potential as well to serve the under-serviced markets (Perez, 1983 cited in Freeman and Perez, 1988; Christensen, 1997; Prahalad & Hart, 2002). These technologies can be classified as low, medium and/ or high technology depending on their complexity or market maturity (Braadland& Ekeland, 2002).

Despite the opportunity spaces for innovation created by technological advances, market conditions appear to be a major constraint (Martin & Scott, 2000; Unruh, 2002; Oxera, 2005). Thus, innovation in most of these emerging technologies experience a phenomenon which is metaphorically termed the "valley of death". This refers to the challenge of either making a transition from a laboratory into production or from production into the market (Marczewski, 1997; Markham, 2002; Wessner, 2005; Ford *et al*., 2007; Nanda *et. al*., 2013). This "valley of death" cannot be solely attributed to funding but to a number of factors such as skills required to upscale technology to commercialisation, market development and challenges with innovation diffusion (Rogers, 2003; Nanda *et. al*., 2013). In addition, the uncompetitive behaviour of incumbents and technological lock-in as evident in the energy industry exercabates this situation (Unruh; 2002; Tidd & Bessant, 2009; Sioshansi, 2010).

In order to address the above challenges there is need for institutional intervention (Edler, 2010). This includes bridging institutions and intermediaries to address market failure, create demand for innovation and facilitate technology transfer and learning within and among the innovation actors (Martin, 2000; Unruh, 2002; Venkataraman, 2004; Oxera, 2005; Edler, 2010). Public procurement policies could help create demand through favoring supplier development of small firms engaged in innovation (Edler, 2010; TIHMC, 2013).

In South Africa, there is a prevalent lack of coherent policy coordination among various government institutions resulting in gridlock and suboptimal policy niches (Ahwireng-Obeng, 2003; Marcelle, 2011). This has been characterised, on one hand, by a form of symptomatic treatment scantly addressing supply side issues and on the other hand, a systemic negation of demand side issues (Mani, 2001; Macheke, 2002; Lorentenzen, 2010). The government and other interested stakeholders have provided interventions *inter alia* incubation centres and support services (Ndabeni, 2008; Chirambo, 2014). However, a number of challenges remain unresolved such as fragmentation, existence of innovation chasm, a narrow definition of innovation and a lack of funding (OECD, 2007; Marcelle, *et al*., 2013).

There are also concerns that the national innovation system is not aligned to socio-economic challenges, and as such could be producing inequalities (Freeman, 2000 in Cozzens, 2007; Abrahams & Pogue, 2010, Lorentzen, 2010; Maharajh, 2010; Marcelle *et. al*, 2013). Resolving these challenges require concerted efforts and collaboration among the triple or multi-helix players such as industry, academia, government and to some extent communities (Etzkowitz, 2000, Mohannak, 1999, Kruss, 2006; Wolson, 2007; Marcelle, 2011).

According to the Global Entrepreneurial Monitor (2007) South Africa, as compared to other countries, grapples with a weak entrepreneurial culture as well as misdirected efforts (Van Vuuren & Groenwald, 2007 in Marcelle, 2011). Empirical evidence reveals a relatively high failure rate of 50% in the first five years among newly established small firms and start ups in South Africa (Cant *et al*., 2003). Lack of access to, or availability of finance and skilled labour, unfriendly labour regime and high operating costs pose challenges to the survival of small firms (Marcelle, 2011). In addition, small firms in South Africa face common challenges plaguing most small businesses elsewhere including lack of sophisticated and innovation management tools, liability of smallness, lack of resources, unconnectedness, informal strategies and short range planning (Marcelle, 2011).

Steel (1994) argues that small firms in South Africa face the miracle of survival and suggests that if they are to become the miracles of growth, significant government

support is required. Currently the meagre government support small firms receive is barely making an impact. There is low visibility, lack of awareness and general inaccessibility to government support programmes, further exacerbated by bureaucracy (Ahwireng-Obeng, 2003; Marcelle, 2011). At the same time, small firms are treated as a homogeneous unit, lacking a segmented approach responsive to capability levels, specificities and needs of small firms (Ndabeni, 2008; 2009; Chandra *et al,* 2001 in Marcelle, 2011; Marcelle *et al*, 2013).

It seems that the challenge facing small firms in South Africa does not lie the shortage of funds or lack of institutions to support innovation in small firms (Ahwireng-Obeng and Piarry, 1999; Mani, 2001; Ahwireng-Obeng, 2003; Marcelle, 2011).. Rather, the problem appears to be the weakness in coordination, implementation, impactness and specificity. While funding and other support mechanisms may be available to small firms and entrepreneurs, without an understanding of how the wealth generating activities of innovation take place, these efforts will be in vain (Marcelle, 2011).

2.4 MOTIVATIONS AND INTENDED OUTCOMES OF INNOVATION

Scholars on organisational theory (e.g. March & Simon, 1958; Cyert & March, 1963; Burns & Stalker, 1961) espouses that the goal setting or formation process in firms is triggered by a number of motivations for problem solving. This results in certain intended outcomes or intended consequences, which, if not met start a new process of problem-solving until the expected or goal aspiration level is satisfied. Thus, innovation is a problem-solving process that is initiated by an individual or a group of individuals to achieve specific goals. (Cyert & March, 1963; Amabile, 1988; Marcelle *et al.*, 2013). It is not an unreflective process but a process that requires motivation (Barret & Sexton, 2006).

There are two types of motivations, namely “voluntary” (referring to intrinsic and goal-directed motivation) and “extrinsic” motivation (Amabile, 1996; Ryan & Deci, 2000; Gagne & Deci, 2005; Bhaduri & Kumar, 2009). Some authors argue that it is useful to treat the motivations for innovation as a continuum from intrinsic to extrinsic factors starting with individual goals to organisational goals of small firms (Cohen & Sauerman,

2007). There is a nexus between goals of the firm and goals of individuals, particularly since certain individuals such as owner-managers and their goals are central to the small firms (March & Simon, 1958; Cyert & March, 1963; Nooteboom, 1994; Barret &Sexton, 2006).

2.4.1 Motivation at individual level

Scholars acknowledge the importance of both pecuniary and non-pecuniary rewards as key motivations for innovation among individuals (Schumpeter, 1934; 1943; Katz, 1993; Kidder, 1981; Amabile, 1998; Ryan & Deci, 2000; Gagne & Deci, 2005; Cohen & Sauerman, 2007; Bhaduri & Kumar, 2009). However, despite this acknowledgement there is dearth on the literature on individual motivation for innovation (Cohen & Sauerman, 2007).

The motivational factors for innovation are both intrinsic and extrinsic , and include but not limited to personal fulfilment, need for achievement, intellectual challenge, curiosity, problem solving, peer or societal recognition and monetary gains (Cyert & Simon, 1963, Sauermann & Cohen, 2007; Bhaduri & Kumar, 2009). Intrinsic motivational factors relate to influences that come from within the person and is rooted in the pleasure of working on the task or in the satisfaction in completing a task (Ryan & Deci, 2000). Extrinsic factors relate to influences emanating from outside the person, the reward is separate from the task itself and could be rooted in, for example, financial compensation (Amabile 1988; Ryan & Deci, 2000). Intrinsic factors can be broken down into individual and social factors, and extrinsic factors into individual, economic and social factors (Avenali *et al*., 2010). Social factors refer to motivations that come from social influence or based on the judgement of others and are non-pecuniary (Avenali, *et al.,* 2010). Findings from a longitudinal study by Brunt *et al*., (2012) show that innovation competitions plays a critical role in stimulating innovation. This is because it provides both a source of internal motivation as an intellectual challenge as well as external validation providing recognition and to some extend monetary gain. Furthermore, these findings confirm that public innovation programmes allows new ideas to be visible and supported.

Apart from the locus of control, there is a major difference between these two types of motivations, intrinsic motivation stay lifelong whereas extrinsic motivation decays with a fulfilment of a goal (Morgan et .al, 1993 in Cohen & Sauerman, 2007). In addition, intrinsic motivation is found in the early stages of innovation when uncertainty is high whereas extrinsic motivation increases with the maturity of the innovation activities or occurs at a later stage in the innovation process when an idea or product is waiting application or commercialisation (Cohen & Sauerman, 2007). Thus the strategic orientation of owner-managers serves as primary driver of the motivation for innovation (Foxall & Johnston, 1987; Edwards *et al*, 2005).

2.4.2 Motivation at firm level

According to literature on organisational theory (March & Simon, 1958; Cyert & March, 1963; Thompson & McEwen, 1958), a firm is a coalition of individuals with specific goals that are distinct from other forms of organisations. Five distinctive goals that are reflected within this understanding include production, inventory, sales, market share, profit (March & Simon, 1958; Cyert & March, 1963). Literature on innovation at large firms argues that strategic innovation to gain competitive advantage, profit and growth is the key motivation for innovation (Lofqvist, 2014).

Arguments from Stage theories (Churchill & Lewis, 1983 in Barret &Sexton, 2006)) postulate that small firms pass through five stages, namely existence, survival, success, take off and resource maturity. Barret &Sexton (2006) summarise them as survival, stability and development but argue that these stages are not rigidly linear but cyclical and dynamic in response to changes in the internal and external environment of the small firms. According to Barret & Sexton (2006, p337), the motivation to innovation in small firms follows a fluid hierarchy of needs primarily focusing on survival with stability and growth as secondary objectives.

Research on small firms highlights the following as motivations for innovation: survival, steady cash flow, stability, sales and growth, profit, solving customer problems, improved quality and sales (Foxall & Johnston, 1987; Barret & Sexton, 2006; Edwards, *et al*, 2005; Lofqvist, 2005). This depends on the age or maturity of the firm as start-ups are likely to create new products and once this is achieved, their goals may shift to

focus on improving processes, sales and growing market share (Chesbrough and Rosenbloom, 2002; Cohen & Sauerman, 2007; Tidd & Bessant, 2009).

Initially, the motivation to innovate in small firms is driven by the initial impetus of the owner manager's intrinsic motivation for problem-solving and the need for achievement. This evolves on a continuum from intrinsic factors to the extrinsic factors of recognition and monetary gain (Cohen & Sauerman, 2007). Since there is a nexus between the owner manager and the firm, problem solving evolves from being voluntary to being goal orientated. Problem solving with a customer could be the starting point to either creating new products and services or improving existing products and services (Foxall & Johnston,1987; D'Amboise & Muldowney, 1988; Lofqvist, 2014; Barret & Sexton, 2006; Cohen & Sauerman, 2007).

2.4.3 Intended outcomes of innovation

Scholars on organisational theory (March & Simon, 1958; Cyert & March, 1963) identify, profit, sales, market share, production and inventory control as goals of the firm that motivate a specific behaviour. This behaviour is purposeful or intentional and once realised, become intended outcomes or consequences. Foxall & Johnston (1987) see the outcomes of innovation as the intended consequences of the interaction between the antecedents of innovation, the behaviour and motivations of the owner-managers. Thus there is no direct relationship between a specific antecedent, behaviour and a consequence due to the nature of the innovation process which is seen as complex, chaotic and idiosyncratic (Quinn, 1985; Pavitt, 2004, Tidd & Bessant, 2009).

A number of scholars (e.g. Tidd & Bessant, 2009; Crossan & Apaydin, 2010) argue that innovation processes have a number of outcomes. According to Foxall & Johnston (1987) these outcomes could be: (1) a redefinition of business in terms of product, (2) market scope,(3) minor diversification, (4) mild or strong emphasis on product/market development, (5) performance in terms of financial criteria including sales, profit and profitability. Edwards *et al* (2005) summarise the outcome of innovation in a firm as either or both business and operational performance. Business performance refers to survival, steady cash flow, stability, sales and growth, profit, solving customer problems

while the operational performance refers to capacity utilisation, quoted lead times and quality.

Barret and Sexton (2006) contend that the outcome of an innovation process is enhanced firm performance in terms of both efficiency and effectiveness in realising the firm's goals. Edwards *et al* (2005) and Barret and Sexton (2006) provide a useful analysis of the outcomes of innovation in small firms as enhanced firm performance in realising the firm's goals at two levels: business performance looking at effectiveness and operational performance looking at efficiency.

2.5. THE INNOVATION PROCESS IN SMALL FIRMS

Literature on innovation processes draws largely from research on large firms in high income countries (e.g. Pavitt, 2004; Goffin & Mitchell, 2010; Tidd & Bessant; 2009; Burgelman, Christensen & Wheelwright, 2009). Notwithstanding the dearth of literature on innovation in small firms from a low and medium income countries' perspective (e,g Hadjimanolis, 1999 in Radas & Bozic, 2009; Radas & Bozic, 2009; Cetindamar *et al.*, 2009), the innovation process is perceived to involve exploration and exploitation of ideas and is characterised by idiosyncrasy, variation or contingency and uncertainty (Pavitt, 2004; Tidd & Bessant; 2009). Most innovation management scholars suggest that it is useful to view the innovation process using the process model with four phases, stages, components or activities as shown in Fig 3 (Tidd & Bessant, 2009; Eveleens, 2010)



Figure 3: The Innovation process (Tidd & Bessant, 2009, p44)

The innovation process as shown in Fig 3 is made up of activities which involve (2) searching for ideas, (2) selecting of ideas, (3) implementation of ideas and (4) capturing value from the implemented ideas, with iterations and feedback loops of learning that occur overtime under conditions of risk and uncertainty. This process is influenced by an innovation strategy and an innovation culture or innovative organisation (Tidd & Bessant, 2009).

In general, the process models have been criticised for presenting a linear outlook of innovation and often failing to consider innovation as an iterative process with feedback loops (Hobday, 2005; Howard et al., 2008 in Lofqvist, 2014). Other authors suggest that process models are based on perceptions lacking theoretical and empirical evidence (Hobday, 2005 in Lofqvist, 2014) and seldom include the commercialisation component (Crossan & Apaydin, 2010 in Lofqvist, 2014). Thus, according to Burns and Stalker (1961) in Lofqvist (2014) and Tidd and Bodley (2002) in Lofqvist (2014), there is no single best way to manage or organise innovation.

The four phases or stages approach in Fig 3 have been criticised for suggesting a Unitarian model of innovation, ignoring variation and specificity of the innovation process (Mahdi, 1996 cited in Eveleens, 2010). Some argue that innovation is not necessarily a rational, linear and logical process but a behavioural, non-linear, random and iterative process best described as a milieu or controlled chaos (Quinn; 1985; Barret & Sexton, 2006; Eveleens, 2010; Lofqvist, 2014). According to Goffin & Mitchell (2010) the innovation process can be metaphorically viewed as a pentathlon as opposed to a marathon involving a number of disciplines where success in one of them is not sufficient to win the race. However, despite its general limitation of focusing largely on large firms, the theory on the innovation process is useful in providing a lens of analysis by presenting innovation management (Tidd & Bessant; 2009) as comprising of innovation strategies, innovation capabilities and innovation activities.

It can be argued that understanding the innovation process, “involves three distinct challenges: problems of competence, problem of variety and problem of selection” (Levinthal, 2007, p293). While enough has been done to understand the first two challenges, little has been done to understand the problem of selection. (Levinthal, 2007). Hence argument that there is a need to examine strategic choices and linkages among institutions, processes in relation to the process of innovation in small firm (Edwards *et al.*, 2005).

2.5.1 Innovation strategies

The literature on innovation strategy and/or innovation strategies takes two perspectives; innovation strategy as an organization’s overall innovation position (e.g. Dyer and Song, 1988 cited in Adams, *et al*., 2006) and innovation strategies meaning more than one strategy per firm (e.g. Freeman, 1982 cited in Martin, 1994; Foxall & Johnston, 1987; Hadjimanolis, 2000a; Baldwin & Gallantly, 2006; Levinthal, 2007 in Malerba & Brusoni, 2007). The term, “innovation strategies” is adopted in this discussion. Thus, strategies can be treated as organisation-environment interactions which are either proactive or reactive i.e. firms shaping the environment and/or firms being shaped by the environment depending on whether the stimuli are positive or negative (Thompson & McEwen, 1958; Foxall & Johnston, 1987). This depends on the strategic orientation of the owner-manager that plays a central role in mediating on the firm and its environment (Foxall & Johnston, 1987; Edelman (2003) cited in Edwards *et al* (2006).

Freeman (1982) cited in Martin (1994) argues that a firm is unlikely to conform to a single type but rather adopts a blend of several types of innovation strategies. Burgelman, Maidique and Wheelwright (1995) highlights that, at times, an idea or project fails as a result of the innovation strategy used to identify it not being ideal for taking the idea forward. This scenario has been formulated as “the problems of intermediate selection along development journeys” since “selection is occurring over a moving target” (Levinthal, 2007, p299). As a result, Levinthal (2007) recommends a number of development efforts or alternative learning strategies. This is also supported by Raynor (2007) who argues that in order to succeed in an uncertain future an organisation should adopt number of choices or strategies.

Empirical studies on small firms confirm that there can be more than one innovation strategies per firm (Foxall & Johnston, 1987; Hadjimanolis, 2000a; Baldwin & Gallantly, 2006). However, it seems that these studies tend to look at the position of the small firm in interacting with the market, ignoring the firm's internal dynamics. As a result, selection processes are largely attributed to the external environment (Malerba & Brusoni, 2007).

Importantly, studies by Foxall & Johnston (1987), using analytical tool of antecedents, behaviour and consequence suggest that innovation strategies adopted by small firms could not be attributed directly to a particular antecedent. This confirms the idiosyncratic nature of the innovation process (Pavitt, 2004; Tidd & Bessant, 2009). Although Foxall & Johnston (1987)'s analytical tool seems provide a linear or sequential presentation of the antecedents, behaviour and consequences, it is clear that it is dynamic involving chaotic interaction of these three elements.

There appears to be consensus among scholars that strategies in small firms are informal and this is likely to be the case with innovation strategies (Marcelle, 2011). According to Nooteboom (1994), the core characteristics of size, personality and independence influence small firms to focus on core strategies of innovation or niche strategies and new or customisation of products. Barret and Sexton (2006) highlight that small firms have broad strategies that lack details but make way for flexibility and adaptability. Thus, innovation strategies in small firms have a "soft focus" as opposed to a "hard focus" as in large firms. Baldwin & Gallantly (2006) argue that innovation strategies in small firms tend to be product based, process based or comprehensive (involving a mixture of the first two) and are likely to focus on quality, flexibility and customisation.

Innovation strategies are contingent on the maturity of the market. Where the technology or innovation is new, small firms are likely to embark on product innovation strategies. If mature, they tend to pursue market innovation strategies and business model innovation (Nooteboom, 1994; Chesbrough and Rosenbloom, 2002; Moore, 2004). Small firms might use a number of bootstrapping techniques in their early stages

to innovate and grow the business but abandon them once the firm is established (Lofqvist, 2014).

2.5.2 Innovation capabilities

Organisations must possess or build the right capabilities that facilitate innovation (Cohen and Levinthal, 1990; Burgelman, Maidique and Wheelwright, 1995; Drejer, 2002). Theories on organisational ambidexterity argue that this is important for both present and future business needs (Duncan, 1976; March 1991; Tushman & O'Reilly, 1996; Birkinshaw & Gibson, 2004; Meeus & Oerlemans, 2005; Tidd & Bessant, 2009). March (1991) argues that exploration and exploitation of ideas requires different capabilities. This includes transformative capabilities and configurationally capabilities in which knowledge is embodied and disembodied to address rapidly changing environments (Teece *et al*., 1997; Marsh & Stock, 2003 in Warren & Susman,(No date); Marcelle, 2004).

Capabilities can be either tacit, embedded in owner managers, employees and soft organizational routines, or codified in processes, procedures and policies of the organisation (Marcelle, 2004). At the same time, managers depending on their motivations, skills and experiences make decisions or choices which are critical in building innovation capabilities (Eisenhardt & Martin 2000; Zahra & George, 2002; Ambrosini & Bowman 2009). Hence variation in firms is not only as a result of technological capabilities but also managerial decisions and choices (Malerba & Brusoni, Eds, 2007). Extant literature on large firms espouses the importance of organisational learning (Henderson & Clark, 1990; Leonard-Burton, 1995; Slater & Narver, 1990; Kogut & Zander, 2002). Thus, the innovation process in small firms is one of learning and social process, involving both internal and external learning mechanisms under conditions of embeddedness over a period of time (Guimaracas *et al.*, 1996 in Lofqvist, 2014; Granovetter, 1985; Marcelle, 2004).

Internally, small firms can build their innovation capabilities through learning by doing, using and interaction, and through trial and error (Marcelle, 2004; Bell, 2009). In addition, small firms learn from failure and problem solving through the owner-manager (Dobson *et al,* 2013). However, small firms due to their resource limitations, are likely

to seek complementary assets from outside their firm boundaries (Teece, 1997; Hadjimanolis, 2000b; Nooteboom, 1994). Thus, external learning is driven by the owner-manager, who may learn from peers, competitors, suppliers and feedback from customers and users (Dobson *et al.*, 2013; Lofqvist, 2014). The literature argues that there must be a balance between internal and external learning mechanisms (Marcelle, 2004). It further argues that internal learning mechanisms provide the absorptive capacity that enables a firm to learn from external sources (Cohen & Levinthal, 1990).

2.5.3 Innovation activities

The main activities of innovation involve exploration and exploitation activities of search, selection, implementation and capturing value from innovation (Tidd & Bessant, 2009). Exploration can be taken to be search and select activities and exploitation to be implementation and capturing value in the innovation process respectively (Pavitt, 2004; Tidd & Bessant, 2009). Although some scholars (Tidd & Bessant, 2009) view search and selection as distinct activities others (Levinthal, 2007 in Malerba & Brusoni, 2007) view search and selection as ongoing random overlapping activities across the innovation value chain.

Search focuses on the sources or origin of innovative ideas (Tidd & Bessant, 2009). According to Cyert & March (1963) search processes are motivated by the need to solve problems. There are various sources of innovation, both internal and external to the firm (Katila & Ahuja, 2002; Drucker, 2002; Mahdi, 2003; Tidd & Bessant, 2009). Internally, owner managers and employees are the source of ideas (Dobson *et al*, 2013). Theoretical and empirical studies on open innovation confirm that small firms leverage on external resources to find ideas, build complementary assets, achieve cost efficiencies, reduce their transaction costs and accelerate time to market (Chesbrough, 2003; Chesbrough *et al*., 2006a). Thus, customers, users, suppliers, competitors, scientific communities, universities and the general public or “crowd” are likely to be the sources of innovation (Etzkowitz, 2000; Von Hippel, 1988; 2005; Mansfield, 2001 in Tidd & Bessant, 2009; De Jong & Marilisi, 2006). In addition, small firms are likely to network with other small firms, large companies, universities and research councils (Gomes-Casseres, 1987; Audretsch & Fieldman, 2003; Lauren & Salter, 2004; Rogers, 2004). On the contrary, other scholars (Hutter *et, al*., 2013; Saunila & Ukko, 2014)

argue that small firms do not have the capacity to engage external sources of ideas, face geographic and search processes are limited to the owner managers and their personal contacts. In addition, small firms also face geographic limitations (Freel, 2000; Bianchi, *et al*., 2010).

Selection involves the making of choices on innovative ideas (Pavitt, 2004; Tidd & Bessant, 2009; Edwards *et al*, 2005). While this can be taken to be a distinct process, it can also be considered to be an intermediate process occurring across the entire innovation value chain (Levinthal, 2007). The selection process in small firms can be described as having both an idiosyncratic nature and shared interpretative framework or means-end process (Dobson *et al*., 2013). Selection in large firms involves management tools for scanning the environment and portfolio management approach. However, small firms lack resources and as a result do not use formal management tools (Nooteboom, 1994, Marcelle, 2011; Tidd & Bessant, 2009). Unlike large firms, small firms have a narrow innovation portfolio, cannot spread risk and are likely to experience a high failure rate (van de Vrande, 2009).

Implementation involves three decisions: make, buy or cooperate which result in in-house development, sourcing and strategic alliances respectively (Tidd & Bessant, 2009; Veugelers & Cassim, 1999; Love & Roper, 2001; Pascussi, 2011). These decisions are influenced by transaction costs, strategic management and resource elements or complementary assets and consider cost reduction, economies of scale, intellectual property and availability of resources (Pascussi, 2011). In-house development is likely to be considered in new industries and outsourcing in mature industries (Stigler, 1951). Cooperation with other small firms, universities or even large companies and might be considered (Audretsch & Fieldman, 2003; Tidd & Bessant, 2009). Cooperation or co-creation of products and services with customers and users are evident in industries such as information and communication technologies (Von Hippel, 1988; Mansfield, 2001 in Tidd & Bessant, 2009; Chesbrough *et al*, 2006a). Generally, small firms are like not to engage in horizontal collaboration, preferring in-house production and are likely to consider vertical collaboration for marketing purposes (Lofqvist, 2014).

Capturing value from innovation involves intellectual property management and commercialisation strategies, which both depend on the technology and nature of the industry (Teece, 1997; Tidd & Bessant, 2009). Lack of a clear intellectual property management and commercialisation strategy could result in failure to capture value from innovation with subsequent loss to competitors (Tidd & Bessnt, 2010). Intellectual property management and commercialisation strategies consider speed to market, secrecy, product complexity, patent protection or registration, as well as user involvement, partnerships, licensing and outright selling respectively (Tidd & Bessant, 2009). Commercialisation strategies likely to be considered by small firm are mainly vertical partnerships with large established firms in order to compensate for lack of resources and build complementary assets (Teece, 1997; Audretsch & Fieldman, 2003). Co-creation of products and services with customers and users also serves as a commercialisation strategy usually in the ICT industry and assist with the diffusion of innovation and user acceptance (Chesbrough *et al.,* 2006a; von Hippel, 1988; Mansfield, 2001 in Tidd & Bessant, 2009). Outright selling is a lesser option because of small firms' liabilities of smallness, newness and unconnectedness and in most cases suboptimal, due to lack of complementary assets and behaviour of incumbency (Chesbrough *et al*., 2006b; Teece, 1986). Licensing out technology to cash rich established large firms is considered as a temporary option (Audretsch & Fieldman, 2003).

2.6 SUMMARY

Three major themes are identified from the literature review: initial conditions for innovation, motivations and intended outcomes of innovation and the innovation process. These themes serve as a conceptual framework in addressing the main research issues and subsequent sub research issues. A summary of each of the three major themes and subsequent sub themes are discussed.

The initial conditions for innovation refer to characteristic and contextual factors influencing innovation in small firms and interacting at the individual, organisational and systemic levels. At the individual level these factors are education, problem solving ability, experience, networking ability, mentorship, lack of business skills and formal

and strategic planning, and time. At the organisational level these factors are size, age, and limited internal resources, close interaction with employees and customers and behavioural flexibility. At systemic level the factors influencing innovation are technology, market access, and demand for innovation, funding, skilled labour, policies and cluster innovation infrastructure.

The motivational factors for innovation at the individual level are problem solving, need for achievement, recognition, and monetary gain. At firm level they are survival, stability and growth. The intended outcome of innovation in small firms is either enhanced business performance and/or enhanced operational performance. The former focuses on production of new goods or services, growth/turn over-sales, profit, market shares, and new business mode. The latter focuses on capacity utilisation or inventory control, quoted lead times (speed to market), cost reduction and quality.

The innovation process in small firms can be summarised as involving strategies, capabilities and activities. Innovation strategies are many per firm as a number of decisions or actions are adopted and at the same time they are informal and broad. Innovation capabilities involve both internal and external learning mechanisms. The former involves learning by doing through trial and error and learning from failure, and the latter, learning from other firms, customers, users and from overseas.

Innovation activities consist of search, selection, implementation and capturing value from innovative ideas. Search processes involve a number of innovation sources, namely owner-managers, customer/users, universities, conferences/expos, partners and networks, influences from outside the country, research councils, and standards associations. Select processes are mainly idiosyncratic and involve a shared interpretive framework but generally lack formal tools and a portfolio approach. Capturing value from innovation involves intellectual property management and commercialisation. The former considers speed to market, secrecy, product complexity and patent protection. The latter considers user involvement, partnerships, licensing and outright selling.

In conclusion as illustrated in Fig 4, it can be argued from a conceptual point of view that the innovation strategies adopted by small firms are the antecedents and

consequences of the dynamic interplay between three elements: initial conditions for innovation, motivations and intended outcomes of innovation and the innovation process. At the centre of this milieu or creative chaos is the owner manager playing a mediating and transformational role by making decisions and adopting courses of actions, which manifest themselves as innovation strategies.

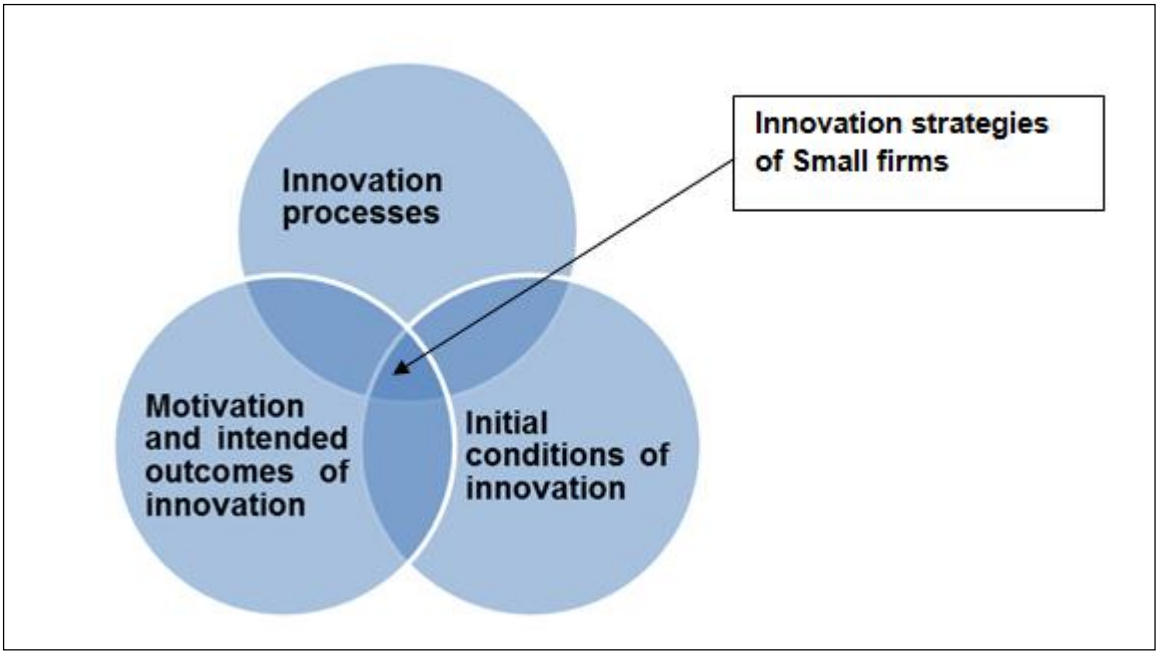


Figure 4: Major themes from literature review (Author's construction)

The literature review shows that there are very little known or understood about innovation strategies of small firms in general and specifically to low and middle income economies such as South Africa. Hence, in light of this background, the following main research issue arises:

> *What are the innovation strategies adopted by small firms in South Africa, their implications and the extent to which they enable small firms to meet their goals?*

In addition, a number of sub research issues emerge:

1. What are factors that influence innovation in small firms?
2. What are the motivations and the intended outcomes of innovation in small firms?
3. What are the innovation processes followed by small firms?

CHAPTER 3 RESEARCH DESIGN AND METHODOLOGY

3.1 INTRODUCTION

This chapter outlines detailed steps of the research design and methodology in order to provide an assurance that appropriate procedures were followed to address the research problem. The chapter is structured according to the following key elements:

- research approaches
- selection of participants
- data collection and analysis
- research quality
- assumptions and limitations of methodology
- ethical considerations and summary

The research process is neither linear nor circular but can be best presented as a spiral process involving iterations, re-interpretation and revisiting earlier stages (Punch, 2005).

3.2 RESEARCH DESIGN AND STRATEGY

Scholars identify two main approaches to research namely: quantitative and qualitative research (Creswell, 2014; Silverman, 2010). The quantitative approach stems from a positivist paradigm and involves the collection and analysis of statistical data. It assumes that there are social facts with a single objective reality separating feelings and beliefs of individuals (Creswell, 2014; Silverman, 2010). The qualitative approach, which is adopted for the purpose of this study, is associated with the interpretive paradigm. It involves understanding a phenomenon in its natural setting (Yin, 2003). It recognises the prevalence of multiple realities and their social construction by human beings (Mason, 2002). This is suitable for this study since innovation is a multidimensional and complex subject characterised by multiple realities (Pavitt, 2004; Adams *et al*, 2006; Barret & Sexton, 2006).

3.2.1 Qualitative approach

This research is an exploratory qualitative and cross sectional study involving a total of ten small firms, out of which eight are based at The Innovation Hub. The remainder are beneficiaries of innovation related public support programmes. A qualitative study emphasises the use of words, rather than statistics to describe social phenomenon and attempts to unearth the deeper meaning and significance of human behaviour and experience (Lincoln & Guba, 1985; Yin, 2003). It is suitable for investigating the experiences of small firms' owner-managers' and support programme managers and their subjective reality to understand the micro-processes of innovation in small firms (Shaw, 1999; Leedy & Ormrod, 2005; Flowers, 2009; Yin, 2003). In addition, it allows the researcher to gain new insights in respect of the phenomenon being studied, develop new concepts about a phenomenon and/or ascertain the problem that exists within a phenomenon (Leedy & Ormrod, 2005).

Qualitative research largely relies on interviews, observations, document review and audio-visual materials as sources of data (Creswell, 2014). For the purpose of this study, interviews were utilised. This enabled the researcher to describe and provide meaning through analysis of the views expressedand at the same time allowed the small firm owner managers and public innovation support programme manager to speak and provide their perspective on the research issue.

The approach asks the 'What' questions and is a justifiable rationale for conducting an exploratory study, the goal being to develop pertinent hypothesis and proposition for further inquiry (Yin, 2003). This is appropriate for this study since very little is known about innovation strategies used by small firms in South Africa. It allows the researcher to get close to the issue/organisation and to understand the dynamics therein (Shaw, 1999). Consistent with this view, D'Amboise and Muldowney (1988) recommends that theorists should study business people's actions in their environment through close interaction. In support of this view, Hill and Wright (2001) argue that study into small firms require an approach that minimises distance between the researcher and key individuals such as owner managers.

Leedy & Ormrod (2005) recommend that researchers must describe the procedural steps followed to solve the research problem. Furthermore Lindsay (1995, p14) recommends that the methodology and design should, "… provide enough detail to allow a reasonably knowledgeable colleague to repeat the same study in a different environment and obtaining almost similar results." Hence, the following sub-sections consider the selection of participants for the study, data collection method, data collection procedure, process and analysis, research quality, limitations of research methodology and issues of ethics.

3.3 SELECTION OF PARTICIPANTS

3.3.1 The Purposive Technique

The purposive or judgemental technique was utilised to select participants for the study. The purposive technique involved both criterion and convenience sampling. Thus, at the onset of the study, the researcher set the criteria for selection of potential participants, speculated on what needed to be known and deliberately set out to find informants with certain qualities who can and were willing to provide the information by virtue of their knowledge or experience (Kuzel, 1992 in Bardour & Bardour, 2003; Silverman, 2010; Burns & Grove, 2003; Cooper & Schindler, 2011). This was appropriate for data collection given the exploratory nature of the study and is suitable given the time limitations posed by a master's degree study.

3.3.2 The selection criteria

Leedy and Ormrod (2005) argue that researchers must justify the criteria for selecting particular units of study. Creswell (2007) cited in Turner (2010) affirms the importance of selecting the right and qualified candidates who can give the most reliable information to the study. For this reason and for the purpose of this study, a total of 10 small firms were selected and their respective owner-managers were interviewed. In addition, six programme managers of public innovation support programmes were also interviewed as key informants.These participants were chosen because of the following reasons;

- Small firms are influenced by the dominant personality of the owner-managers or founders (D'Amboise & Muldowney, 1988; Foxall & Johnston, 1987; Nooteboom, 1994; Cooper, 1981 cited in Mazzarol & Reboud, 2011).
- Public innovation support programmes managers' views have useful insights due to their interaction with small firms and management of specific innovation support instruments aimed at small firms.

The ten firms were identified by the researcher based on his knowledge as an innovation specialist working for a private consultancy firm based at The Innovation Hub, a Gauteng provincial government owned science and Technology Park located in Pretoria. These small firms are part of The Innovation Hub database with eight of the firms based at The Innovation Hub. While the other two firms are not based at The Innovation Hub they have benefitted directly from related public innovation support programmes and indirectly from the services of The Innovation Hub.

These ten small firms satisfy two criteria:

1) innovative - "innovative SMEs are those that identify, interpret and apply knowledge (both embodied and disembodied) effectively and as appropriate throughout the organisation." (Edwards *et al.*, 2005, p1124).These ten small firms are perceived to be innovative because of their location, activities and qualification for public innovation support programmes (Marcelle, 2011). They are across three industries or technology domains: information and communication technologies, bio economy or biosciences, climate innovation or green technologies and offer different ranges of products and services. According to Musengi (2003), this variety allows for comparison but does not seek to generalise the finding given the exploratory nature of the study.

2) Qualify to be defined as small firms since they employ less than 50 people and this is consistent with the definition of small firms (South Africa, 2004).

The six managers of public innovation support programmes based in Gauteng were selected because of the government's interest in supporting innovation in small firms as a means to achieve both the economic and social good (Marcelle, 2013). Therefore, managers of public innovation support programmes are likely to have information about

innovation activities in small firms since they work closely and interact with them. In addition, their perceived neutral government role and management of innovation incentives encourage small firms to share information with them. The selection of these two groups of informants also made it convenient in terms of location and the time required for the completion of a masters study.

3.4. DATA COLLECTION

The research used interviews as the primary data collection method which did not require total immersions in settings (Mason, 2002). According to Burgess (1982) in Ngutshane (2012, p50), “Interviews are particularly appropriate when the focus of the study is on the meaning of a particular phenomenon to the informants or participants, and where individual perceptions of a process or phenomenon are to be studied in an organisational context.” Semi-structured interviews were conducted with 10 owner managers of small firms and 6 managers of public innovation support programmes as as primary sources of data and key informants respectively. According to Creswell (2014), semi-structured interviews offer the following benefits:

- The researcher has the opportunity to probe whether the participants have provided sufficient answers.
- The researcher is able to explain and clarify interview questions.

In addition, semi-structured interviews allow themes to emerge and be identified where little is known about the subject under investigation (Turner, 2010). However, it is difficult to code or process large amounts of data captured during the interviews (Creswell, 2007 in Turner, 2010). Furthermore, the interview protocols should be carefully designed in order to avoid ambiguity, and embarrassing, hypothetical questions (McNamara, 2009 in Turner, 2010). The researcher conducted all the interviews. The interview questions were based on the three major themes:

- Initial conditions for innovation
- Motivations and intended outcomes of innovation
- Innovation process

The interviews used two interview protocols, one for each group, small firm owner managers and managers of public innovation support programmes respectively as shown in the appendices 1 and 2, designed in two parts. The first part was to get the interviewee's demographic profile and background information. This first part prepares the interviewee by creating an atmosphere of reciprocity and general easiness (Burgess, 1982). The second part involved a more detailed and critical aspect of the interview focussing on innovation processes in small firms.

3.5 DATA COLLECTION PROCEDURE

The data collection procedure commenced with interviews of owner-managers of small firms as primary sources of data and was followed by public support innovation programmes managers serving as key informants. Other secondary sources of data, marketing brochures, other documents in the public domains and internet sources were also used to check for background information on the participating small firms and public support programmes. The process of data collection was sequenced in the order discussed.

3.5.1 Pre-interview arrangements

In preparing for the interviews, written requests for permission to conduct the study were sent to the owner-managers and public innovation support programmes managers two weeks in advance.The e-mail invitation was followed up with a telephone call and the participants confirmed their consent either verbally or in writing. When permission was granted and appointments for interviews were subsequently arranged to take place in their offices or a convenient place and time.

3.5.2 The Interviews

The interview process followed guidelines recommended by McNamara (2009) cited in Turner (2010). The interview protocols were pilot tested in each of the first interviews, in order to identify and correct any flaws and to ensure the efficacy of the protocols (Creswell, 2007 cited in Turner, 2010; Kvale, 2007 cited in Turner, 2010). During the interview process, the researcher: (1) introduced the purpose of study in order to build rapport with participants and (2) explained how the results would be reported, assuring

participants that any comments made during the interview will be non-attributable and names of people and organisations would remain confidential. The proceedings were tape-recorded and notes were taken. The interviewer concluded by thanking the participants.

3.6 DATA ANALYSIS

Interpretivism or constructivism was used to analyse and interpret data as it places the importance of insiders' viewpoints in understanding social phenomenon (Miles & Huberman, 1994; Flowers, 2009). The process was very iterative and involved revisiting earlier steps as new themes and insights emerged, and served to update the literature review accordingly (Punch, 2005). A modified Ritchie and Spencer's (1994) framework was used to sift, chart, and sort data accordingly to key issues and themes. The framework has five steps: (a) familiarisation, (b) identifying a thematic framework, (c) indexing, (d) charting, (e) mapping and interpretation.

3.6.1 Familiarisation

Data from interview transcripts was sifted and sorted through a process of immersion. This involved listening to the recorded interviews and rereading interview transcripts and subsequently, data reduction, identifying and capturing key ideas and themes.

3.6.2 Identifying the thematic framework

The thematic framework was derived from the literature review in chapter 2. Thus data and themes emerging from the interviews were superimposed on a predefined template.

3.6.3 Indexing

The thematic framework derived from the literature was applied to the interview transcripts. Thus, data was coded against this pre-formatted template and presented in an appropriate form using charts or tables.

3.6.4 Charting

This involved “lifting data from its original setting” and rearranging it accordingly to themes derived from the literature reviews (see chapter 2). Charts or tables were used to present data in a clear and orderly manner, consistent with the order of participants as provided by their background information (see chapter 4). The charts or tables were by case for each respondent across all themes, with the themes on the horizontal row and the case of the vertical column. The data presentation is in the following chronological order:

- An introduction of the major and sub-section. For each sub-section, the factors or sub-times being explored are introduced, followed by an overview of the results,
- Data relating to the interviews presented in a table with an “X” in the box indicating comments or statements corresponding to the sub-themes or factors and the respective participant,
- A narrative including some verbatim statements discussing the data.

3.6.5 Mapping and interpretation

This process was done in the form of discussing the research findings in relationship to the literature review. This involved searching for patterns, associations, concepts, and explanations in the data. According to Ritchie and Spencer (1994) the researcher defines concepts, maps the range and nature of phenomena, creates typologies, finds associations within the data, provides explanations and develops strategies.

3.7 ASSUMPTIONS

The following assumptions that were considered in the study:

- The participants are knowledgeable about innovation and have sufficient knowledge of innovation activities in small firms
- The small firms are innovative
- Innovation is beneficial to small firms
- The participants will cooperate and give reliable information
- Time and resources will be adequate for the research

3.8 RESEARCH QUALITY

A qualitative study must be credible, transferable, dependable and confirmable (Lincoln & Guba, 1985; Silverman, 2010; Creswell, 2014). This is importance for the following reasons:

- Credibility refers to whether or not the research findings are authentic in representing some form of reality (Creswell, 2014).
- Transferability is concerned with the generalisability of findings to other contexts (Creswell, 2014).
- Dependability is the assurance of stability and quality of data collected, such that a subsequent researcher can draw on the findings, interpretation and claims of the study (Silverman, 2010)
- Confirmability refers to the internal coherence of the data in relation to the findings, interpretations and recommendations (Creswell, 2014).

A number of actions were taken to ensure the research quality as shown in Table 2:

Table 2: Actions taken to meet criteria for research quality

Criteria	**Action taken in the study**
Credibility	The research approach and methods used in this study are well-established and the participants were purposively selected.
Transferability	The results are not generalisable except for theoretical consideration.
Dependability	A number of participants were selected to gather multiple perspectives. The interview protocols were pilot tested and modified accordingly.
Conformability	A systematic process for collecting, analysing and interpreting data was followed.

3.9 LIMITATIONS OF THE RESEARCH METHODOLOGY

This methodology identified the following limitations:

- The limited number of interviews due to the limited time and exploratory nature of the study.
- The “Hawthorne effect” resulting in participants only give information that they think the interviewer wants to hear (Creswell,2014).

- Face to face interviews are costly and time consuming.
- Three of the interviews were telephonic and this might have affected the rapport between the interviewer and interviewees.
- Purposive selection relies on the subjectivity of the researcher and researcher bias could lead to misleading results (Cooper & Schindler, 2011; Creswell, 2014).
- The results or findings are not generalisable except for the theory (Yin, 2003).

3.10 ETHICAL CONSIDERATIONS

Ethical research is voluntary and involves getting informed consent from the participants and full disclosure on the consequences of the research (Cooper & Schindler, 2011). Furthermore the researcher must be honest about the purpose of the research and their personal motives as well as demonstrate integrity during the research process (Cooper & Schindler, 2011). Firstly, the research was first cleared by the University of Witwatersrand. Secondly, a letter was sent to the prospective participants explaining the purpose of the study and interview and requesting permission. The letter emphasised that the interviews were voluntary and information obtained will be non-attributable and treated with confidentially.

3.11. SUMMARY

This chapter focussed on the research methodology. A qualitative exploratory cross sectional study of ten small firms was carried out to explore innovation strategies in small firms in South Africa. An interpretive paradigm was used to understand the experience of participants as well as draw deeper meaning from their everyday realities and interaction with the environment. The research methodology was effective and sufficient to explore the main research issue, associated research issues as well as fulfilling the research aims. The research findings were able to illuminate pertinent information and add to the understanding of innovation strategies of small firms in South Africa.

CHAPTER 4: PRESENTATION OF DATA

4.1 INTRODUCTION

Chapter 3 outlined the methods and techniques for collecting and analysing data in exploring the main research issue: *What are the innovation strategies adopted by small firms in South Africa, their implications and the extent to which they enable small firms to meet their goals or objectives?* This chapter presents the findings from the interviews of ten small firm owner managers and six managers of public innovation support programmes. It is organised as follows: the demographic profile of participants, followed by the presentation of data.

4.2 DEMOGRAPHIC PROFILE OF PARTICIPANTS

A total of sixteen interviews were conducted, thirteen were face to face and three were conducted telephonically. The participants were ten small firm owner managers and six managers of public innovation support programmes as primary sources of data and key informants respectively.

4.2.1 Ten selected small firms

A summary of profiles of both participants and ten selected small firms denoted **"SF1 to SF10"** as shown in Table 3. The small firms differ in the educational levels of the owner managers, firm size, age, industry sectors, business activities and their products or services are at different levels of maturity. The participants hold academic qualifications ranging from diplomas to doctorate degrees. The industry sectors from which participants were drawn were (1) information and technologies, (2) climate innovation technologies and (3) bio-economy, while the business activities of these small firms show that participants had diverse innovation experiences. Such a mixed demographic profile may, to a greater extent, raise the credibility of the results of the study.

Table 3: Demographic profile of the ten small firms

#	Code	Year of Operation	Sector	Business Activity	Product Maturity	Owner education level	# Staff
1	1SF	2011	ICT	Mobile applications	Prototype	Honour's degree	6
2	2SF	2008	ICT	Mobile applications	Commercialised	Master's degree	4
3	3SF	2005	ICT	Tracking devices	Ready to commercialise	Honours degree	6
4	4SF	2000	ICT	Training games	Commercialised	Master's degree	5
5	5SF	2007	Climate innovation technologies	Energy efficient products	Commercialised	Diploma	3
6	6SF	2012	Climate innovation technologies	Clean energy	Prototype	Honours degree	5
7	7SF	2011	Climate innovation technologies	Clean energy	Ready to commercialise	Honour's degree	4
8	8SF	2002	Bio-economy	Medical products	Commercialised	Doctor of Philosophy	5
9	9SF	2007	Bio-economy	Cosmetics	Commercialised	Diploma	3
10	10SF	2007	Bio-economy	Cosmetics	Commercialised	Honour's degree	3

4.2.2 Six key informants

A total of six managers of public innovation support programmes based in Pretoria, Gauteng province, were interviewed as key informants and are denoted, **"KI1 to KI6"**. These were made up of support programmes: two provincial government initiatives and four national government initiatives. Four of the support programmes are sector specific: climate innovation technologies incubation, ICT funding, health funding and the bio-economy, while the other two are generic: broad incubation services and broad research and technical expertise. The managers of these programmes interact directly with small firms through their various support programmes and have insights into innovation in small firms. The demographic profiles of the public innovation support managers are shown in Table 4.

Table 4: Demographic profile of public innovation support programmes managers

#	Unique codes	Focus Area	Geographic Scope	Management level
1	1PISP	Climate innovation technologies incubation	Provincial	Middle manager
2	2PISP	Broad incubation services	Provincial	Middle manager
3	3PISP	ICT funding	National	Senior manager
4	4PISP	Health funding	National	Senior manager
5	5PISP	Bio-economy incubation	National	Middle manager
6	6PISP	Broad research and technical expertise	National	Senior manager

The participants hold either middle or senior management positions at provincial or national government offices. As depicted in the table above, these participants have different areas of focus. The profile of participants ensures the quality of the research as stated in section 3.7.

4.3 PRESENTATION OF RESULTS

This section presents data collected via sixteen qualitative interviews. The presentation of data is guided by three major themes identified in the literature review namely:

- Initial conditions for innovation
- Motivations and the intended outcomes of innovation
- Innovation processes

The results are presented in a sequential order starting with results of interviews of small firm owner managers followed by key informants. The presentation uses both a narrative format and tables. It follows the step indicated in section 3.6.4:

- An introduction of the major section and sub-section section. For each sub-section, the factors or sub-times being explored are introduced, followed by an overview of the results
- Data relating to the interviews presented in a table with an “X” in the box indicating comments or statements corresponding to the sub-themes or factors and the respective participant
- A narrative discussing the data including some verbatim statements from participants and key informants.

4.3.1 Initial conditions of innovation

The participants were asked to report on the initial conditions for innovations faced by small firms. These initial conditions explain both the internal environment and the external environment in which small firms are embedded or submerged and are made up of three sub-sections namely: individual level, organisational level and systemic level. The results of the interviews involving both owner managers and public innovation support programme managers are presented in a chronological order.

4.3.1.1 **Individual level**

This section presents results on initial conditions for innovation in small firms at the individual level focussing on the following factors: education, prior working experience, problem solving abilities, networking, mentorship, business skills, lack of formal and strategic planning and time. The participants reported that some of these factors,

namely education, experience and problem solving abilities facilitate their ability to innovate (see Table 5 below). They highlighted that these factors assist them to identify innovation opportunities, understand market needs, and also provide the skills needed to perform innovation activities.

Table 5: Owner managers' perceptions on factors that facilitate innovation at individual level.

Small firms	Education	Experience	Problem solving	Networking	Mentorship
SF1	x			x	x
SF2	x	x	X	x	x
SF3	x				x
SF4		x	X		
SF5	x			x	
SF6	x				
SF7		x	X		x
SF8	x		X	x	
SF9		x	X	x	x
SF10			X		x

The participants reported that education played a critical role in identifying innovation opportunities. The participants indicated that their businesses were a result of the opportunities they identified during their educational studies. They also indicated that their education gave them skills to carry out innovation activities. Some of the verbatim statements by the participants are captured below:

> *SF 1: "I studied business studies and as part of my research was doing a project on informal retailers and small businesses and I saw a business opportunity, small firms needed affordable accounting packages for their reconciliation."*
>
> *SF5: "I studied architectural design and we follow the design approach is our product development."*
>
> *SF8: "This is a product of my PhD. It is cutting edge research."*

The participants reported that prior experience facilitated their ability to perform innovation activities. Thus, it enables them to identify innovation opportunities and skills. In addition, they reported that their experience offers them exposure to user and customer needs. According to one of the participants:

> *SF4: "We worked in a transport consulting research firm and this enabled us to identify opportunities and understand issues in the taxi industry."*

The majority of the participants stated that they are problem solvers and expressed enthusiastically that they enjoy finding solutions to problems. They indicated that this was driven, on one hand, by a degree of altruism to help others and, on the other hand, self-satisfaction or fulfilment as reflected by the following statements:

> *SF9: "I like solving other people's problems."*
>
> *SF10: "I have talent. It just happens."*

The participants also reported that networking facilitates their ability to innovate. They network at events and workshops organised by people other than themselves. These events and workshops serve as sources of ideas, additional skills and in some cases, facilitate access to markets as shown by the statement below:

> *SF 1: "Recently we were brought together from different industries and I was amazed how much I learnt from other people. We are even starting to get some inquiries from some of these contacts."*
>
> *SF2: "We attended a workshop on ICT…and we saw an opportunity and we knew exactly what we were supposed to do."*

The participants reported that mentorship facilitated their ability to perform innovation activities. According to these participants, mentors serve as a sounding board and compensate for their lack of business skills, while also serving as a source of ideas. In addition, they reported that mentors also facilitate networking, bringing potential funders and access to markets. One participant confidently stated that:

> *SF 2: "Mentors can challenge your assumptions, flag your blind spots and point you in the right direction. We have benefited immensely from mentors, they also help us network and our mentor got us in touch with a potential client."*

The key informants were asked to report on factors they believe facilitate innovation in small firms. They reported that education, experience, problem solving, networking

and mentorship play a positive role in facilitating the owner managers' ability to innovate. However, in contrast to the perception offered by small firm owner managers, the key informants reported that while the educational background of small firm owner managers was important, it was not sufficient as a broad range of skills are needed for a business to be successful. They highlighted that in a majority of cases owner managers possess technical skills but lack business skills. For instance one key informant commented:

> *KI1: "The educational background of the small firm owner managers is important but other skills are needed to be a successful business."*

The key informants concurred with small firm owner managers that the previous work experience facilitates the ability to perform innovation activities. However, they argue that the experience of running a business remains a challenge for a majority of small firm owner managers. Notwithstanding this, they argue that small firm owner managers can learn on-the-job and their businesses were a "crucible." The following statement by one of the key informants reinforces this perspective:

> *KI1: "In as much as the small business owners might have prior work experience, lack of business experience is a challenge and they have to learn on the job."*

The key informants also reported that small firms lacked resources to network effectively. According to them, effective networking requires financial resources and some openness to sharing information funding. They indicated that asset small firms by organising networking events and providing funding to attend conferences. These roles are explained in the following statement below:

> *KI2: "We act as connectors or bridges, organising networking events and assist with funds for conferences."*

The small firm owner managers were asked to report on the barriers to innovation in small firms. The results of the interviews as presented in Table 6 show that lack of business skills, lack of formal and strategic planning and time are barriers to innovation and success of small firms. However, these factors were not openly acknowledged as weaknesses but instead they were presented as business needs.

Table 6: Owner managers' perceptions on barriers of innovation at individual level

Small firms	Lack of business skills	Time	Lack of formal and strategic planning
SF1	X	x	x
SF2	X		x
SF3	X	x	x
SF4	X		x
SF5		x	x
SF6	X	x	
SF7	X		
SF8		x	x
SF9	X	x	x
SF10			

The participants reported that when they started their business, they only understood the technical component of the work and did not have an entirely business perspective. Interestingly, a majority of the participants did not openly acknowledge the lack of business skills as a weakness. In some cases, business skills are expressed as a business need and in others as a support service provided by external parties. However, all the participants concur on its importance in spite of mixed opinions. The above scenario is reflected in the participant's statement below:

> *SF1: "Most of us come from a technical background and we just have the product idea but not a whole understanding of business, we need business training."*

A majority of the participants conceded that time is a constraint to their efforts for innovation and business operations in general. Although they highlighted it as a challenge, they did not explain why this was challenge to them and what could be done to resolve it. This is reflected by the comment from one of the participants:

> *SF3: "We are always under pressure and we wish one day we will be free from the tyrant of urgency."*

A majority of the participants only gave broad statements with regards to formal and strategic planning but offered no concrete action. In addition, neither details nor specifics were furnished. According to one participant:

> *SF3: "We are going to be a game changer in the industry just like Elon Musk [referring to the South African born US based entrepreneur]."*

However, two participants indicated that they have formal and strategic plans. These participants gave some details and specifics on what their firms need to achieve as presented below:

> *SF4: "We look forward to expanding into other countries."*

> *SF8: "Our Company was started in 2001 as a university spin off. We had a detailed plan from day one because of the nature of industry which demands an audit trail for compliance purposes."*

The key informants were asked to report on what they perceive to be barriers to innovation in small firms. They confirmed the perception by small firm-owner managers that lack of business skills, time, and lack of formal and strategic planning were barriers to innovation in small firms. However, in contrast the key informants argued that these were not external factors but weaknesses of the owner-managers. They reported that the small firm owner manager often has technical skills but lacks the necessary business skills. The key informants emphasised that support is necessary if small firm owner managers are to overcome these weaknesses. According to one of the key informants:

> *KI3: "They understand the technology and not the business. We equip them with business skills. Our support frees their time so that they can concentrate on the bigger picture."*

4.3.1.2 **Organisational level**

Table 7 below presents results from the interviews focusing on initial conditions for innovation at the organisational level: size, age, limited internal resources, close interaction with customers and employees, and behavioural flexibility. The owner managers reported that these factors have three implications on innovation in small firms: 1) Factors that either constrain or facilitate innovation in small firms depending on the situation, 2) Factors that facilitate innovation only and 3) Factors that act as barriers to innovation.

Table 7: Owner managers' perceptions on factors influencing innovation at organisational level

Small firms	Size	Age	Limited internal resources	Close interaction	Behavioural flexibility
SF1	x	x	x	X	x
SF2	x	x	x	X	x
SF3		x	x	X	x
SF4	x	x	x	X	
SF5	x	x	x	X	
SF6	x	x	x		
SF7	x		x		x
SF8		x	x	X	
SF9	x	x	x	X	x
SF10	x		X		x

The participants reported that, on one hand, size and age facilitate innovation and, on the other hand, are barriers to innovation. These two scenarios are depicted by the two statements below:

> *SF1: "Our size and age makes us agile and we make quick decisions."*

> *SF5: "Our size limits us, making us vulnerable to competition from big companies with more resources."*

The participants reported that close interaction with employees and customers, and their flexibility facilitated innovation in small firm. They attributed this mainly to the small size. They argue that size allows them short communication and command lines as well as speed of execution as compared to large firms. One of the participants boasted:

> SF5: "We are small; we can easily work as a team, make decisions and reach out to our customers very quickly."

A majority of the participants conceded that limited internal resources are a barrier to innovation in small firms. As a result, they cannot afford to employ highly skilled people nor buy specialised equipment. Their comments on limited internal resources resonate with the notion that size and age act as barriers to innovation. One of the participants expressed this general vulnerability and state of affairs:

> *SF3: "We are small and cannot afford specialists or equipment."*

The key informants were asked to give their perspective on the initial conditions in small firms. Contrary to some of the owner managers' perceptions, they did not perceive size and age as facilitating innovation but rather constraining innovation in small firms. They argued that size and age limit the small firms' networks, sources of ideas and lack complementary assets which are all critical for performing innovation activities. This perception is reflected in the following statement from a key informant:

> *KI4: "Size and age places a limit of scale on the number of activities and external engagements."*

At the same time the key informants do not perceive small firm to possess behavioural flexibility but rather see them as rigid and unresponsive. They believe this to be influenced by both the individual characteristics and behaviour of the owner managers as well as limited internal resources. According to the key informants:

> *KI2: "Small firm owner managers have a stubborn spirit, remain stuck to their ideas and are not open to external parties."*

> *KI4: "I say they are rigid, change is expensive and they do not have the luxury of resources to do so."*

However, in contrast to the first two situations, the key informants note some differences depending on the stage of product development or maturity of the small firm. At the same time, they identify some positive aspects of small firms and concur with the small firm owner managers that close customer and employee interaction facilitates innovation. The following two statements reinforce this perception.

> *K3: "Small firm owner managers might be rigid during earlier product development but tends to open up as they approach the market."*

4.3.1.3 Systemic level

This section presents results of the interviews on initial conditions for innovation at the systemic level by focussing on factors external to the firm looking at the interaction environment: technology, market access, demand for innovation, networks and linkages, funding and skills, and the institutional environment: policy environment and the cluster innovation infrastructure which includes science parks and incubation programmes.

The participants were asked to report on the extent to which certain factors facilitate innovation in the small firms at the systemic level, as shown in Table 8. The small firm owner managers reported that technology and the cluster innovation environment facilitated innovation in small firms. The remaining six of the factors: market access, demand for innovation, networks and linkages, funding, skills and policies were reported to constrain innovation in small firms. Thus, a majority of the participants expressed the notion that the systemic environment was generally hostile to small firms.

Table 8: Owner managers' perceptions on factors influencing innovation at systemic level

Small firms	Technology	Market access	Demand for innovation	Networks and Linkages	Funding	Skills	Policies	Cluster Environment
SF1	x	x	x		x		x	x
SF2	x			x	x		x	x
SF3	x			x	x	x	x	x
SF4	x		x	x		x	x	x
SF5	x	x	x	x	x	x	x	x
SF6	x		x	x		x	x	x
SF7	x			x			x	x
SF8	x	x	x	x	x	x	x	x
SF9	x	x						x
SF10							x	x

There is consensus from the owner managers on the role of technology in facilitating innovation in small firms. The participants reported that advances in technology create gaps that offer them business opportunities. At the same time the participants also highlighted that acquiring technology enables them to perform innovation activities in a better, faster and cheaper way. This is substantiated by the following statements from some of the participants:

> *SF1: "There was a gap in the market and need for change and technology presented a business opportunity."*
>
> *SF5: "Outsourcing production was becoming more and more expensive. We managed to buy machinery and brought everything in-house."*

The participants reported that the cluster innovation environment facilitates innovation in small firms by providing a number of support services such as affordable rental facilities, business skills training, financial support and networking opportunities. However, the participants reported that most of these services were neither easily accessible nor visible to the majority of the intended beneficiaries. These mixed views are reflected by statements from two of the participants below:

> *SF5: "This place is good for networking as well as making useful contacts through networking sessions and innovation related events."*
>
> *SF2: "This place is good but not everyone can access these services, especially if you come from a disadvantaged background."*

The participants reported that market access and demand for innovation was a challenge, largely as a result of the behaviour of incumbents, mainly large firms which try to protect their business interests. Another challenge they highlighted was user acceptance, arguing that there was a high degree of scepticism since a majority of these products and services are new. This was in spite of the fact that the products or services were approved or tested by various compliance or standardisation bodies. Participants offered the following remarks:

> *SF1: "There are a lot of gate keepers, especially big firms with entrenched interest. They will not easily give you access unless they are assured that their interests are safe."*

> *SF5: "Customers were initially sceptical as our products are new, although they have been approved and tested for safety."*

The participants reported that networks and linkages are not well developed and as a result, they struggle to find resources for various innovation activities. According to the participants networks and linkages also had an impact on the available skills. They argued that the current situation makes it difficult for them to find the right people to employ or partner with as well as identify potential suppliers of critical services. The majority of the participants conceded that this was a major frustration as indicated below:

> *SF4: "This is not silicon valley. I cannot find the right people to either employ or partner with. We have resorted to train our own employees but it poses a business risk. At the same time we must work with overseas partners and this is costly for the business."*

The participants also indicated that funding was a challenge for small firms. They argued that there was very little early stage and late stage funding, with private venture capital characterised by low appetite for risk and are virtually non-existent. They further commented that while government funds appeared to be available, it was often too little and too late. In addition, it is not easy to access due unnecessary bureaucracy. A majority of them highlighted that they find alternative approaches to circumvent this challenge as captured in the following statement:

> *SF1: "The problem with funding innovation in South Africa is the gate keepers. There is no appetite for risk and they keep on asking people to prove that something is innovative. Government agencies are even more disappointing, they keep on asking for more and more information but the reality is that these people have never run their own businesses. When we go overseas we find a different mind-set altogether. It is disappointing that things we do are not appreciated locally but get appreciated overseas."*

The participants argued that policies from the government are unfriendly to small firms. They indicated that the policies among different governments departments tasked with assisting small firms were often contradictory. Furthermore, there was a tendency by government to pick winners. In addition, they complained that they were rarely consulted on these policies, yet they are meant to benefit them. Two of the participants poignantly put it this way:

> *SF1: "They should use a Grenade approach, meaning do not pick the winners early but give everyone enough change to fail fast and move on, with a Grenade you throw it, you hit some and miss others*

but you will hit something. But with a Sniper, approach you have to spent time aiming for the right target, what are the chances of hitting the target."

SF3: "What the government gives with the right hand, it takes with the left hand. A good example is the contradiction on qualification for tax exemption. We must be consulted on policies and incentives."

The key informants were asked to report on the factors they perceive to either facilitate or constrain innovation at systemic level. The key informants conceded with small firm owner managers that technology facilitates innovation in small firms. However, they perceive small firms to be constrained in accessing new technologies and therefore require support. According to one of the key informants:

KI6: "We have a state of the art facility and equipment and we offer these facilities at a very reasonable fee so that small firms can easily access technology and skills that they cannot afford to acquire on their own."

The key informants agreed with small firm owner managers and conceded that market access, demand for innovation, networks and linkages, access to funding and skills and policies are constraining innovation in small firms. Thus small firms need external support to resolve these challenges.

KI1: "Small firms generally operate in a hostile environment characterised by difficult to access market, funding, lack of contacts and unfriendly policies. We need to do more to support small firms to innovation."

The key informants also confirmed the perception by small firm owner managers that the cluster innovation environment facilitates innovation in small firms but most of services were neither visible nor easily accessible by the intended beneficiaries. They highlighted that public awareness of the programme was a challenge and at the same time, the majority of these services can only be accessed through the internet or urban walk-in centres. According to one participant:

KI3: "These programmes are good for small firms but public awareness and dissemination of information remains a challenge. People can only access us through the website, call centre and walk in centre but there is a limit to what this can achieve."

4.3.2 Motivations and intended outcomes of innovation

This section is divided into three subsections: motivational factors at individual level, motivational factors at firm level and intended outcomes of innovation. Each sub-section addresses relevant sub-themes according to the interviews of the participants and key informants.

4.3.2.1 Motivational factors at individuals level

This subsection presents results from the interviews that focused on these factors: problem solving, need for achievement, recognition and monetary gain. The participants were asked to report on motivational factors at the individual level. The results show that all the factors, problem solving, need for achievement; recognition and monetary gain generally serve as a motivation for innovation in small firms. The results of interviews of small firm owner managers are presented in Table 9.

Table 9: Owner managers' perception on motivational factors for innovtion at individual level

Small firms	Problem solving	Need for achievement	Recognition	Monetary gain
SF1	x		x	
SF2	x	x		
SF3	x	x		
SF4	x	x	x	x
SF5	x	x		x
SF6	x		x	
SF7	x		x	
SF8	x	x		x
SF9	x	**x**	x	
SF10	x	x		x

A majority of the participants reported that they are motivated by problem-solving. The participants indicated that at first they just enjoy solving problems or other people's problem and eventually they end up solving customers' problem. They argued that a problem can be viewed as an opportunity to develop innovative solutions as shown by the verbatim statements below.

> *SF2: "My business started as a research project. I saw problems faced by small traders and I came up with a solution."*
>
> *SF4: "We solved a climate challenge. Our product is energy efficient compared to current products in the market."*

In addition, the need for achievement was reported by a majority of the participants to be a motivation for innovation by small firm owner managers. Some of the participants indicated that they want to accomplish great feats in science and technology and others stated that performing innovation activities brings to them personal satisfaction. According to participants:

> *SF3: "Our goal is to be a game changer. We are going to be like Leon Musk [referring to a South African born but US based entrepreneur who has made headlines internationally]."*
>
> *SF8: "This is cutting edge science representing the next generation practices in the medical field."*

The participants also reported that competitions play a critical role in recognition and as a motivational factor for innovation in small firms. A majority of them indicated that they participate in local and international competitions, indicating that competitions, including winning awards, raised their individual profiles as well as the visibility of their firms.

> *SF4: "We got an international award for being one of the most innovative SME from the developing world."*
>
> *SF5: "We appeared on Good Morning Africa…."*
>
> *SF9: "We were voted the best stand at an Export Exhibition […]."*

Some of the participants reported that monetary gain was a key motivation for innovation in small firms. These participants reported that they have commercialised products in the market and therefore needed customers who can pay. One of the participants commented:

> *SF4: "We need to find customers and partners who can pay."*

The key informants were asked to report on the motivational factors for innovation at the individual level. They confirm that small firm owner managers are motivated by the need for achievement and problem solving, and recognition. In addition, they highlighted the importance of competitions as a source of recognition for small firm owners and therefore a trigger for innovation.

> *KI1: "Small firm owner managers often see themselves as mission led, accomplishing something great to solve humanity's problems. At times we have to remind them that they are running a business and money matters."*
>
> *KI2: "Competitions have helped us attract a good pipeline of start-ups."*

4.3.2.2 Motivational factors at firm level

This section presents results from the interviews focussing on the goals of the firm: survival, stability and growth. The small firm owner managers as shown in Table 10 reported that survival, stability and growth serve as motivational factors for innovation in small firms.

Table 10: Owner managers' perceptions on motivation for innovation at firm level

Small firms	Survival	Stability	Growth
SF1	x		
SF2	x	x	
SF3	x	x	
SF4	x	x	x
SF5	x		
SF6	x		
SF7		x	
SF8	x		X
SF9	x	x	
SF10	x	x	

The participants reported that survival was the most important motivational factor at firm level, followed by stability. They try to achieve this by managing their internal resources and responding appropriately to changes in the external environment. Thus, they closely observe the head count and only employ when necessary, streamlining their processes and in some cases resorting to subcontracting in order to survive.

> *SF4: "When we started we were twelve but now we are five, we had to shed off part of our staff."*
>
> *SF2: "I have a small team, if I get more orders I sub contract that way I am able to watch the bottom line."*

The participants reported that although growth is a motivation for innovation it is not as important as survival. They perceive growth as an option for the distant future as shown by the vague statements below from one of the participants.

> *SF4:"We look forward to expand into other countries."*

The results from interviews of key informants confirm that survival is the primary motivation for innovation in small firms with stability and growth as secondary motivators. The key informants also argue that small firm owner-manager is focussed on surviving the day.

> *KI2: "We assist with funding for operational cost so that they are stable."*
>
> *KI3: "Most of the businesses are hand to mouth business and they must innovate if they are to survive."*

4.3.2.3 Intended Outcomes of Innovation in small firms

This section presents results on the intended outcomes of innovation in small firms, focusing on the two major categories:

- Enhanced business performance - production of new goods and services, profitability, growth and new business models
- Enhanced operational performance - capacity utilisation or inventory control, quoted lead times (speed to market), cost reduction, quality

The participants were asked to report on the intended outcomes of innovation which they presented into two parts, enhanced business performance and enhanced operational performance. The results of the interviews on enhanced business performance and operational performance are presented in Table 11 and 12 respectively.

Table 11: Owner managers' perceptions on intended outcomes of innovation for enhanced business performance

Small firms	Production	Profitability	Growth	New business model
SF1	X			
SF2	X			X
SF3	X			
SF4		X		X
SF5	X	X	X	X
SF6	X	X		
SF7	X			
SF8	X	X	X	X
SF9	X	X	X	X
SF10	X		X	X

A majority of participants reported that the production of new goods and services is the most importance outcome for enhanced business performance. They argue that once there are goods and services that can be sold, other outcomes become important as they are built on the product platform. One of the participants commented:

> *SF2: "We have a product that we can sell first and everything else follows."*

The participants reported that it was important for their firms to be profitable. However, some of the participants indicated that this was a challenge due to high production costs as a result of outsourcing. Others highlighted that local markets gave them lower

margins compared to international market and at the same time it was not easy to penetrate these international markets. According to one participant:

> *SF4: "We need customers who can pay. Our local market is a bit depressed, we hope to expand into international markets was we can earn higher margin."*

Although the participants reported that growth was an intended outcome of innovation, they did not emphasise its importance relative to the other factors such as production of goods and services and profitability. A majority of them indicated growth as something that comes after production and profitability. One of the participants specified:

> *SF4: "We can only grow the business if we are making profit, otherwise for now we must just keep our heads above the water."*

Some of the participants, particularly those with products and services in the market reported that a new business model was an intended outcome of innovation. These participants argued that because the business environment is dynamic, they have to be flexible and adjust accordingly. Their business model is to keep cost down either through outsourcing or owning their means of production and partnering where necessary. However, they also indicated that this can shift depending on the circumstance, explaining that their business models and the respective changes in respond to the business environment. This is evident in the following statements:

> *SF2: "When we started working on our product there were no smart phones and so now we have put the product on hold and work on a mobile application. In the future we will integrate the product and the application"*
>
> *SF4: "Our product was very expensive so we decided to introduce a cheaper standard product as a Trojan horse to enter the market."*
>
> *SF10: "I was the first to introduce this product on the market, and other big players followed suit and I responded by introducing a similar product for the other gender."*

Regarding enhanced business performance, the key informants reported that the production of goods and services and profitability were the most important intended outcomes of innovation. They stated that there must be a product or service which must be profitable to offer to the market. Although they reported growth and new business models as intended outcomes of innovation, they perceived them to be secondary.

KI3: "The small firms strive to have a product first, make a profit and everything follows, otherwise there is no business."

On operational performance, the participants reported capacity utilisation or inventory control, quoted lead times (speed to market), cost reduction, and quality were the intended outcomes of innovation as shown in Table 12. The participants reported that they strive to achieve at least one or more forms of improvements.

Table 12: Owner managers' perceptions on intended outcomes of innovation for enhanced operational performance

Small firms	Capacity utilisation	Lead times	Cost reduction	Quality
SF1		X		X
SF2		X		
SF3	X	X	X	X
SF4	X		X	
SF5	X		X	X
SF6		X		
SF7		X		
SF8	X	X		X
SF9	X	X	X	X
SF10	X		X	X

The participants reported that capacity utilisation is critical in ensuring optimal production, meeting customer demand, responding to fluctuations in the market as well as avoiding waste. Some of them indicated that they only produce their products on order, do not stock excess and also outsource production if they cannot meet the demand using their current production capacity. One of the participants stated:

SF9: *"I only produce as per customer orders but if I get more orders, I will subcontract."*

The participants also reported that improving on lead times is critical to their businesses as it enables them to achieve customer satisfaction. Some of them argue

that in their industries speed to market was the only way to stay ahead of competition, and to avoid giving competitors the opportunity to copy their products and services. In addition, the participants argued that reducing lead times also had an effect on the overall cost of doing business. One participant alluded to the benefits of improving lead times:

> *SF3: "We managed to reduce our lead times by devising a colour code that enabled our team members to work fast. This way we can quickly get our product into the market."*

Quality was also reported by the participants to be important for operational performance. The participant stated that improving quality reduced product recall and instils confidence in customers. A majority of the participants indicated that they follow stringent processes determined by industry standards as shown by the statement below.

> *SF5: "Our product was approved by SABS (a standards organisation) and the Electrical Association for both quality and safety. Customers can happily use our products without fear or uncertainty."*

The participants reported that most of the improvements on operational performance have a combined effect on cost reduction. They further highlighted that cost reduction is passed on as benefit to customers and at the same time allows them to make a higher profit margin. According to one of the participants:

> *SF5: "All these improvements add up to one thing, cost reduction and this allows us to make a better profit margin."*

On operational performance, the key informants reported small firms tend to focus on lead times and cost reduction but struggle with capacity utilisation and quality. They indicated that their programmes support small firms to achieve capacity utilisation and quality management. One of the key informants confirmed this state of affairs and reiterated the support mechanisms put in place to help small firms:

> *KI3: "Reducing time to market and operational costs is important for small firms but they struggle with capacity issues as well as quality issues..."*

4.3.3 The innovation process

This section is divided into three subsections: innovation strategies, innovation capability building mechanisms and innovation activities.

4.3.3.1 Innovation strategies

The participants were asked to report on the nature of innovation strategies in small firms focusing on these factors: many types, informality and broadness. The results of interviews of small firm owner managers are presented in Table 13.

Table 13: Owner managers' perceptions on innovation strategies

Small firm	Many types	Informality	Broad
SF1	X	X	X
SF2	X		
SF3	X	X	X
SF4			
SF5	X	X	X
SF6	X		X
SF7	X	X	X
SF8	X		
SF9	X	X	X
SF10	X		X

The participants reported that they have many types of innovation strategies, indicating that these strategies are likely to "change" as the owner managers themselves are "constantly" searching for better ways to perform innovation activities. The statements below reflect this dynamic situation:

> *SF1: "We are constantly refining our processes otherwise we will be left behind."*
>
> *SF2: "We change depending on the situation, if we are not responsive to the change in the environment we will not survive."*

The majority of the participants indicated that their innovation strategies are informal as they are not written down. Despite this, these participants were adamant that they know exactly what needs to be done. However, there were a few exceptions to the prevalence of informality, with two participants indicating that they have formal innovation strategies due to the nature of their industries. These mixed perceptions on innovation strategies are reflected by the following two contrasting statements:

> *SF1: "It is not written but it's there and we know what needs to be done."*
>
> *SF8: "We follow a formal process that is documented. In our industry it's important for compliance."*

In addition, a majority of the participants reported that their innovation strategies were broad but offered few details. Two participants did indicate they had detailed specific innovation strategies. In a majority of cases, the participants stated, *"We know what needs to be done."* and in exceptional cases, *"We follow a formal process."*

The key informants confirmed that innovation strategies in small firms can be characterised as many types, informal and broad. They perceive this to be strength on one hand but weakness on the other. These perceptions on innovation strategies in small firms are reflected by the following statement.

> *K4: "Yes, small firm owner managers are good at coming with new ideas but face difficulties in taking these ideas forwards."*

4.3.3.2 Innovation capabilities

This section presents results of interviews focusing on innovation capabilities. The participants as shown in Table 14 were asked to report on how small firms build their innovation capabilities. The interviews focused on:

- Internal learning mechanism - learning by doing and learning from failure
- External learning mechanism - learning from other firms, customers and users in small firms, and copying from overseas.

Table 14: Owner managers' perceptions on learning mechanism used by small firms

Small firms	Internal learning mechanisms		External learning mechanisms		
	Learning by doing	Learning from failure	Learning from other firms	Learning from customers/users	Learning from overseas
SF1	x	X		x	
SF2		X		x	
SF3	x		X		
SF4	x			x	x
SF5	x	X		x	
SF6	x	X	X		
SF7	x				
SF8	x		X	x	x
SF9	x		X	x	
SF10	x		X	x	

The participants reported that internal learning mechanisms in small firms involve learning by doing and learning from failure. They highlighted that learning by doing is important as in most cases they are embarking upon new initiatives/products and have to learn in the process. They also described this process of learning by doing as one that required patience. One of the participants used the analogy of a tree, "bamboo" and "birth pains" to illustrate the learning by doing process.

> *SF1: "We are doing something that has not been done before. We have started building the first Meta data in the industry. Every day is a learning opportunity. I picture it as a bamboo growing. You do not see it, it grows underground, it's slow at first and then it shoots and starts fast. Yes, it's like birth pains, it's a painful process but joyous in the end."*

A majority of the participant reported that they learn from failure, conceding that innovation is a process of trial and error. They indicated that failure in other ventures offered them important lessons for their next idea. They perceive failure to be a tipping point that makes or break a small firm as summed up in the following sentiment:

> *SF1: "Our first idea did not work. Despite having an egg on our face, we did not give up. The most important lesson we got was that it's not only about the technology that matters but the people too. Now we involve our customers and users in developing the product and this way we cannot fail."*

The participants reported that external learning mechanisms involved learning from customers and users, and overseas. They indicated that customers and users provided valuable insights on the problems they encounter every day. The participants further indicated that if they can understand a problem from a customer perspective, this is half the problem solved. One of the participants providing ICT related products and services testified:

> *SF2: "Our product is meant for small traders. We work closely with them to understand their needs as well as get new ideas. We also do beta testing with them in order to get their inputs."*

The participants also reported that external learning mechanisms involved learning from overseas. Some of these participants indicated that they adopt technology from overseas and adapted it to suit local conditions and needs. Others highlighted that participating in overseas conferences relating to their industry allows them to

benchmark and learn about new technological advances. The following statements reflect this learning approach:

> *SF4: "We got this technology from overseas. However, over there it is used for industrial purposes. We adapted it to suit our local needs and use it for training purposes."*
>
> *SF8: "We attend international conferences in our field. We learn a lot from these international contacts and are able to stay abreast with technological advances in our industry."*

The key informants acknowledged that small firms use both internal and external learning mechanisms but also noted that small firms are constrained when it comes to learning from external sources. The key informants indicated that they also provide support for small firms to be able to learn from external sources. According to the key informants:

> *K2: "Our programme provides a learning environment for small firms to fail fast and try again. At times we advise them to go away and come back when they feel they are rejuvenated and can give it a best shot again."*
>
> *K5: "We create networking and mentorship opportunities so that small firms can learn from each other and other external parties. We are a credible organisation with perceived neutrality and therefore can get even competing firms under the same roof."*

4.3.3.3 Innovation activities

The participants were asked to report on how small firms perform innovation activities including search activities, select activities implementation activities and capture activities.

4.3.3.3.1 Search activities

This section presents results from interviews on search activities focusing on the sources of innovation including owner managers, customers/users, universities, conference/expos, networks, overseas, research council, industry associations and standardisation bodies. The results from interviews of small firm owner managers are presented in Table 15.

Table 15: Owner managers' perceptions on sources of innovation ideas.

Small firms	Owner managers	Customers/Users	Universities	Conferences /Expos	Networks /Partners	Overseas	Research Councils	Industry /standards bodies
SF1	x	X			x			x
SF2	**x**	X						
SF3	x	X	x		x			
SF4	x	X			x	x		
SF5	x	X					x	x
SF6	x				x			
SF7	x		x					
SF8	x		x	x				x
SF9	x	X	x					
SF10	x	X		x				

A majority of the participants reported that they are primary source of ideas. They indicated that this was influenced by their education and desire to solve problems. According to the participants, these ideas are either as a result of their studies or just a problem they wanted to solve. Some of the participants made the following remarks:

> *SF8: "This company, it's a product of my PhD. This was a breakthrough research and we decided to commercialise it."*
>
> *SF10: "I worked as a makeup artist in the film industry and had to find a way of making the actors look good after every rehearsal. I searched for products and could not find one. I ended coming up with one myself and I found myself with a business."*

The majority of participants also reported that customers and users are a source of ideas for innovation. While customers and user are not necessarily the primary source of ideas, they act as an important source of insight and feedback on product development. Furthermore, some the participants, as shown by the statements below, indicated that they involve their customers and users in co-creation of products and services:

> *SF4: "Our users provide the content around which the products and service are build and at times and they help come up with new ideas."*
>
> *SF5: "Pilots help us to get insights and feedback from customers and users."*

The universities were also mentioned by the participants as a source of ideas for innovation. However, similar to the sentiments above, they are not identified a primary source of ideas but assist in the refinement of ideas. A few of the participants indicated that they use technology stations at universities to refine their ideas:

> *SF3: "We work with university professors and lecturers as research partners in developing our ideas."*
>
> *SF9: "I worked with Tshwane University of Technology and used their technology stations to test my products."*

The participants reported that conferences and expos can serve as a source of ideas, indicating that the conferences and expos allow them to stay abreast of technological advances while also allowing them to make contacts for potential partnerships. One of the participants, as shown in the statement below, indicated that conferences and

expos allowed her to meet a technical expertise who helped solve a problem the firm was experiencing during product development:

> SF10: *"I had gone all over looking for someone to help me resolve a technical problem until I stumbled upon a technical expert at a conference."*

The participants reported that network and partners serve as sources of innovation ideas. Whilst partners were sought, the participants emphasised that these were from their close networks and in most cases not involved in the same activities. In one case, a participant worked closely with university professors and lecturers:

> *SF3: "We work with university professors and lecturers as research partners in developing our ideas."*

Overseas, just as in the case of external learning mechanisms, was also reported by participants to be a source of innovation ideas. Participants highlighted that they adopt ideas and adapt it to the local needs and also use information from overseas as a sounding board to stay abreast of new technologies. According to one of the participants:

> *SF8: "We get ideas from overseas. This allows us to stay abreast with technological advances and market insights so that we can provide our customers with cutting edge solutions."*

The majority of participants did not report on research councils as a source of innovation. When asked why they were not working with research councils, participants either expressed ignorance on the role of the research council or indicated that there was no engagement. However, there was one exception with one participant indicating that a research council assisted their firm in developing their product:

> *SF5: "We came with the idea and the scientists at the CSIR helped us realise the physical product."*

The participants also reported that industry associations and standards association serve as sources of innovation ideas. They indicated that these associations not only create standards but also share ideas which can offer important clues for new product development. The ideas that are shared through the relevant non-confidential platforms allow participants to determine whether a product/idea

already exists. In this way, participants are able to focus on improving an idea or may develop new ideas altogether. One of the participants stated:

> *SF1: "We share our source code through an industry based API interface. It allows us to improve on what exists or come up with really cool ideas. "*

The key informants confirmed that small firm owner managers are the primary source of innovation ideas. However, although they acknowledged that small firm have other multiple sources of innovation ideas, they do not perceive these sources to be optimal. The key informants argued that small firms lack the capacity to effectively tap ideas from external sources beyond the owner manager and their close or personal networks. In order to achieve this, the key informants argue, small firms need support. According to the key informants:

> *KI2: "We assist by organising networking opportunities and funding collaborations so that small firms can tap into other external sources of ideas."*

> *KI5: "We assist small firms with support to attend international conferences and Expos so that they can effectively network and access ideas from a diverse ecosystem."*

4.3.3.3.2 Selection activities

This section presents results from interviews on selection activities: idiosyncratic processes, shared interpretive framework, use of formal tools, portfolio approach.

The results from interviews of owner managers on selection activities in small firms are presented in Table 16.

Table 16: Owner managers' perceptions on selection activities

Small firm	Idiosyncratic Processes	Shared Interpretive Framework	Formal tools	Portfolio Approach
SF1		x	X	
SF2	X			x
SF3	X	x	X	
SF4	X	x	X	
SF5	X	x		x
SF6	X			
SF7	X	x		
SF8	X	x	X	x
SF9	X	x		x
SF10	X			x

All but one of the participants reported that selection activities can be characterised as idiosyncratic and cannot be completely understood. The participants highlighted that their innovation activities do not necessarily happen in thoughtful and logical process involving sequential steps but involves involves serependity and to some extent, good luck. According to them they have to make choices and also change abruptly depending on the situation. One of them described this situation as a "messy process". The following statements capture these sentiments:

> *SF5: "You start somewhere and then a number of things start to happen. At that point you must trust your instinct."*
>
> *SF8: "I tend to work back ward and forth. You realise that the recipe is now dry and that is now the answer but it was never your intention."*
>
> *SF10: "We were working on something and we came to this by accident. It was sheer luck and people started asking for it."*

Some of participants reported that they use a shared interpretive framework. They indicated that although it's not written there was a shared meaning on what must be done. The owner manager shares this shared interpretive framework with other team members and it guides the innovation process and provides direction in the small firm. One of the participants expressed this comment:

> *SF1: "We use a standard software protocol. Every team member understands it and it guides our processes."*

A majority of the participants indicated that they do not use formal tools in their selection activities but rather rely on their instincts to make decisions. However, there were some exceptions with two of the participants indicated that these use formal tools. These two contrasting scenarios from a majority of the participants and the few exceptions are illustrated by the following statement:

> *SF8: "We have clear matrix based on relative ease of implementation and cost of doing so to select our ideas."*
>
> *SF9: "I know what I need to do. I rely mostly on my gut feelings using trial and error."*

There were two mixed outcomes when the participants were asked to report whether they use a portfolio approach or not. On one hand, a majority of participants from firms with no products on the market indicated that they did not use a portfolio approach. However, on the other hand those from firms with existing products indicated that they use a portfolio approach and have at least two products. These two mixed outcomes are best exemplified by the two contrasting statements below:

> *SF7: "We only have one product still in development. We will focus on this for now until it is established in the market."*
>
> *SF10: "I have two products, one for man and the other for woman."*

The key informants confirmed that innovation processes in small firms are highly idiosyncratic. However, they reported that a shared interpretive framework does not exist in small firms as the owner managers do not easily share information. Furthermore, they reported that small firms rarely use a portfolio approach making them vulnerable to risk and uncertainty. The key informants also emphasised the need to support small firms with funds to acquire formal tools. This notion is summed up in the following statements made by the key informants:

KI4: "Most of the time no one except the owner knows what is happening […]."

KI3: "A majority of the businesses are built on one product making vulnerable."

KI5: "We support small firms with funds to acquire formal tools."

4.3.3.3.3 Implementation activities

This section presents results from interviews relating to implementation activities which include make/in-house development, buy decision/outsource and cooperate decisions. The participants reported that implementation activities in small firms involve make, buy or cooperate decisions which translates into in-house development, outsourcing or partnerships respectively. The results from the interviews of the owner managers are presented in Table 17.

Table 17: Owner managers' perceptions on implementation activities.

Small firm	Make decisions	Buy decisions	Cooperation decisions
SF1	x		X
SF2	x		x
SF3	x		x
SF4	x		x
SF5	x	X	x
SF6	x	X	
SF7	x		
SF8	x		
SF9	x	X	x
SF10		X	x

The majority of participants reported that they consider "make decisions" are most likely to develop their products in-house than "outsource" or "partner with other parties".

They indicated that this was in order to protect their intellectual property, control quality and production costs. According to one participant:

> *SF2: "We make the product in-house in order to avoid sticky issue like intellectual property infringement."*

A few participants reported that they consider "buy decisions" or "outsource production" but only as a temporary measure. They argued that they outsource to meet increase demand especially since some do not have their own production capacity. Participants from firms in ICT indicated that they cooperated with users to produce their products and services. The following verbatim statements were given by the participants:

> *SF5: "We decided to buy our own machines and bring production in-house in order to keep our eyes on the cost."*
>
> *SF9: "We outsource the excess demand that we cannot handle to contract manufacturers."*
>
> *SF1: "We cooperate with users to co-create products and services."*

The key informants reported implementation decisions depended on the maturity level of their product or services, and recommending that small firms consider "cooperation decision". They argued that this will enable small firms to compensate for their lack of complementary assets.

> *KI2: "Small firms are likely to develop products by themselves but cooperation with external service providers could assist in solving their bottlenecks."*

4.3.3.3.4 Capture activities

This section presents results from participants on capture activities focusing on both intellectual property management and commercialisation strategies. Intellectual property management considers these factors: speed to market, product complexity, secrecy and patent protection. Commercialisation strategies consider these factors: user involvement, partnerships, licensing and outright selling.

The results from the interviews of owner managers are presented in Table 18.

Table 18: Owner managers' perceptions on capture activities

Small firms	Intellectual property management				Commercialisation strategies			
	Speed to market	Product complexity	Patenting	Secrecy	User involvement	Partnerships	Licensing	Outright selling
SF1	X				x	x		
SF2	X				x	x		
SF3	X	x		X	x	x		
SF4		x			x	x		
SF5			x		x	x		
SF6			x					"
SF7		x						
SF8			x				x	x
SF9				x		x		x
SF10				x		x	x	x

The participants reported that capturing value from innovation in small firms involves both intellectual property management and commercialisation strategies. On intellectual management, the participants reported that small firms were likely to consider a number of different approaches ranging from speed to market, product complexity, patenting to trade secrets. The participants indicated that this depended on the industry and nature of the product and service. Furthermore, the participants highlighted the importance of intellectual property management as shown by the statement below:

> *SF2: "Ideas need some kind of protection, otherwise they can easily be copied and worse still having someone claiming that your idea is theirs can be detrimental to the business."*

The participants reported small firms with tangible products are likely to consider patenting, product complexity to trade secrets depending on their industries. They argued that while patenting is ideal, it is expensive and in some cases small firms have to rely on product complexity or trade secrets which are cheaper. However, they indicated that trade secrets were ideal in cases that involve chemical formulae. The participants also reported that firms in ICT are likely to consider speed to market as reflected by the statements below:

> *SF8: "Our ideas are patented and because of our industry, these allow us to compete globally."*
>
> *SF9: "We do not patent and our formulas are trade secrets. I am the only one who knows the actual ingredients."*
>
> *SF1:"In ICT, being first to market is important in order to beat competition."*

The key informants confirmed that small firm's owners are likely to consider all forms of intellectual property management in order to protect their ideas. They also confirmed that these depended on the industry and nature of technology. However, the key informants felt that small firm owner managers had unnecessary expectations on the value of their intellectual property, resulting in failure to leverage on it and at times acting as obstacles to good business deals. According to one key informant:

> *KI3: "If not protected, the risk is that some of the ideas can be easily copied and the owner of the intellectual property will find it difficult to capture value. However, not every idea can be protected and there is need to be realistic about the value of the intellectual property to allow business transactions to take place. Otherwise without a real business model around it, it's worth nothing.*

Regarding commercialisation, participants reported they are likely to form partnerships through vertical collaboration with large established retail players. Although they are likely to consider licensing, it is a temporary option. Furthermore, they indicated that outright selling was sub-optimal as they faced a lot of challenges from established supply chain networks to anti-competitive behaviour from large established firms. Participants also reported that firms in ICT and industries requiring high user input use co-creation of products and services as a commercialisation strategy. The following verbatim statements were given by the participants:

> *SF5: "We partner with large retailers who have established networks otherwise we cannot compete with them."*
>
> *SF8: "We licensed our first product but we will not do that now."*
>
> *SF10: "We try to sell own our own but struggle to secure shelf space. The big companies push us away. They can afford to pay a premium for shelf space which we cannot."*

The key informants reported that commercialisation remains a challenge for small firms as they do not have complementary assets such as distribution chains when compared to large companies. Furthermore, they noted that large companies are likely to use anti-competitive tactics to protect their markets. The key informants recommended the need for government to create incentives that persuade large retail organisations to partner with small firms. The following remarks were given by one key informant:

> *KI5: "Market access is a challenge for small firm as the incumbents; often large companies cannot give their game away and will try all kind of under-handed tactics to keep at small firms at bay. Government can unlock this through supplier development programmes to incentivise large retail organisations to partner with small firms. While this appears to be a paper exercise, more must be done to make this real."*

4.4 SUMMARY

This chapter provided valuable information about innovation in small firms on the initial conditions for innovation, motivations and intended outcomes of innovation and the innovation processes adopted by the small firms. The findings which have been presented in detail in this study are summarised below.

4.4.1 Initial conditions for innovation

The participants reported that their education, experience, problem solving abilities, networking and mentorship facilitated innovation. However, the lack of business skills, formal and strategic planning were reported as factors that constrain innovation. The key informants highlighted that small firm owner managers need external support for business skills training and also for acquiring tools for formal and strategic planning. Participants reported that size makes small firms flexible, adaptable and responsive to opportunities but also, due to limited internal resources, make them rigid and unresponsive to changes in the environment. Key informants concurred with the participants that small firms have close interaction with customers and employees. However, despite a number of interventions to promote innovation in small firms, the external environment was reported to be hostile to small firms.

4.4.2 Motivations and intended outcomes of innovation

The primary motivation factors for innovation at individual level reported to be problem solving, need for achievement and less of monetary gain and at firm level to be survival, stability and growth. Survival was highlighted to be the most important factor, followed by stability and growth. The participants reported that the intended outcomes of innovation were either the business performance of the firm or its operational performance or both. While the former focuses on new products/ services, growth and new business models, the latter focuses on improvements such as capacity utilisation, cost reduction, lead times and quality.

4.4.3 The Innovation Process

Innovation strategies were reported to be more than one per firm, informal and broad. At the same time innovation capabilities were reported to involve internally and external learning mechanisms. Search processes involve an array of actors involved in innovation such as owner managers, customers/users, universities, conference/expos, networks, overseas, research council, industry associations and standardisation bodies. However, in many cases these processes are mainly limited to the owner managers and their personal networks. The selection processes was reported to be idiosyncratic, possessing a shared and interpretive framework and less use of formal tools and portfolio approach. Implementation process was reported to involve mainly in-house development with co-

creation for related ICT products and outsourcing as a temporary option. The participants reported that capturing value from innovation involves intellectual property management and commercialisation of products and services. Patenting, product complexity and trade secrets were reported to be ideal strategies for intellectual property management of tangible products and speed to market was considered for ICT. Commercialisation was reported to involve mainly partnerships with established players, co-creation in the ICT industry, while outright selling and licensing were reported as only temporary strategies.

The following chapter gives an analysis of these results.

CHAPTER 5: ANALYSIS OF RESULTS

5.1 INTRODUCTION

This chapter discusses the results presented in Chapter 4. The discussion is based on the areas covered by the interviews according to the three major themes: initial conditions for innovation, motivations and intended outcomes of innovation and innovation processes.

5.2 INITIAL CONDITIONS FOR INNOVATION

The literature argues that initial conditions for innovation interacting at the individual level of the owner manager, organisational level and systemic level, influence innovation in small firms (Foxall & Johnston, 1987; D'Amboise & Muldowney, 1988; Hunger & Wheelen, 2003; Mazzarol, *et al,* 2011; Dampour, 1991; Tidd & Bessant, 1997; Dahlqvist *et al.,* 2000; Edwards *et al*., 2005; Barret & Sexton, 2006; Crossan & Apaydin, 2010; Marcelle *et al.,* 2013). Furthermore, there is a nexus between the individual, organisational and systemic levels as these levels are not discontinuous but form a continuum of random interactions (Barret & Sexton, 2006).

The results of interviews show that innovation in small firms is either facilitated or constrained by a number of factors acting at three levels: the individual level, the organisational level and the systemic level. In a majority of cases, the ideas from the owner managers form the core of the business and their decisions determine what happens in the business. This confirms the literature that small firms are characterised by the dominant personality and behaviour of owner managers (D'Amboise & Muldowney, 1988; Nooteboom, 1994; Tamasso and Dubbini, 2005; Mazzarol & Reboud, 2011).

The results from the interviews reveal that innovation activities in small firms are heavily dependent on the small firm owner managers' personal initiative, decisions and involvement. In addition, the owner managers show that they are able to sense opportunities, and organise the necessary resources to exploit these opportunities. This is consistent with the literature which argues that owner managers, usually founders of small firms, possess entrepreneurial orientation such as innovativeness, reactiveness,

risk taking, autonomy and competitive aggressiveness (D'Amboise & Muldowney, 1988; Venkataraman, 2004; Davidsson, 2008).

The literature further argues that owner managers undertake both entrepreneurial actions and managerial actions (Morlauchi, 2007). Thus owner managers make both strategic and operational decisions as a mediation effort or response between a firm and its environment to realise their goals (Cyert & March, 1963; Foxall & Johnston, 1987; Edwards et al, 2005; Edelman, 2003 cited in Edwards et al, 2005). The results show that owner's managers are central to the interpretation and appropriate mediation on these factors in order to guide innovation in small firms.

According to scholars, the general human capital and managerial knowledge from educational background, work experience and lessons learned from past ventures form initial capital for success (Cooper *et al*. 1994 in Dahlqvist *et al.,* 2000; Westhead et al, 2003). Education and training have an influence on creativity and the ability to act on opportunities (Venkataraman, 1997; Shane, 2000). Furthermore, the literature recognises the owner manager's innate abilities of problem solving as facilitating innovation in small firms (Gaglio & Katz, 2001; Sarasvathy, 2001; Srinivas & Sutz, 2008). In addition, innovation is seen to be a social process involving networking and mentorship (Granovetter, 1985; Burt, 2004; Dobson *et .al,* 2013). This is seen as critical in supplementing the education, experience and financial capital of owner managers or founders (Urban and Shaw, 2010; Venter, Urban & Rwigema 2008 in Sefalafala, 2012).

The interviews reveal that the factors which facilitate innovation at the individual level are the owner managers' educational background, experience and problem solving abilities, as well as networking and mentorship. Educational background is shown to trigger the owner manager's ability search for new ideas to be applied to either an old problem or new problems. Experience is shown to provide background understanding to problem solving. The owner managers' problem solving ability appears to be the most outstanding factor and trigger for innovation in small firms.

Education, experience and problem-solving appear to play a critical role in making necessary linkages between problems and their potential solutions. The results of the

study reveal that small owner managers use networks and mentorships as a source of learning and strategy to complement their weaknesses. While networks are sources of new ideas and skills, mentorship is considered as a source of networking opportunities and business skills. Mentors bring experience or prior understanding of business and are likely to provide contacts that augment the small firm owner managers' networks. In addition, mentors can offer new skills to owner managers and act as a sounding board for new ideas.

Small firm owner managers have limited geographic reach and experience difficulties in networking (Freel, 2000; Bianchi, *et al*., 2010). The results show that while the small firm owner managers acknowledge that networking facilitates innovation, the public innovation support programme managers perceive the owner managers' ability to network to be constrained and limited to close personal networks.

The literature review points out that lack of business skills, formal and strategic planning and time are challenges faced by small firms which constrain innovation (D'Amboise & Muldowney, 1988; Marcelle, 2011). The Entrepreneurial Dialogues: State of Entrepreneurship in SA Report of 2010 highlights that most small firms owner managers are inventors and interested in the technology of their business rather than the business of their technology (Anon, 2010). Thus, according to Marcelle (2010), there is a general lack of business understanding among small firm owner managers. Furthermore, the literature argues that small firm owner managers do not use formal and strategic planning tools (Marcelle, 2011). Time is also acknowledged as a challenge for small firm owner managers as they have to juggle a number of activities (D'Amboise & Muldowney, 1988).

Concurrent with the literature, the results reveal that lack of business skills, formal and strategic planning tools and time are challenges that constrain innovation in small firms. Small firm owner-managers acknowledge that they need support for business skills training. The results also show that in most cases small firm owner-managers do not follow any formal processes or use any strategic planning tools. However, there were some exceptional cases where small firm owner managers used formal tools and to some extent, strategic planning tools. The results show that a decision whether to use formal and strategic planning tools or not depends on the industry and the type of technology.

For instance, small firms producing products in industries such as medical biotechnology and ICT tends to follow a systematic process of development and also make use of formal tools.

According to the literature, the owner manager's personal strength and weakness impact the ability to carry out innovation activities in the firm (Marcelle, 2011). Furthermore, the literature highlights that small firm owner-managers can have a "dark side" and are likely to exaggerate their firms' position and capacity or being dishonest about their individual strength and weakness in order to gain (Kets de Vries, 1985; Carrol, 1984 in D'Amboise & Muldowney, 1988; Baumback, 1979 in D'Amboise & Muldowney, 1988; Rutherford *et al.,* 2009). The results also reveal that small firm owner-managers tend to overlook their weaknesses and blind spots but in most cases assign or blame them on external factors. Thus, the weaknesses are indirectly acknowledged and often expressed as needs. At the same time, small firm owner-managers tend to exaggerate their success, expressing optimism the majority of the time and rarely exhibiting an inclination towards creating a realistic picture of current and expected events.

Business skills training plays a critical role in supporting small firm owners to effectively and efficiently run their businesses and perform innovation activities (Venkataraman, 1997; Shane, 2000; Naidoo, R. & Urban, B, 2010; Bercovitz and Feldman, 2008; Marcelle, 2011). Effective time management is acknowledged as a recipe for success in small firms (Marcelle, 2011). There is consensus among the key informants that small firm owner managers need support in order to overcome the lack of business skills and time. Business skills training and effective time management were perceived to be essential in assisting small firm owner managers to effectively and efficiently manage their businesses and perform innovation activities.

At organisational level, scholars argue that there are a number of factors or determinants that either facilitate or constrain innovation in firms (Amabile, 1988 and Hamel, 2000 in Ngutshane, 2012). These factors or determinants include general firm characteristics (firm age, size, ownership status and capital), firm structures (intellectual capital and firm culture) and strategies (collaborations, knowledge management, investment strategies and operational priorities) (Dampour, 1991 in Ngutshane, 2012).

In addition leadership, internal and external linkages influence innovation within the firm (Lofqvist, 2014). The literature identifies size, age, and limited internal resources, close interaction with customers and employees, as well as behavioural flexibility as critical factors that influence innovation in small firms (Nooteboom, 1994; Rothwell & Dodgson, 1994; Moller *et al.,* 2007; Mazzarol *et al.,* 2011; Hutter, 2013; Saunila & Ukko, 2014; Lofqvist, 2014). Size and age are recognised as actors that either facilitate or constrain innovation in small firms depending on the situation (Hutter, 2013; Saunila & Ukko, 2014). Size presents a weakness or liability due to limited internal resources, lack of broad multidisciplinary competences, as well as lack of effective structures necessary for innovation performance (Moller *et al,* 2007; Hutter et al, 2013; Saunila &Ukko, 2014; Handoko et al, 2014). At the same time size favours a flat structure which allows for flexibility, adaptability and responsiveness to the changing environment (Ghobadian & Gallear, 1997; Di Tommaso & Dubbini, 2000); Moller *et al.,* 2007; Laforet, 2008; Hutter *et al*., 2013; Saunila & Ukko, 2014).

The results show that size, age, and limited internal resources, close interaction with customers, and employees as well as behavioural flexibility influence innovation in small firms. The results reveal three scenarios:

(1) Factors that either facilitate or act as a barrier to innovation depending on the situation

(2) Factors that only facilitate innovation

(3) Factors that only act as a barrier of innovation in small firms

Both size and age are shown to either facilitate or constrain innovation depending on the situation. The results show that small firms have limited resources including limited human resources, skills, finance and complementary assets that constrain innovation in small firms. The small firms' capabilities are limited to the skills and expertise of the owner-managers and their closed personal networks as they cannot afford to employ and retain skilled staff. Innovative ideas are either abandoned, delayed and in some cases where implemented, fail as a result of inadequate resources including skills to perform the activities. This has mixed results and impacts on innovation; in some cases success is evident and in other cases, the results have been detrimental to the small firms.

The literature argues that small firm size and age allow close interaction with customers in order to get market insights and co-creation of products and services (Nooteboom, 1994; Rothwell & Dodgson, 1994; Mazzarol *et al.*, 2010). According to literature, small firms have flat or organic structures that encourage horizontal communication among employees, close customer interaction, flexibility and adaptability which facilitates innovation in small firms (Burns & Stalker, 1961 in Lofqvist, 2014). The results confirm that small firms are close to customers and at the same time use them as sources of ideas and partners in co-creation of products and services. Furthermore, the results show that small firms are flexible in their decision making processes and are likely to be responsive to changes in the environment as the owner managers change their production approaches or business models accordingly. However, the key informants perceive small firms to be rigid and unresponsive, and this seems to contradict the innovation literature. Thus, the findings according to perception of key informants suggest that the owner managers keep are stubbornly attached to their ideas even if these ideas are not producing the expected results. At the same time the owner managers rarely listen to external advice or seek help when their businesses face a crisis.

The literature argues that the systemic environment has an influence on innovation in small firms (D 'Amboise & Muldowney, 1988; Mohannak, 1999; Hunger & Wheelen, 2003; Edwards *et al*., 2005; Barret & Sexton, 2006; Mazzarol & Reboud, 2011). Thus, the systemic environment is recognised as made up of the following factors: enabling conditions, market conditions, technological regimes and trajectories, industry structure, institutions, actors, activities and functions, knowledge flows, linkages and interactions, policies, regulations and incentives (Venkataraman, 2004; Marcelle *et al.*, 2013).

These factors are both intangible and tangible, characterised into two main categories: interaction environment and institutional environment (Venkataraman, 2004; Barret & Sexton, 2006). The interaction environment refers to factors that interact with the firm which can either influence, or are influenced by the firm, such as technology, market access, demand for innovation, networks and linkages, access to funding, and skills. The institutional environment consists of factors that the small firms are unlikely to influence directly and are mostly given such as policies and the cluster innovation environment (Barret & Sexton, 2006; Mazzarol & Reboud, 2011).

The results from the small firm owner managers show that five of the factors in the interaction environment (market access, demand for innovation, networks and linkages, access to funding and skills) constrain innovation in small firms. However, technology is perceived by the owner managers to facilitate innovation. The owner managers have mixed perceptions on the institutional environment, on one hand they perceive policies to constrain innovation and on the other hand perceive the cluster innovation environment to facilitate innovation in small firms.

Market access and demand for innovation are challenges for small firms because of the liability of newness and unconnectedness (Moller *et al.*, 2007; Chesbrough, 2010). Thus, small firms are restricted geographically and lack complementary assets for taking products to markets (Freel, 2003; Teece, 1997). At the same time, established incumbents, mostly large firms, create high barriers to entry and project uncompetitive behaviours making it difficult for small firm to carry out innovation activities (Tidd & Bessant, 2009). Both incumbency by large firms and habitual practices by consumers or user can also result in technological lock–in for instance in the energy industry carbon lock in has affected uptake of climate innovation (Unruh; 2002; Foxton, 2003; Sioshansi, 2010). Furthermore, new technologies do not necessarily have markets and it takes time before an innovation is diffused and accepted by users or consumers (Rogers, 2003).

The owner managers conceded that market access and demand for innovation is a major challenge for small firms. This is largely because the firms are small and new and unlike large firms, they do not have a large number of customers and are therefore restricted to their geographical areas of location. In addition, they do not have complementary assets important for supporting innovation and taking ideas to the market. Markets for a majority of these technologies do not necessarily exist and have to be created. In addition, it takes time for customers to accept new products due to a number of concerns including safety and quality.

Technology is recognised as one of the systemic factors that facilitate innovation as new technologies offer low entry barriers (Pavitt, 1984; Dosi, 1988; Perez, 1983 cited in Perez and Freeman, 1988). Scholars argue that the majority of the firms active in new technology are small firms (Audretsch & Fieldman, 2003). Thus, technology is seen to provide new opportunities and at the same time improve business activities (Perez, 1983 cited in Perez and Freeman, 1988; Marcelle, 2004; Tidd & Bessant, 2009). New

technologies can be disruptive to existing business models and at the same time present opportunities to serve the under-serviced or “bottom of pyramid” markets (Perez, 1983 cited in Perez and Freeman, 1988; Prahalad & Hart, 2002; Christensen, 1997).

The results show the role of technology in facilitating innovation in small firms. Thus, technology is perceived as presenting a business opportunity either by introducing technology in the form of new products or services, or applying technology to solve problems. The use of new or improved technologies enables small firms to carry out their innovation activities in a more effective, faster and cost-effective manner. These results also show that the majority of technologies present new business opportunities and have the potential to serve the base of the pyramid markets by offering both affordable and accessible products and services.

The literature, however, emphasises that for technology to succeed there must be necessary support mechanisms. Failure to have these in place will result in a failure to upscale technology from the laboratory to the market and/or present challenges in taking the technology to the market, a scenario termed, “the valley of death” (Marczewski, 1997; Markham, 2002; Wessner, 2005; Ford *et al*., 2007; Nanda et.al., 2013). Therefore, institutional interventions are needed to correct market failures. These interventions can facilitate market access and create demand for innovation through various innovative and incentive mechanisms such as public procurement and tax rebates (Martin & Scott, 2000; Unruh, 2002; Venkataraman, 2004; Oxera, 2005; Elder, 2010).

The results show that whilst the public innovation support programmes are assisting small firms to carry out technological innovation, it is inadequate to effectively scale up technology from the laboratory to production. Furthermore, the results show that venture capital is virtually nonexistent as the small firms do not acknowledge them as potential sources of funding. In addition, the results show that there has been significant emphasis on the supply side of innovation such as training services, provision of facilities and public funding, negating the demand side of innovation such as market access and incentivising the adoption of technologies. This has resulted in challenges in the commercialisation of products and services. The results show the need for institutional support to correct market failure. This support should be in the provision of downstream funding opportunities to augment the lack of participation by venture capital, and also by

stimulating demand for innovation through public procurement and facilitating market access by incentivising large firms to partner with small firms.

Networks and linkages are seen to play an important role in innovation and their absence and relative weaknesses is likely to constrain innovation (Marcelle, 2014). The role played by intangibles such as social capital to networks and linkages is acknowledged (Burt, 2000; Molina-Morales & Martinez-Fernandez, 2010; Ulhøi, 2005; Urban & Shaw, 2010). However, networks and linkages on their own are insufficient; the ability to network and make use of the linkages is even more critical (Sefalafala, 2012). According to Mahonnak (1999), there is need for bi-directional communication between various innovation actors within an innovation system. However, small firms face the liability of unconnectedness and are limited to their personal networks (Moller *et al,* 2007). Therefore, scholars argue that there is need for intermediaries to help small firms to network and build social capital (Uzzi, 1997; Venkatamaran, 2004; Diener & Piller, 2010; von Nell & Lichtenthaler, 2011).

The results show that networks and linkages are not well developed. As a result small firms struggle to get new ideas and support for innovation from external parties. This is also compounded by the ability of small firms' owner managers to network effectively. However, the results show the positive role played by public innovation intermediaries in the creation of the right conditions for networking. This is done by organising events and supporting collaborations among small firms and other innovation actors such as research councils.

Access to funding and skills has been highlighted as a general challenge to small firms as they struggle to finance operations, and recruit and retain skilled personnel critical for performing innovation activities (Marcelle, 2011). This is compounded by unfavourable employment legislation which makes it difficult for small firms to hire personnel for example onerous procedures for firing non performing employees which makes firms difficult for small firms to employ staff (Ahwireng-Obeng, 2003). The result is, on one hand, a high failure rate among newly established small firms as they are not optimally resourced and on the other hand, a survivalist attitude due to reluctance to act on non performing employees, subsequently constraining growth in new firms (Steel, 1994; Cant *et al*., 2003; Marcelle, 2011).

The result shows that access to funding is a challenge to small firms, with negative impact on the ability of small firms to carry out innovation activities. Access to funding also affects the ability to recruit skilled personnel and perform other innovation activities such as acquiring new knowledge. Small firms are left with no choice but to take a survivalist attitude which constrains future growth. Hence, most of the small firms are unlikely to hire additional workers as it is difficult to lay them off and preferring to keep lean resources with the option to outsource.

The institutional environment which includes policies as well as the cluster innovation framework (of which incubation programmes, science parks and other support programmes are a part) play an important role in creating the enabling conditions for innovation (Edwards *et al.,* 2005; Barret & Sexton, 2006; Mazzarol & Reboud, 2008). However, in South Africa, the policy environment is characterised as lacking coherence and impact. It is viewed as being generally unfriendly to small firms, with binding constraints on innovation (Ahwireng-Obeng, 2003; Marcelle, 2011). According to Marcelle (2011), a number of policies intended to support innovation in small firms do not talk to each other resulting in duplication, confusion and minimal impact. This is exacerbated by fragmentation of the innovation landscape, existence of the innovation chasm, a narrow definition of innovation and funding (OECD, 2007; Marcelle, 2011).

The results show that policies meant to support small businesses in South Africa are perceived to be unfriendly and failing to achieve the intended outcomes. There is a general concern that there are much duplication among the various policies and programmes meant to support small firms. Furthermore, the policies are seen as contradictory, as in some cases what is promulgated in one policy directive is pre-empted by another. For instance, the majority of the policies have paid attention to supply side issues and overlooked demand side issues. In addition, there is a tendency by the policy makers to treat small firms as a homogenous unit and do not necessarily take into account the differences that exist among the small firms. The policy makers tend to view innovation using a very narrow definition focusing on technology only.

Scholars argue most of these policies meant to support small firms in South Africa are spelt out at the macro level, with little or no emphasis at the local level or point of action, treating small firms as one homogenous unit (Ndabeni, 2008; Chandra *et al.,* 2001 in Marcelle, 2011; Marcelle *et al.*, 2013). Therefore, there is need to pay attention to the

issues of variation and the need for specificity tailored to the circumstances of these firms (Marcelle, 2011). At the same time these policies mostly address the supply side issues and do not look at the demand side (Mani, 2001; Macheke, 2002; Ndabeni, 2008: 2009; Lorentenzen, 2010). Edler (2010) recommends that public procurement policies can be used to create demand led innovation. While the role of public support agencies is recognised in South Africa, it is characterised by low visibility, lack of awareness, general accessibility and bureaucracy (Ahwireng-Obeng, 2003; Marcelle, 2011). There is a strong argument by scholars to critically consider coordination, impact, implementation and specificity (Ahwireng-Obeng and Piarry, 1999; Mani, 2001; Ahwireng-Obeng, 2003; Marcelle, 2011).

Small firm owner managers felt that policies to support innovation are out of touch with the day to day reality of small firms. This is because there is a top down approach in designing policies meant to benefit small firms, and the small firm owner managers argue that they are rarely consulted. To counteract this, they advocate for the need for a dialogue between the policy makers and the small firm owner managers. The small firm owner managers indicated the need for public policies that stimulate demand led innovation. They also expressed ignorance of the work and existence of some public support agencies such as research councils as well as decried the fact that not all public support programmes were accessible. The results show that there is a general lack of understanding on innovation in small firms and as well as efforts to engage the intended beneficiaries of these policies and programmes on issues that affect them. This creates frustration and a sense of alienation between the small firm owners and the policy makers.

It is important to consider the dimensions of entrepreneurship as an economic function, creation of a new venture, form of behaviour and set of characteristics (Morlacchi, 2007). Antecedence shows that innovation does not only involve the small firm owner managers as lone entrepreneurs but also involves multi-actor agents such as governments and other support institutions (Schumpeter, 1934). These institutions play a critical role as intermediaries in building social capital through innovation events, offer support for collaboration projects and also help small firms to network and form necessary linkages (Van de Van, 1999; Uzzi, 1997; Venkatamaran, 2004; Morlacchi, 2007; Diener & Piller, 2009; von Nell &Lichtenthaler, 2011). However, the literature highlights that in South

Africa, these government and support institutions are seldom visible, accessible and impactful to the intended beneficiaries (Ahwireng-Obeng, 2003; Marcelle, 2011).

The results of the study show that the effort by the government in South Africa to facilitate innovation in small firms by setting up a cluster innovation framework (which includes incubation centres and science parks) is a step in the right direction. These incubation centres, science parks and support programmes offer services ranging from sector specific programmes to broad services. The latter includes tenant facilities, business training, mentorship, seed funding, technical services, market development and networking opportunities. However, a general concern is that there is low visibility and accessibility of their services to the majority of the intended beneficiaries, particularly those from previously disadvantaged backgrounds. There seems to be very little effort to create awareness and accessibility of these facilities and support programmes. Most of these programmes are only accessible through the internet and very few walk-in centres.

5.3 MOTIVATIONS AND INTENDED OUTCOMES OF INNOVATION

Innovation in small firms is not a passive process but is motivated or goal orientated with intended consequences or outcomes aimed at solving a problem (Cyert & March, 1963; Foxall & Johnston, 1987; Barret & Sexton, 2006). Thus, innovation is initiated by an individual or a group of people to achieve specific goals (Cyert & March, 1963; Amabile, 1998; Marcelle *et al*,. 2014).

Initially, the motivation to innovate in small firms is driven by the initial impetus of the owner manager and there is a nexus between the individual motivation for innovation and those of the firm (Foxall & Johnston, 1987; D'Amboise & Muldowney, 1988; Cohen & Sauerman, 2007). This motivation for innovation evolves on a continuum from intrinsic to extrinsic factors (Cohen & Sauerman, 2007). It begins as voluntary problem solving problems at individual level. Subsequently it becomes goal orientated at firm level directed at solving customer problems by either creating new products and services or improvement of the existing products and services (Foxall & Johnson, 1987; D'Amboise& Muldowney, 1988; Lofqvist, 2005; Barret & Sexton, 2006; Cohen & Sauerman, 2007). The intended outcomes of innovation in small firms are to achieve both operational performance and overall business performance (Foxall & Johnston, 1986; Lofqvist, 2005; Barret & Sexton, 2006).

The results of the study show that innovation in small firms is initiated by mostly owner managers. The motivation for innovation could be both voluntary and intrinsic, or goal-orientated and based on an extrinsic motivation. Furthermore, the results show that the goals of the owner manager are inextricably the goals of the small firm and act as the motivational driver for innovation. The results show that the intended outcome of innovation is to achieve the desired operational and/or overall business performance.

Literature argues that individuals are motivated by intrinsic and extrinsic factors which involve pecuniary and non-pecuniary rewards (Schumpeter, 1934; 1943; Amabile, 1988; Ryan & Deco, 2000; Gagne & Deci, 2005; Cohen & Sauerman, 2007). Intrinsic factors relate to the task and reward being inseparable while extrinsic factors relate to the task being separate from the reward (Ryan & Deco 2000; Amabile, 1988). Intrinsic factors can be broken down into individual and social factors, with extrinsic factors broken down into individual economic, and social factors (Avenali *et al*., 2010). Some of the intrinsic and extrinsic factors are social factors which are non-pecuniary and are based on the judgement of others (Avenali, *et al.*, 2010). The motivational factors, both intrinsic and extrinsic, include personal fulfilment or need for achievement, intellectual challenge or problem solving, curiosity, peer or societal recognition or monetary gains (Cyert & March, 1963, Sauermann & Cohen, 2007). Competitions have been noted to stimulate innovation among inventors and entrepreneurs, as well as enable public innovation programmes to scout for innovative ideas (Brunt, *et al.,* 2012).

The results show that the owner managers were influenced by a number of motivational factors, some common to each other, and others differing from one another. The results show that problem solving and the need for achievement are largely intrinsic and voluntary. By contrast, recognition and monetary gain are extrinsic and non-voluntary, often driven by the judgement of others and serves as an external reward. The results of the findings also confirm that competitions serve as a source of recognition as they offer a form of external validation of participating companies by giving visibility and working as a point of future reference. The results also confirm that public innovation support programme use competitions as a strategy for sourcing innovative ideas.

According to the literature, intrinsic motivations stay lifelong whereas extrinsic motivation diminishes with a fulfilment of a goal (Morgan *et al*, 1993 in Cohen & Sauerman, 2007).

Intrinsic motivation is argued to be present in the early stages of innovation whereas extrinsic motivation increases with the maturity of the innovation activities or late stage activities such as commercialisation (Cohen & Sauerman, 2007). Innovation competitions are recognised as an important extrinsic factor for individual motivation for innovation (Brunt *et al*., 2012; Everett *et al.*, 2012).

The results of the study show that problem solving is the primary motivation, whereas achievement and recognition are secondary. While problem solving, and the need for achievement and recognition seem to play critical roles and are present in all the firms, monetary gain is present in firms whose technologies are at an advanced stage or have products and services in the market. Furthermore, both owner-managers and public innovation support programme managers acknowledge that innovation competitions serve as a source of recognition and motivation for innovation in small firms.

The literature argues that the motivational factors in small firms are survival, stability and growth (Foxall & Johnston, 1997; Barret & Sexton, 2006; Edwards, *et al.*, 2005; Lofqvist, 2005). The literature emphasises that these motivational factors differ from firm to firm and are likely to shift from time to time (Foxall & Johnston, 1987; Chesbrough & Rosenbloom, 2002; Cohen & Sauerman, 2007; Tidd & Bessant, 2009). However, Barret & Sexton (2006) argue that the main motivational factor for innovation in small firms is survival with the other factors, stability and growth playing secondary roles. Barret & Sexton (2006) further argue that these motivational factors are not necessarily linear nor sequential as implied by stage theories (Churchill & Lewis, 1983) but involve a dynamic hierarchy of motivational needs. This hierarchy of motivational needs is cyclical in response to the dynamic imbalances between external demands and internal capacity (Barret & Sexton, 2006).

The results show that the goals of the firm or the motivational factors for innovation in small firms are survival, stability and growth. Survival is the primary motivation for innovation in small firms at firm level, with stability and growth being secondary motivation. Growth does not seem to be an immediate concern but it is only considered as a long term objective. In addition, the results show that most owner-managers try to achieve survival and stability by managing their internal resources and responding appropriately to changes in the external environment.

According to Barret & Sexton (2006), the motivational factors in small firms are intentional. Foxall & Johnston (1987) argue that the outcomes of innovation are the intended consequences of the interaction between the antecedents of innovation, the behaviour and motivations of the owner-managers. However, scholars highlight that there is no direct relationship between a specific antecedent, behaviour or motivation and a consequence but view them as random elements (Quinn, 1985; Pavitt, 2004, Tidd & Bessant, 2009) consistent with the nature of the innovation process. The literature argues that the intended outcome of innovation is to achieve either enhanced operational or overall business performance or both. The former refers to survival, steady cash flow, stability, sales and growth, profit, solving customer problems, while the latter refers to capacity utilisation, quoted lead times and quality (Foxall & Johnston, 1987; Chesbrough & Rosenbloom, 2002; Edwards *et al*., 2005; Lofqvist, 2005; Barret & Sexton, 2006; Tidd & Bessant, 2009).

The results of the study show that the intended outcomes of innovation are solving problems either internally or externally with two major outcomes: enhanced business performance and enhanced operational performance. The former includes production of new goods or services, profitability, growth and new business models and the latter includes capacity utilisation or inventory control, quoted lead times (speed to market), cost reduction and quality.

The literature shows that the size, age or maturity and industry of the firm influences innovation (Dampour, 1991 in Ngutshane, 2012, Nooteboom, 1994; Rothwell & Dodgson, 1994; Moller *et al*., 2007; Saunila & Ukko, 2014; Lofqvist, 2014). A firm can have many intended outcomes of innovation (Foxall & Johnston, 1987; Barret & Sexton, 2006; Lofqvist, 2005; Cross & Ayadin, 2008). In small firms the potential outcomes of innovation vary from firm to firm (Mazzarol & Rebound, 2011; Barret & Sexton, 2006). Small firms, mostly start-ups, innovate in order to create new products and services and once this has been achieved their goals shift to sales, growing market share, new business models and improvements (Chesbrough & Rosenbloom, 2002; Cohen & Sauerman, 2007; Tidd & Bessant, 2009).

The results of the study show that the intended outcomes of innovation in small firms depend on the size, age and the industry in which the firms are embedded and vary from firm to firm. Small firms are likely to consider one or more types of enhanced business

performance with one or more types of enhanced operational performance. Some of these outcomes are generic while others are specific to certain firms. Production of goods or services is considered the most important enhanced business performance outcome. Profitability, growth, new business model and improvements are considered once new goods and services have been created.

Scholars highlight that operational performance in small firms includes improvements in the areas of capacity utilisation, lead times, and quality and cost reduction (Foxall & Johnston, 1987; Edwards's *et al*., 2005; Lofqvist, 2005; Barret & Sexton, 2006). These improvements are passed on as customers benefit from a better, cheaper and faster service or product delivery (Lofqvist, 2005). The results show that small firms strive to achieve at least one or more forms of improvement, capacity utilisation, lead times, and quality and cost reduction. In addition, the results show that cost reduction is usually a combined effect of the other factors.

The results show that cost reduction is an important outcome of innovation in small firms as this is critical to their survival and benefits their customers. Small firms are sensitive to disturbances in cash flow and therefore cost reduction is key to their survival (Lofqvist, 2005). At the same time, small firms struggle with issues of capacity as they may not be able to afford to buy new technologies or equipment, recruit or access a broader base of competences (Scott *et al*., 1996; Hutter *et al*., 2013). The results show that the majority of the firms in the ICT industry consider lead time to be an important factor and therefore strive to be first to market. Firms in high velocity industries where there are rapid changes such ICT innovate in order to reduce lead times (Tidd & Bessant, 2009). At the same time, firms that have products and services in the market are likely to consider improvements around capacity utilisation (Tidd & Bessant, 2009). The results also show that capacity utilisation is important to firms that already have or are about to launch products and services. However, the results also show that both capacity utilisation and cost reduction are challenges for small firms.

5.4 THE INNOVATION PROCESS

The innovation process involves three major elements: innovation strategies, innovation capabilities building mechanisms and the main innovation activities (Goffin & Mitchell, 2010; Tidd & Bessant, 2009; Eveleens, 2010). The innovation process is characterised

as idiosyncratic, chaotic, complex, heterogeneous and contingent (Pavitt, 2004; Tidd & Bessant; 2009). The results show variation among small firms with respect to their innovation strategies, innovation capability building mechanisms and the main innovation activities. At the same time the results show that innovation processes in small firms except for a few cases are informal.

According to Levinthal (2007), the innovation process involves the problems of intermediate selection along development journeys since selection occurs over a moving target. As a result, there are likely to be many types of innovation strategies per firm (Freeman, 1982 in Martin, 1994; Levinthal, 2007; Burgelman, Maidique & Wheelwright, 1995). The literature on innovation in small firms argues that innovation strategies can be characterised as many "types", informal and broad (Foxall & Johnston 1987; Hadjimanolis, 2000; Baldwin & Gallantly, 2006; Marcelle, 2011). The results of the study show that there are many types of innovation strategies in small firms. Thus, the small firms are likely to "change "and/or "assess" their innovation strategies depending on the situation. In addition, the results show that the innovation strategies in small firms are informal and broad as they are not written down. They also do not spell out their specific details but rather give vague statements about a future position.

The literature argues that innovation capability is the ability to transform knowledge into outcomes that create new value for organisations (Saunila & Ukko, 2014). Thus, in order to respond to a rapidly changing environment organisation must possess or build the right capabilities in order to be able to integrate, build, and reconfigure internal and external competencies to create this new value or innovation (Cohen and Levinthal, 1990; Burgelman, Maidique & Wheelwright, 1995; Teece *et al*., 1997). Innovation in small firms involves internal and learning mechanisms (Guimaracas *et al*., 1996 in Lofqvist, 2014; Granovetter, 1985; Marcelle, 2004, Bell, 2009; Dobson *et al*, 2013). Internal learning mechanisms are learning by doing and from failure (Dobson *et al,* 2013). External learning mechanisms involve learning from other firms, customers and users and copying from overseas (Dobson *et al,* 2013; Lofqvist, 2014). The literature highlights that internal learning capabilities allows an organisation to absorb external knowledge (Cohen & Levinthal, 1990; Hutter *et al.*, 2013).

The results show that small firms engage in innovation capability building and this involves internal and external learning mechanism. Internal learning mechanisms include learning by doing and from failure whereas external learning mechanism include learning from other firms, customers, users and copying from overseas. However, the learning processes in small firms are constrained and this serves as an impetus for problem solving. The results reveal that although small firms partner with big firms, in many cases it was hardly for learning purposes but rather because they felt vulnerable. The results also show public innovation support programme managers are sceptical on the ability and capacity of small firms to learn from external parties and emphasise the need for external support from interested stakeholders.

The main activities of innovation in firms can be explained as involving four key main activities, search, selection, implementation and capturing value processes (Tidd & Bessant, 2009; Eveleens, 2010). These processes are not necessarily linear but can be random with some iteration between them (Quinn; 1985; Hobday, 2005; Barret & Sexton, 2006; Eveleens, 2010; Howard *et al.*, 2008 in Lofqvist, 2014). The literature identifies search activities or processes in small firms as mainly receiving innovation ideas from internal and external sources (Katila & Ahuja, 2002; Drucker, 2002; Mahdi, 2003; Tidd & Bessant, 2009). Internally, the owner-managers are central to innovation activities and serve as the main or original source of innovation ideas (Hutter *et. al*., 2014, Dobson, *et al*., 2009). Externally customers, users, competition, industry associations and scientific bodies such as universities, research institutions and standardisation associations serve as a source of ideas (Von Hippel, 1988; 2005; Drucker, 2002; Howe, 2004; Tidd & Bessant, 2009; West & Gallagher, 2006; West *et al*., 2006).

The results reveal that search activities or processes in small firms involve a number of sources of innovation. These are owner-managers, customers/users, universities, conference/expos, networks, overseas, research council, industry associations and standardisation bodies. The results also show small firms use a number of sources, more than one per firm, for identifying innovation opportunities. The owner managers are in most cases the primary source of ideas. This is influenced by their educational background, previous experience and the desire to solve problems.

Customers and/or users can directly play a critical role in the innovation process by co-creating products and services with small firms (Von Hippel, 1988). The role of universities as sources of knowledge is acknowledged particularly from students and university research (Etzkowitz, 2000; Lauren & Salter, 2004; Witt and Zellner, 2007). However, the literature argues that technology transfer between scientific bodies such as universities and research council and small firms remains very low (Witt and Zellner, 2007; Wolson, 2007). Networking through conferences and strategic alliances with other firms and innovation actors serve as a source of ideas (Gomes-Casseres, 1987; Audretsch & Fieldman, 2003; Lauren & Salter, 2004; Rogers, 2003). Overseas sources can also serve as sources of innovation ideas (Hobday, 2005).

The small firm owner managers identified customers and users as an important source of new ideas. They also acknowledged the role played by the university as a source of skills and new ideas. Conferences, personal and business networks were also identified as important for building new contacts and sharing new knowledge. Overseas sources were identified as an important source of knowledge where the technology involved is complex. The small firm owner-managers also identified industry and standard associations as sources of innovation ideas. Although research councils were identified as a source of innovation ideas, their visibility appear to be very low. However, results suggest that small firms lack the capacity to effectively tap into these innovation sources beyond the owner managers and their close networks. Therefore, external support such as research support programmes and travel grants were recommended in order to assist small firms with resources and opportunities to tap into other sources of innovation.

Selection processes in small firms follow both idiosyncratic processes and a shared interpretive framework (Cyert & March, 1963; Dobson *et al.*, 2003). The innovation literature highlights idiosyncratic processes that are characterised by means-end framing and various cognitive processes involving casual links, recognising patterns and making connections by small firm owners (Gaglio & Katz, 2001; Sarasvathy, 2001; Srinivas & Sutz, 2008). Scholars argue that unfortunately, in small firms, there is rarely a shared interpretive framework as the owner manager might not be willing to share their innovative ideas with their employees (Hutter *et. al*., 2013).

The results show that innovation in small firms does involve both an idiosyncratic process and a shared interpretive framework. The selection processes is idiosyncratic or

unpredictable due to various learning points and at times, some of the product development or breakthroughs are a matter of serependity. The results show that although some of the processes are not written down, there is a shared interpretive framework understood by owner managers and their sub-ordinates in developing their products or services.

The literature argues that most small firms do not use formal tools or a portfolio approach. As a result, selection processes depend largely on the gut feelings and a degree of luck (Nooteboom, 1994, Marcelle, 2011; Tidd & Bessant, 2009). Small firms that do so have a narrow portfolio of innovation opportunities ideas which in turn, impact innovation, although there are exceptions, (Hutter *et. al*., 2013). However, small firms that use formal tools and a portfolio are likely to be more successful than firms that do not (Marcelle, 2011). The results show that the majority of small firms do not use any formal tools or a portfolio approach. If one product of service fails, it translates to a firm either closing its doors or establishing a new service altogether. However, there are exceptions as some small firms have more than one product either in development or ready to commercialise. In this study one firm in the bio economy began with a cosmetic product for men and later on introduced the same product for women. In two other cases, one firm in ICT and another a climate innovation technologies firm, introduced one alternative product and mothballed the first one for reintroduction later. These results, confirmation the literature and show that these products are not introduced simultaneously but one after the other resulting in a narrow portfolio and high risk of failure.

Implementation processes in small firms involve three key decisions: in-house development, outsourcing and strategic alliances (Veugelers & Cassim, 1999; Tidd & Bessant, 2009; Love & Roper, 2001; Pascussi, 2011). According to the literature, these decisions are influenced by transaction costs, strategic management and resource elements or complementary assets (Pascussi, 2011). This also considers cost reduction, economies of scale, intellectual property and availability of resources (Tidd & Bessant, 2009; Love & Roper, 2001; Pascussi, 2011). Firms are likely to consider in-house development in infant or new industries and outsourcing in mature industries but also in emerging industries if there are resource constraints (Stigler, 1951). The results of the study reveal that small firms are likely to implement innovation activities through in-house development, sourcing and collaboration with customers and users. The motivation for

in-house development is to control costs, quality and intellectual property. Outsourcing is considered if small firms lack either the capability or capacity to develop the product/service. This is a temporary option, often a last resort, while collaboration is important to get customer or users insights. The results of the study suggest that these implementation decisions are influenced by the industry, age or size of the firm.

The literature shows that whilst small firms are good at finding innovation ideas, they face challenges in implementing them and taking the ideas to market (Hutter *et al,* 2013). This is because small firms lack complementary assets and as a response are likely to consider cooperation with other small firms, universities or even large companies (Audretsch & Fieldman, 2003; Tidd & Bessant, 2009). Cooperation with customers and users to co-create products is also a common practice in information technologies (Von Hippel, 1988; 2005; West & Gallagher, 2006). However, empirical research shows that small firms are likely not to engage in horizontal collaboration preferring in-house production, but are likely to consider vertical collaboration for marketing purposes (Lofqvist, 2014).

The results show that small firms cooperate less with other partners during product development but more so when seeking to enter the market. More so, such cooperation with large established firms is rooted in the aim to access complementary assets such as distribution channels and markets that small firms do not have. However, the results show that cooperation in product development is likely in some industries such as in the ICT industry where customers and users participate in co-creation of goods and services. The results show that the public innovation support programme managers perceive small firms to experience difficulties implementing innovative ideas and they recommend the need for external support.

The literature shows that intellectual property management and commercialisation are important if firms are to appropriate value and benefit from their innovation (Tidd & Bessant, 2009). According to Tidd &Bessant (2009) firms should consider a number of intellectual property management approaches. Thus firms with tangible products are likely to patent, firms with intangible products and technology that is not complex are likely to keep trade secrets(Tidd & Bessant, 2009). Firms in information technology are likely to consider speed to market (Tidd & Bessant, 2009). The literature shows that small firms

are likely to partner with established firms to take their products and services to market (Audretsch & Fieldman, 2003; Tidd & Bessant, 2009). While outright selling and licensing might be considered, the former is a challenge for small firms due to lack of complementary assets, and the latter only a temporary option (Teece, 1986; Chesbrough, 2006b; Tidd & Bessant, 2009).

The study shows that capturing value considers a number of intellectual property management approaches: small firms producing tangible products in high technology areas are likely to patent or rely on product complexity whereas firms producing goods and services in medium and low technology areas are likely to use trade secrets. Firms in information technology areas consider speed to market or lead times. Generally, commercialisation strategies in small firms involve partnership or cooperation with large established firms and less of outright selling and licensing.

5.5 SUMMARY

The findings show that the initial conditions for innovation in small firms are constrained by their limited internal environment and hostile external environment. Notwithstanding this, the motivational factors for innovation exist at both the individual level of the owner managers and the firm. At the individual level the primary motivation for innovation is problem solving and at the firm level, survival is the primary motivation with stability and growth as secondary motivation. The intended outcomes of innovation in small firms are either enhanced business or operational performance, or both. In the former, the production of goods, services, and profitability is primary and in the latter, the overall desirable combined outcome is cost reduction and customer satisfaction. The results show that innovation processes are limited to the ideas of owner managers and their closed networks as well as characterised with the lack of capacity to effectively engage external sources. As a result, small firms are likely to develop products and services internally but seek to cooperate with external partners to take their products and services to market. The results suggest that external support is necessary for small firms to be able effectively carry out innovation activities.

The study proceeds with conclusions, recommendations, limitations and areas for future research in the next chapter.

6 CONCLUSIONS AND RECOMMENDATIONS

6.1 INTRODUCTION

This study explored innovation strategies of small firms in South Africa. An attempt was made to examine and unravelled the “black box” and provide some understanding on the dynamics of innovation in small firms. The purpose of this chapter is to summarise the findings and conclusions that can be reached based on the literature and interviews on three main research themes: (1) initial conditions of innovation (2) motivations and intended outcomes of innovation and (3) Innovation process.

6.1.1 Main research issue

In light of the research problem identified in Chapter 1, this study explored the following main research issue:

What are the innovation strategies adopted by small firms in South Africa, their implications and the extent to which they enable small firms to meet their goals?

6.1.2 Research issues

In exploring the main research issue, the following research issues were addressed:

1. What are the factors that influence innovation in small firms?
2. What are the motivations and the intended outcomes of innovation in small firms?
3. What are the innovation processes followed by small firms?

As discussed in Chapter 3, semi-structured interviews were conducted involving 10 small firm owner managers as primary participants and 6 managers of public innovation support programmes as key informants. In the next sub-section, the findings of the study are presented. This section summarises findings of the interviews and review of literature and provides the basis on which conclusions and recommendations for this study are made.

6.2 MAJOR FINDINGS

The findings from the study confirm that innovation in small firms is constrained by the strategic orientation of the owner managers, limited internal resources and a harsh external environment. Thus, owner-managers play a central role in innovation and the overall success of the small firms. Their weaknesses and strengths have implications on innovation in small firms. Their goals are invariably the firm's goals. The findings confirm that small firms suffer from liabilities of smallness, newness and unconnectedness, which impair their ability to innovate. Furthermore, the study reveals that the policy environment is harsh and unfriendly to small firms. Small firms find it difficult to access government support due to bereaucracy. At the same time although the cluster innovation infrastructure is a step in the right direction, it remains largely invisible and inaccessible to the majority of their intended beneficiaries.

The findings confirm that problem solving abilities, need for achievement, need for recognition and less of monetary gain serve as the small firm owner managers' primary motivation. At the firm level, the motivation for innovation is primarily driven by the need for survival in a dynamic motivational hierarchy involving stability and growth, with growth as a peripheral and long term option. The findings confirm that intended outcomes of innovation in small firms are either enhanced business performance resulting in new products/services, sales, profitability, growth and new business models, or operational performance, resulting in improvements. The findings suggest that small firms are ambidexterous and are likely to pursue both operational and business performance but to varying degrees.

The study reveals that due to a number of the characteristic and contextual factors influencing innovation in small firms, the owner managers devise a number of appropriate innovation strategies. These strategies are many per firm, informal and broad. However, the findings also show that there are exceptions where some small firms have formal and clearly articulated innovation strategies. The findings show that small firms lack adequate means and resources to source ideas from external sources and as a result, are limited to ideas from owner managers and their personal networks. At the same time, whilst small firms can easily search for innovation ideas, they are constrained when it comes to the implementation of these ideas due to limited resources and capacity.

The study shows that the implementation of innovation in small firms is characterised by two extremes: in-house development on one end, and cooperation decisions on the other, with outsourcing only considered as temporary strategy. The findings reveal that cooperation decisions present a managerial paradox as small firms rarely cooperate with external parties in the early stages of the innovation process. They prefer in-house development as a strategy to optimise resources and safeguard their intellectual property. However, they are likely cooperate or partner with large, established players, in the late stages of innovation in order to compensate for the lack of complementary assets, specifically when taking their products and services to market.

In conclusion, the findings reveal that innovation strategies in small firms are the consequence of the dynamic interaction between the initial conditions for innovation, motivations and intended outcomes of innovation and the innovation processes themselves. The innovation strategies cannot be attributed to a single factor or antecedent but can be best characterised as chaotic, complex, idiosyncratic and dynamic processes. At the centre of this milieu or creative chaos are owner managers playing a mediating and transformational role by making and adopting a number of decisions and courses of actions, all which manifest as innovation strategies.

6.3 RECOMMENDATIONS

The findings discussed above have implications for both owner-managers and interested stakeholders wishing to carry out and promote innovation in small firms respectively. In light of this, the following recommendations are made:

6.3.1 Recommendations for small firm owner-managers

Small firm owner managers wishing to carry out innovation activities should consider:

- **Implementing strategic and formal planning tools and methods**. This will provide a holistic picture of the business from the beginning to the end, including resource requirements.
- **Leveraging on the available business skills** training offered by many public innovation and related support programmes. This will augment their technical skills. Furthermore they should purposively consider lifelong learning in response to the changing business and technological environment.

- **Changing from being inward looking to being open minded** in order to harness external sources of ideas and support. In addition, they should also embrace new management practices such as design thinking, open innovation and business model innovation in order to ensure organisational renewal.

6.3.2 Recommendations to interested stakeholders

Interested stakeholders including state and non state actors wishing to promote innovation in small firm should consider:

- **Devising sector based and demand-driven interventions** to address the specificities of small firms at the point of action to avoid inertia, unnecessary red tape and frustration of intended beneficiaries. The heterogeneous nature of small firms must be kept in mind.
- **Increasing the support to small firms to build the necessary linkages** and network effectively in order to access ideas and resources outside their traditional closed networks.
- **Crafting appropriate strategies to increase the visibility and accessibility of support programmes** to the general population and intended beneficiaries, particularly those in previously disadvantages communities.
- **Investing in more low cost alternatives** close to where the majority of the population live although large physical infrastructure concentrated in urban centres is still necessary. This relates particularly to government intervention. It will ensure inclusivity and increased embeddedness of innovation support programmes to stimulate grassroots innovation and entrepreneurship that responds to local needs with the potential to revitalise rural and township economies.
- **Streamlining of the policy environment including the formulation of coherent policies** by state actors in order to match intentions with actions and make it easier for small firms to operate.

6.3.3 Recommendations to both owner-managers and interested stakeholders

All stakeholders including small firm owner managers, state and non state actors should consider dialogue on the following:

- **Consultative bi-directional engagement** incorporating both top down and bottom up approaches on the design and implementation of interventions meant

to facilitate innovation in small firms.

- **Continual engagement and definition of the innovation discourse on small firms.** This should take into context the dynamic nature of innovation and the specifics of low and middle income countries, such as South Africa.

6.4 LIMITATIONS AND FURTHER RESEARCH

The limitations of this study and areas of future research are discussed respectively.

6.4.1 Limitations of the study

Limitations of the study are highlighted and indicated as follows:

- The study was cross-sectional. It was limited to ten small firms due to time limits posed by the nature of the study and is therefore not representative of all innovative small firms in South Africa.
- The small firms in this study employ less than ten people and could be regarded as very small firms, not sufficient enough to substantiate all small firms.
- Although innovation is a multi-disciplinary and complex construct the study only considered innovation as beneficial to the small firms, focused on product innovation and issues that were of interest to the researcher. In addition,since the majority of since the majority of the participants were techno-entrepreneurs, this might be misconstrued as viewing innovation as technology.

6.4.2 Further research

Future studies on innovation and innovation strategies in small firms could consider:

- A large cross-sectional study involving a representative sample to allow the generalisability of findings.
- A longitudinal study of one, a few or more cases to allow for the testing of the long term impacts.
- Exploring other types of innovation other than product innovation as well as investigating the unintended consequences of innovation in order to provide a more holistic view of the dynamics of innovation.

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ANNEXURES

ANNEXURE 1: INTERVIEW PROTOCOL FOR OWNER-MANAGERS OF SMALL FIRMS

Preamble

Small firms by virtue of the size and circumstances face constraints and challenges, as response small firms are expected to innovate. Innovation, in this context refers to the application or production of new knowledge in their business activities to meet business objectives, which could be survival, profitability and growth. These activities could be technical for example in the production of goods and services or non technical including administrative and marketing activities. The selection and decision criteria in the application or production of new knowledge depend on goals of the owner-manager in response to both the firm's internal and external stimulus.

Please, could you give me a background of your business?

-Start date, Trigger, Nature, Firm size, Firm age, Milestones and Challenges

1. Describe the business activities of your firm?
2. Does your firm apply or produce new knowledge in its business activities? If so what type of knowledge does your firm produce?
3. What was the end result of this knowledge? Is it new products, services, processes, products and improvement? What business activities did this impact, products, services, marketing and administration?
   -In progress, Completed, Abandoned, Successful, Unsuccessful
4. What were the sources or origin of this new knowledge?
5. What were the processes that your business followed in applying or producing this new knowledge?
6. What internal and external factors motivated your business to choose particular processes?
7. What factors did you consider when choosing the process/as to follow in the application or production of new knowledge did you make in applying or producing new knowledge?
8. Why did you make these choices or take these particular courses of action?
9. To what extent did these choices meet your business objectives?
10. What inputs did you use to undertake these processes? How do you get these inputs?
11. What did you learn in the process of applying or producing new knowledge?
12. Does the geographic or physical location of your firm influence the way you get or produce new knowledge? If so, how?
13. What advice would you give to others small firms in your situation wishing to apply or produce new knowledge in their business activities?
14. Where do you see your firm in the next five to ten years?
17. Is there anything else you would want to share with me?

ANNEXURE 2: INTERVIEW PROTOCOL FOR OWNER-MANAGERS OF SMALL FIRMS

Preamble

Small firms by virtue of the size and circumstances face constraints and challenges, as a response small firm are expected to innovate. Innovation, in this context refers to the application or production of new knowledge in their business activities to meet business objectives, which could be survival, profitability and growth. These activities could be technical for example in the production of goods and services or non technical including administrative and marketing activities. The selection and decision criteria in the application or production of new knowledge depend on goals of the owner-manager in response to both the firm's internal and external stimulus.

1. Please could you give an overview of your interactions with small firms?

2. What kind of support has your organisation given to small firms and why?

3. To what extent did this support influenced the application or production of new knowledge in small firms?

4. What can be learnt in giving this kind of support?

5. Apart from your organisation, are there other organisations that have provided support to these small firms to help them to undertake new activities?

6. How does this support differ from yours?

7. To what extent did this support complement yours?

8. What else can be done to enable small firms to apply or produce new knowledge effectively in their business activities?