**UNIVERSITY OF KWAZULU-NATAL**

# Investigating innovation in South African SMMEs

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# Abstract

People, environment and events interact to create an economy and business is integral in sustaining the economy. Not only large business but small, medium and micro-enterprises (SMMEs) are interwoven into the very fabric of the South African economy. For any business to move forward innovation is not a luxury but a necessity. The aim of this study is to explore how South African SMMEs innovate. This was a cross-sectional study utilizing a quantitative approach of an online questionnaire to collect data. From a sample size of 300 a total of 104 responses were received. Findings reveal that innovation is not dependent on firm size but innovation strongly impacts and is impacted by firm performance. South African SMMEs are actively engaged in many innovation types with customer centric innovation being most predominant followed by product innovation, business services innovation, channel innovation and business model innovation. These findings demonstrate that businesses engage in innovation activities beyond product, process, organisational and marketing innovation. Results showed that innovation intensity is widespread (breadth) rather than deep (depth). This could imply that SMMEs balance innovative activities with maintaining routine practices. Lack of government support, high taxes and shortage of skilled staff are common obstacles to innovation. Knowing that SMME s are innovatively active, accessible and meaningful support by government and policy makers should be directed towards innovation capabilities rather than focussing on outcomes. Owners and managers need to recognise their innovative activities to leverage the concentrated innovation potential, which the study has revealed, in the direction of sustainable growth.

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# Chapter One: Introduction

## 1.1 Introduction

Progress encapsulates change towards something which is better. Innovation the beguiling tool for such change, lends itself to understanding its fundamental nature while providing insights on stimulating progress and growth. Innovation is improving, reconfiguring, putting unlikely elements together, solving a problem or answering environmental challenges. The innovation process is an interdependent, dynamic and an interplay of several factors (Doran, 2012). The vast differences in the economics of each country interacting on a global forum furnish the essential backdrop to explore innovation within South Africa. No matter how intriguing innovation is, it is often understood as the domain of large firms, level of radicalness and of a disruptive nature. Yet it is the organic, dynamic and flexible nature of small, medium and micro enterprises (SMMEs) that creates a conducive environment for creativity and innovation.

This contradiction demonstrates the alluring nature of innovation that begs further understanding and investigation. South Africa, a young transformational democracy facing many challenges aims to see SMMEs as the bedrock of its economy, allowing for stability and progress in its economics (South African Government, 2018). Distinctively it is the specificity and niche orientation of SMMEs, cultivating knowledge richness, which can be channelled to leverage innovation (Raju, Lonial, & Crum, 2011).

This chapter introduces the study and elaborates upon the motivations and the reasons for investigating innovation in South African SMMEs. The research problem and research statement of the study is deliberated upon, and specified. How the research aims and objectives were developed and briefly how the study was conducted is discussed and presented. The construction of the remainder of the paper is outlined in this chapter.

## 1.2 Motivation for the Study

South Africa is a beautiful country yet unique in its history. Adding to its transformational state is the rapidly changing global environment. History and present-day challenges make for unusual lateral solutions. Challenges such as poverty and unemployment require solutions such as job creation, skills development, rural development and people empowerment. The overall unemployment rate is 26.7% (Figure 1.2.1) yet within the age group of 15-34 years approximately 3 million out of 10 million people are not employed and neither are there in education or training (STATS SA Statistics South Africa, 2018).

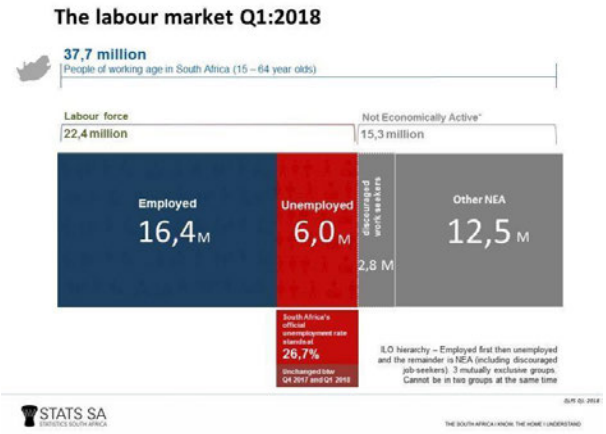


Figure 1.2 1 South African Labour Market

Adapted from: (STATS SA Statistics South Africa, 2018)

Employment is intrinsically linked to economic growth and happy citizens. However dynamic, South African solutions are possible from government, business and the people. It was in Mazorodze and Tewari (2018) study which has revealed that local innovation plays a greater role on productivity in the manufacturing sector than international innovation spill-overs. Small business as well can play a pivotal role in addressing unemployment and creating jobs. Small business is the heartbeat of a nation, an opinion shared by Kongolo (2010) expressed in his study on the role that small businesses play in economic development. Acknowledged as such in the National Small Business Act of 1996 and highlighted in South Africa's National Development Plan published in 2011, is the need for a "vibrant small business community" (sbp, 2013). This is possible if small businesses grow and are able to sustain themselves.

The primary tool for growth is innovation which addresses changes for unique challenges and, improvement of the business. Innovation and business are synonymous. The key determinants of innovative behaviour of the self-employed are: education, firm intrinsic motivation, resilient extrinsic motivation, prior experience and the external environment which promote innovation in small businesses (Baron & Tang, 2011; Romero & Martinez-Roman, 2012). The aim of innovation is either to differentiate the business or to satisfy goals of the owner or manager. This is in response to the needs of society, environment, large firms or towards the fulfilment of potential. The result adds to the uniqueness of small businesses. Three significant outcomes are identified as a result of this uniqueness:

- Accepting this specificity, aids in modelling developmental support towards creating vibrant and active small businesses.
- Understanding innovation equips business owners and managers to strategize present and future resources to grow the organization.
- Knowing how micro, small and medium businesses (SMMEs) innovate can lend itself to improve, increase profitability and create jobs.

Stable small and medium enterprises (SMEs) can encourage formation of new small businesses which in-turn can reduce unemployment and strengthen the economy. Innovation is key for growth and understanding how SMMEs in South Africa innovate can help in the quest of an economically stable South Africa. Stakeholders that can benefit from the research are owners, managers, entrepreneurs, development and research organisations, government and policymakers.

## 1.3 Problem Statement

South African SMMEs contribute 40% to the total turnover of business (Small Enterprise Develpoment Agency, 2018). Romero and Martinez-Roman (2012) noted that those businesses which opened out of necessity were comparatively less likely to be innovative. Only 29% of the South African population is employed by small business (Adclick, 2018). With high unemployment and retrenchments in South Africa many of the small businesses are opened out of need. Hurst and Pugsley (2011) found that small businesses that originate to serve an existing market are not

motivated to grow and pay little attention to entrepreneurial skills. This implies that small businesses tend to open in saturated markets providing undifferentiated products and services. Aterido, Hallward-Driemeier, and Pages (2011) found that SMMEs specifically micro-enterprises, remain informal to avoid more regulations and taxations adversely constraining their innovation abilities and growth.

In contrast SMEs are more often in contact with end-users or customers, establishing the platform to be focussed, knowledge rich, flexible, and innovative (Raju et al., 2011). These characteristics can unleash creativity and innovation. African creativity and innovation are often pursued by the global markets. These attributes are known as drivers of economic value (Nussbaum, 2013; RodríguezPose & Lee, 2014). SMMEs could lack the awareness and ability to channel their knowledge and innovative energies, constructively, losing the opportunity to harness human resources and create employment.

These contrasting SMME characteristics of static versus dynamic, flexibility versus rigidness, need versus growth illustrates a SMME landscape that requires clarity and specific, unambiguous growth. Understanding the innovative potential and innovative activities of South African SMMEs contributes towards the debate of whether small, medium and micro enterprises are growing and if they are able to direct sustainable value to the economy of the country. Hence a comprehensive recounting of innovation by South African SMMEs and its value to performance and growth is needed to interpret sustainability versus change in an environment which is dynamic, unpredictable and forever new. In doing so this study was exploratory and descriptive in nature, profiling innovation in South African SMMEs.

## 1.4 Objectives

The overall aim of this research is to examine innovation in South African SMMEs. In doing so the objectives are defined as follows:

1. To identify the types of innovation in South African SMMEs.
2. To establish the intensity of innovation in South African SMMEs.
3. To explore if innovation impacts on South African SMMEs performance.
4. Exploring obstacles to innovation in South African SMMEs.

## 1.5 Research Questions

1. What are the different types of innovation activities undertaken by South African SMMEs?
2. How innovative are South African small firms (intensity)?
3. Does the intensity of innovation and type of innovation impact or is impacted by firm size?
4. Does the intensity of innovation and type of innovation impact or is impacted by financial performance?
5. What are South African small firm perceptions of obstacles to innovation?

## 1.6 Methodology

The methodological strategy, adopting a quantitative approach, was that of a survey. Principal data was collected using an online questionnaire. This data was collated and analysed by SPSS, a statistical software, using descriptive and inferential statistics. Secondary data was collected by undertaking a thorough review of the existing literature on innovation in business.

## 1.7 Chapter outline

The dissertation comprises five chapters that lead methodically from one to another.

- **Chapter One: Introduction**

  This chapter has provided an introduction to the topic under investigation together with the reasons for the study. The problem statement has been succinctly stated. The aims and objectives addressing the problem statement has been carefully developed and listed.

- **Chapter Two**: **Innovation Literature Review**

  A survey of the literature pertinent to the aims and objectives of the study was conducted. How innovation is researched and how it is lacking with regards to small, medium and micro businesses was investigated. Innovation measures, its outcomes and barriers were discussed. An exploratory framework addressing the research objectives concludes the review.

- **Chapter Three**: **Research Methodology**

The chapter devolves the methods used to conduct the research. Methods regarding research design, theories, philosophies, strategy used, sample structure, how the data was collected and the statistical data analysis employed. A detailed discussion was done on the selected research instrument.

- **Chapter Four**: **Presentation of Results**

  In this chapter the analysed data by SPSS, a statistical software, is presented in the form of graphs, figures and tables. Explanations of the statistical methods extracting the results to meet the criteria for sound and reliable research and the aims of the study are conducted. Pertinent results are listed.

- **Chapter Five**: **Discussion of Results**

  To fulfil the studies aims and objectives a comprehensive discussion of the results ensues, deliberating and comparing the results to existing literature findings.

- **Chapter Six**: **Conclusions and Recommendations**

  The final chapter lays out concise and clear results to each of the aims of the study. From these findings the way forward is suggested.

## 1.8 Summary

This chapter lays out the incentive and rationale for the study. The aims and objectives are elicited and the outline of how the rest of the dissertation is to be carried out is discussed. To gain insights into the topic a comprehensive review on innovation from existing literature is conducted in the following chapter.

# Chapter Two: The Literature Review

## 2.1 Introduction

This chapter maps, using previous research studies, the history of innovation, in relation to business activity. Measures used to determine innovative activities and how these activities are classified are identified. Using literature each of the categories of innovation are reviewed. Discussions are extracted to understand innovation levels together with relationships between innovation and firm size, and, innovation and firm performance. Salient areas where further investigation would be beneficial are identified.

## 2.2 Innovation

Innovation is the heartbeat of any economy. Humankind is wired to evolve, and, change together with progress, is a natural path, of which "innovation, intuition and inspiration" (Shankar, 2016) are integral elements. To provide for societies' growing needs and to take care of the environment which supports these needs, it is essential that firms innovate. Just how do firms innovate? This is a question that has fascinated researchers and business alike. Much of the research on innovation is focused on large firms with a dedicated research and development division (Abdu & Jibir, 2018; Giannopoulou, Barlatier, & Pénin, 2019; Huang & Hou, 2019). Understanding how small, medium and micro-enterprises (SMMEs) engage in innovation is more thought-provoking, and a challenge.

The business management mantra of 'effectiveness and efficiency' alludes to a foundation of continuous innovative activities. Establishing an organic ever-present competitive advantage to maintain business activities is essential. Innovation is the key to obtaining such an advantage, which transforms to growth and sustainability (Volpe, Ricotta, Vagnani, & Valeri, 2013). Morris (2018) sizeable cross-country study using a large database, which included small and medium firms and data extracted from the World Bank Enterprise Surveys, revealed the greater productivity of innovative firms that was considerable, and also, more impactful economically. Investigating the dynamic nature of innovation and its complexities specifically in

SMMEs allows insights into the process of innovation. Earliest work on innovation conceptualizes innovation as a static linear process with innovation investigated along product, process, organisational and marketing activities. However, innovation is much more than a static process and rather a multifaceted, multidimensional process and interdependent. In investigating innovation one can use either a resource-based perspective or a process-based perspective. Large resources are associated with large enterprises. Smaller firms are required to manage their resources. Interestingly Woschke, Haase, and Kratzer (2017) found that scarce resources led to positive incremental innovation performance. To investigate small, medium and micro-enterprises (SMMEs) innovative activities this study uses an extensive, process and resource perspective.

Hsin Chang, Hong Wong, and Sheng Chiu (2019) recommend innovating along all facets of business processes to leverage business systems. It is Xu et al. (2007) total innovation management paradigm (Figure 2.2.1) which proposes that all employees are innovators, merging the concepts of value chain activities and extrapolating that value, which is being created in all activities along the value chain combining human resources and strategy. Therefore both technology and non-technological aspects of business are acknowledged.

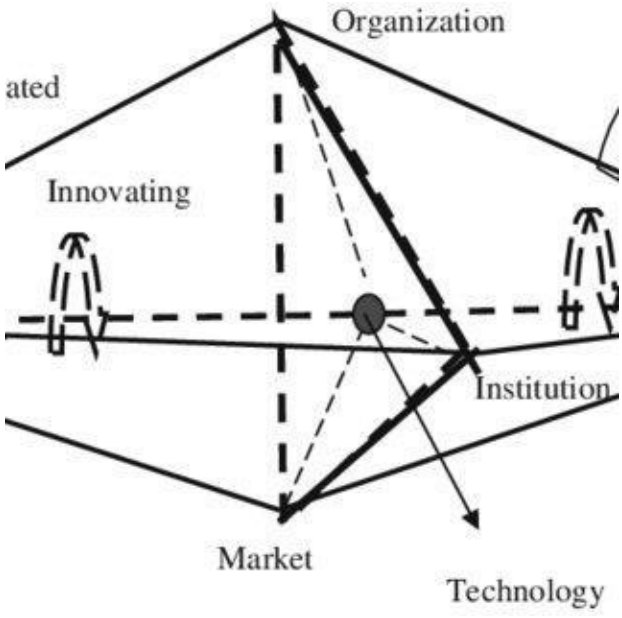


Figure 2.2 1 Value Creating Framework

(Adapted from: Xu et al. (2007)

According to Edwards, Delbridge, and Munday (2005) a process view is proposed to explore innovation in SMEs. Innovation should be considered along a firm's characteristics, both strong and weak competencies, resources, structures, business model and practices. The framework Fig 2.1 then demonstrates the relationship between firm-level innovation (organisational) to innovation of the outer social and economic players (institutional).

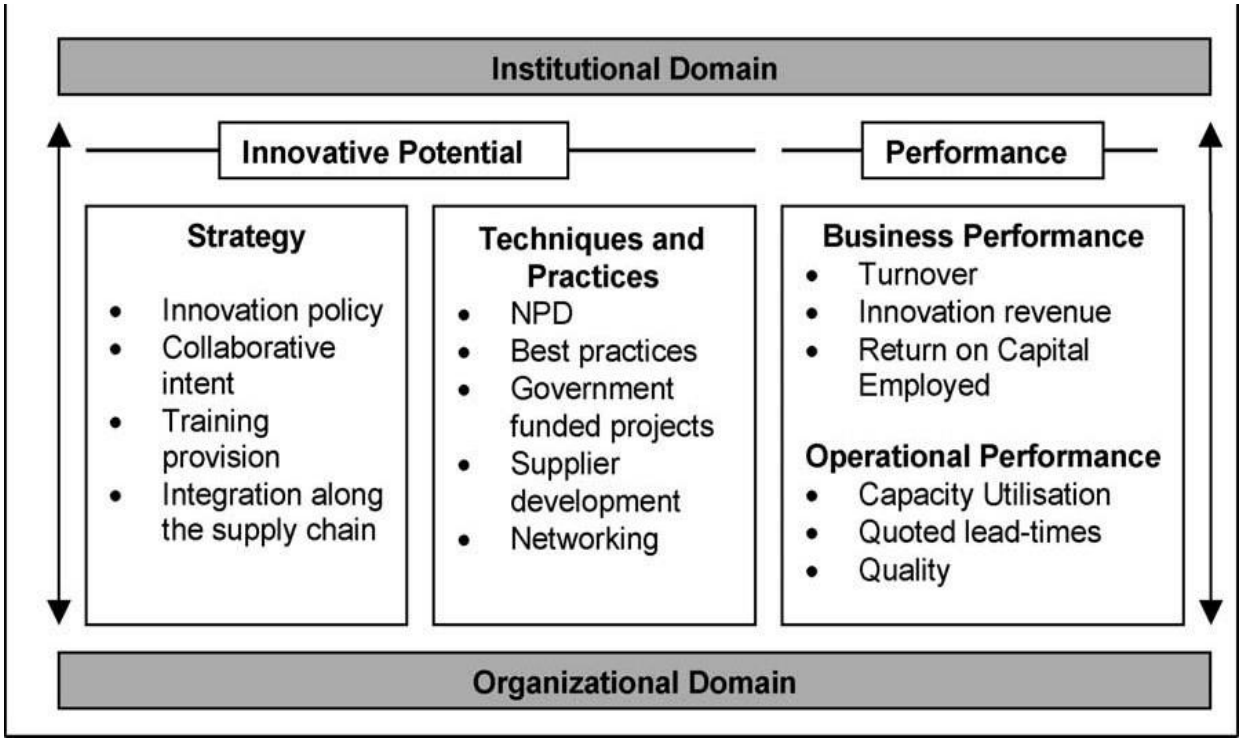


Figure 2.2 2 Conceptualising Innovation in SMES.

(Adapted from: Edwards et al. (2005)

The study based on a review of research findings on SMEs and innovation, promulgates a conceptual framework of innovation that looks at micro-processes of innovation and the relationships of SMEs with its various players. Innovations vary in form and nature and to identify these different characteristics they are categorised into types of innovation. When considering categorizations of innovations into types, according to Garcia and Calantone (2002) the perspective to consider should be both at a macro and micro level. Therefore instead of considering innovation on its own, methodical management at different levels for firms and it's networks promotes

innovation through knowledge gain and growth (Tambo, 2014). This in- depth look at innovation processes within SMMEs indicates a disparity within the literature of the groupings of innovation types that SMMEs engage in, which in-turn can be further disseminated and investigated. The link between how ingrained is innovation in SMMEs and the micro-processes within and surrounding a smme is important in obtaining a holistic view of innovation in SMEs. For example Bogers and West (2012) consider 'distributed' innovation involving open innovation, users, crowdsourcing and co-creation. They demonstrate the importance of external search abilities to innovate. Varis and Littunen (2010) have shown that different types of innovation in SMEs are linked to growth.

'More' innovative firms engage in marketplace review, product experience enhancement and have improved technologies and systems compared to 'less' innovative firms (Bigliardi, Colacino, & Dormio, 2011). Abereijo, Adegbite, Ilori, Irefin, and Aderemi (2008) study showed a positive relationship between a firm's innovative capability and an entrepreneur's characteristics; specifically, their dedication to innovation and garnering support, within the organisation, for innovation. These endeavours create an environment that cultivate and support innovation. The ability of a firm to unlearn in response to changing environments which clashes with existing internal capabilities impacts innovation and is moderated by the organic nature of the firm (Wang, Lu, Zhao, Gong, & Li, 2013).

For innovation management according to Rammer, Czarnitzki, and Spielkamp (2009) SMEs without formal research and development divisions can gain innovation success similar to organisations with in-house research and development by managing innovation, primarily human resources including how teams work. Suitable business practice environments such as participation, team work and a collaborative approach has a greater impact on market and learning orientation and innovativeness (Tsai & Lee, 2005).This is indicative of realising that innovation does not happen only when a new product is developed or outcome based but that it is happening along all processes and areas. Hence the need to identify the different types of innovation, SMMEs engage in. This allows owners, managers and policy makers to understand the areas to strengthen, strengths to exploit and what needs supporting.

Customary indicators used to determine innovation activity are research and development investments or expenditure and patents acquired (Ortiz-Villajos & Sotoca, 2018). Subsequently descriptive determinants based on inputs and outputs have been used to investigate innovation. Are these indicators sufficient when measuring innovation activity in low –technology firms, firms that do not have a research and development division and micro-enterprises? Nesta in their 2006 report "The innovation Gap" (nesta, 2006) discuss "hidden innovations" that requires measures which encompasses the diversity within which innovation takes place. Hidden innovations was found to be more about absorptive qualities, exploitation and integrations than creating (Abreu, Grinevich, Kitson, & Savona, 2010; nesta, 2007). Volpe et al. (2013) in their review of studies done on innovation in SMEs have shown as well, that it is, innovation activities, that improve a firm's absorptive capacity. In this study a substantial spectrum of innovation indicators is identified to determine intensity of innovation and types of innovation in SMMEs.

Owners and managers need to be skill-full when developing innovation strategies since the precursors to innovation are found at different points and have a strengthening result on innovation outcomes (Calantone, Chan, & Cui, 2006; Rothaermel & Hess, 2007). Sánchez-González and Herrera (2014) study has also demonstrated the characteristic of astuteness in selecting types of innovation to pursue.

Innovation for innovation sake does not always result in successful returns. Calantone et al. (2006) have found when there is increased product innovativeness, unfamiliarity with regards to customers, leads to low product success. This highlights other aspects of the innovation process; namely: customer centric innovation, product performance innovation, channel innovation and technical abilities (Calantone et al., 2006). Excessive technological capabilities in product innovation enhance exploitation yet impede exploration but is mediated positively by flexibility in strategy (Zhou & Wu, 2010). The process of obtaining, co-ordinating, converting and exploiting, that characterises a firm's absorptive capabilities, is enhanced by regional innovation programs, knowledgebased services and value chain players, leading to improved innovation functioning (Brunswicker & Vanhaverbeke, 2014; Lau & Lo, 2015). Increased technology does not necessarily lead to radical

innovations. Booyens, Molotja, and Phiri (2013) demonstrated in their investigation of South African SMMEs located in the creative media sector, were technologically innovative, but the type was incremental in nature.

Hult, Hurley, and Knight (2004) in their study on innovativeness in organisations, in general recommended an "integrated and compositional" methodology to understand the relationships of innovativeness, context and performance. It was found that a firm's innovativeness has an important bearing on performance independent of volatile market situations**.** Theoharakis and Hooley (2008) also found that in emerging markets compared to established markets, organisational innovativeness is increasingly important to propel firm performance and customer service.

Bigliardi et al. (2011) in their study profiled innovative SMEs and found that they are customer-centric, highly aware of markets and aim for product differentiation relative to competitor's products. Often it is assumed that research and development is a prerogative of large organisations. However, Cardoso and Torkkeli (2014) study concluded that firms in the low and intermediate technology sectors have innovative strategies which can involve up-to-date imminent innovation. Productivity and successes in the market are used by small firms as indicators of innovation performance (Sawang, Zolin, Matthews, & Bezemer, 2014). It was also found that innovation was viewed as a vital activity for survival. It can be deduced thus-far that innovation can contain many perspectives, angles and orientations. A purposeful overview of innovation in SMMEs leads to understanding the multifaceted nature of innovation. As a consequence, this study can make a helpful contribution.

### 2.2.1 Defining Innovation and Innovativeness

The widely accepted standard definition of innovation has been developed by the Organisation for Economic Co-operation and Development. They consider innovation to be either new or improved, a product to be goods or services, includes marketing changes, changes in organisational practices (with respect to business methods, within the firm, external to the firm) and the implementation of the new or improved (Organisation for Economic Co-operation and Development, 2005).

Identifiable within this definition are four types of innovation that are commonly found in the literature. They are product, process, marketing and organisational innovation. This conceptualizes the traditional view of innovation. It is the studies aim to re-look this view of innovation and instead embrace other forms and modes of innovation. Other authors have defined innovation to encompass the complexity of innovation.

“Innovation is the multi-stage process whereby organizations transform ideas into new or improved products, service or processes, in order to advance, compete and differentiate themselves successfully in their marketplace” (Baregheh, Sambrook, & Rowley, 2009, p. 1334). Some studies adopt an amalgamated definition of innovation to apply broadly to the sector under investigation, such as
Terziovski (2010) research of innovative SMEs in the manufacturing industry. Innovative SMEs are those that recognize, understand and suitably apply tangible and intangible knowledge (Edwards et al., 2005). They consider innovative potential to be the correlation between practices implemented and strategy.

Rajapathirana and Hui (2018) consider innovativeness, as part of an organisational culture, having the receptiveness for newness and the capacity to innovate, and having the ability to adopt and implement changes. An increased level of a culture of innovativeness is positively linked to innovation capabilities. Jakobus (2015) has shown that innovativeness and adaptability are linked. The antecedents of a culture of innovativeness are organisational learning, inclusive decision making and growth (Abereijo, Ilori, Taiwo, & Adegbite, 2007; Hurley & Hult, 1998). Bulent and Seigyoung (2006) also define innovativeness as an ability to actively seek new avenues that go beyond set practices. It is innovativeness that plays a mediating role between intellectual assets and firm performance (McDowell, Peake, Coder, & Harris, 2018).

Anahita Baregheh, Jennifer Rowley, Sally Sambrook, and Daffyd Davies (2012b) found that SMEs in the food sector were geared towards being innovation orientated and can be described as engaged in the vibrancy of innovation. It was found that innovation capability significantly impacts on the types of innovation activities (Rajapathirana & Hui, 2018). Understanding the multiplicity of types of innovation

and their relationship to each and to the organisation was identified as a possible future research undertaking.

In essence innovation can be defined as unique change, either new or improved in every or any facet of business, encompassing capabilities, execution, and outcomes together with its corresponding cyclical entrenchments and learnings and as a result, is a common denominator for any industry sector.

### 2.2.2 SMMEs – South Africa

The definition of a sme varies from country to country with some of the common denominators being firm turnover, investment and employee number. The National Small Business Act of South Africa (NO. 102 OF 1996) differentiates 'small business' into micro, very small, small and medium enterprises, functioning in any sector of business. The acronym 'SMME' is used to describe these categories of 'small business'. The updated National Small Business Amendment Act (NO. 26 of 2003) classification schedule, defines a 'small business' according to number of permanent employees, turnover and asset value.

Table 2.4 1 SMME Classification Schedule

Adapted from: National Small Business Amendment Act (NO. 26 of 2003)

| **Sector or sub-sector in accordance with the Standard Industrial Classification** | **Size or class** | **The total full-time equivalent of paid employees** | **Total turnover** | **Total gross asset value (fixed property excluded)** |
|---|---|---|---|---|
| Agriculture | Medium | 100 | R5m | R5m |
| | Small | 50 | R3m | R3m |
| | Very Small | 10 | R0.50m | R0.50m |
| | Micro | 5 | R0.20m | R0.10m |
| Mining and Quarrying | Medium | 200 | R39m | R23m |
| | Small | 50 | R10m | R6m |
| | Very Small | 20 | R4m | R2m |
| | Micro | 5 | R0.20m | R0.10m |
| Manufacturing | Medium | 200 | R51m | R19m |
| | Small | 50 | R13m | R5m |
| | Very Small | 20 | R5m | R2m |
| | Micro | 5 | R0.20m | R0.10m |
| Electricity, Gas and | Medium | 200 | R51m | R19m |

| | | | | |
|---|---|---|---|---|
| Water | | | | |
| | Small | 50 | R13m | R5m |
| | Very Small | 20 | R5.10m | R1.90m |
| | Micro | 5 | R0.20m | R0.10m |
| Construction | Medium | 200 | R26m | R5m |
| | Small | 50 | R6m | R1m |
| | Very Small | 20 | R3m | R0.50m |
| | Micro | 5 | R0.20m | R0.10m |
| Retail and Motor Trade and Repair Services | Medium | 200 | R39m | R6m |
| | Small | 50 | R19m | R3m |
| | Very Small | 20 | R4m | R0.60m |
| | Micro | 5 | R0.20m | R0.10m |
| Wholesale Trade,Commercial Agents and Allied Services | Medium | 200 | R64m | R10m |
| | Small | 50 | R32m | R5m |
| | Very Small | 20 | R6m | R0.60m |
| | Micro | 5 | R0.20m | R0.10m |
| Catering, Accommodation and other Trade | Medium | 200 | R13m | R3m |
| | Small | 50 | R6m | R1m |
| | Very Small | 20 | R5.10m | R1.90m |
| | Micro | 5 | R0.20m | R0.10m |
| Transport, Storage and Communications | Medium | 200 | R26m | R6m |
| | Small | 50 | R13m | R3m |
| | Very Small | 20 | R3m | R0.60m |
| | Micro | 5 | R0.20m | R0.10m |
| Finance and Business Services | Medium | 200 | R26m | R5m |
| | Small | 50 | R13m | R3m |
| | Very Small | 20 | R3m | R0.50m |
| | Micro | 5 | R0.20m | R0.10m |
| Community, Social and Personal Services | Medium | 200 | R13m | R6m |
| | Small | 50 | R6m | R3m |
| | Very Small | 20 | R1m | R0.60m |
| | Micro | 5 | R0.20m | R0.10m |

From the above schedule (Table 2.4.1) the number of permanent employees and turnover classifications are distinguishing factors for this study. The above schedule uses the ‘Standard Industrial Classification’ to determine sectors and subsectors. In

accordance with the above schedule the same sector classification is used in this cross-sector study.

South African SMMEs output makes up approximately 36% of gross domestic product (Smit, 2017). The demand for jobs is high, opportunities are few, and small survivalist businesses opening out of need may have short life cycles or expose entrepreneurial skills that lead to longer life spans due to innovative methods. Interestingly innovation was found to be lower in small businesses that depended on a defined set of customers and suppliers for a large portion of their business activities (Porter & Kramer, 2011; Romero & Martinez-Roman, 2012). Booyens (2011) highlights the need to distinguish between growth and development: a) to meet the needs of innovative SMMEs for growth and b) the needs of survivalist businesses to develop. The SME Growth Index (sme growth index, 2014) a study conducted by business environment specialist 'sbp' has instead shown that 62% of businesses surveyed considered introducing new products and services or entering new markets. This data points to a positivity that reflects efforts to realize human potential, goals and innovation.

A key determinant of a successful SME is innovation (Atiku, Danja, & Science, 2014). Increasing innovation activities positively affects the impact, as well, of SMEs corporate social responsibility on firm performance (Martinez-Conesa, Soto-Acosta, & Palacios-Manzano, 2017). Beynon, Jones, Pickernell, and Packham (2016) study exploring, how SMEs embark on innovation, found the different characteristics of SMEs impacted on their intent to innovate. SMMEs operate in a wide range of businesses and industries. Within the context of the South African economy, SMMEs, specifically micro-enterprises, wield a certain amount of power in the communities they are located in or serve. The aspiration would be to sustain, raise and give back to society and this is possible for SMMEs with innovative strategies. This identifies the need to investigate innovation in South African SMMEs.

SBP (sbp, 2009) conducting regular SME Growth index reports (sme growth index, 2014) revealed that, even having to work in challenging conditions, SMEs were tough showing positive innovation activities. Understanding the 'innovation climate'

(Mazzarol, Clark, Reboud, Gough, & Olson, 2014) is important for SMMEs. A firm's health is directly linked to the economy in which it operates. P. D. Gupta, Guha, and Krishnaswami (2013) suggest that the growth of a sme is melded with sustainable innovation. McGuirk, Lenihan, and Hart (2015) study which introduces the concept of 'innovative human capital' to measure growth and innovation, reveals that employees transferable and innovative abilities are more valuable to small firms.

This relationship between economic growth and SMME growth would seem ambiguous especially in the current fast changing information age. Growth is characterised by innovation and understanding the innovative potential of SMMEs would provide clarity to the ambiguity.

### 2.2 3 Innovation – Global and South Africa

In examining the innovation habits of SMEs in a multi-country investigation, SMEs were found to be more similar than different, suggesting a concurrence of orientation (Mazzarol et al., 2014). Abor and Quartey (2010) study demonstrated the similarities between Ghanaian and South African SMEs in terms of attributes and crucial economic contribution. The antecedents of innovation in SMEs addressed by Radas and Božić (2009) in their study were found to be similar for both developed and developing countries.

According to OECD STI Outlook 2016 (OECD, 2016) Africa's population would increase by a whopping 109% and the world population will increase to 8.5 billion by 2030 and to 9.7 billion by 2050. Economies would need to sustain such growing populations. For such expansive economic sustenance, innovation would be a key driver with SMMEs the pillars on which to harness such innovations.

The Global Innovation Index measures the innovative performance of countries throughout the world. South Africa was ranked 58$^{th}$ from 126 countries in the Global Innovation Index (Global Innovation Index, 2018). The broad-spectrum index itself is a mean of innovation input and innovation output indicators that contribute to innovation. The sub-indices are indicative of how widespread innovation can be, within, even the context of a single firm. Narrowing types of innovation to just a few

categories would be scratching the surface of what is a more in-depth exercise. The National Advisory Council on Innovation, a legislated South African advisory body for science, technology and innovation, in their report “South African Science, Technology and Innovation Indicators 2017” (National Advisory Council on Innovation, 2016) has adopted an innovation scorecard framework (South African Innovation Index) which has three holistic activity groupings consisting of public sector facilitators, at firm- level, and innovations output both socially and economically. Similarly the ‘Quintuple Helix Innovation Model’ demonstrates the flow of knowledge and manifestation of sustainable innovation inclusive of all role players (Carayannis, Barth, & Campbell, 2012).

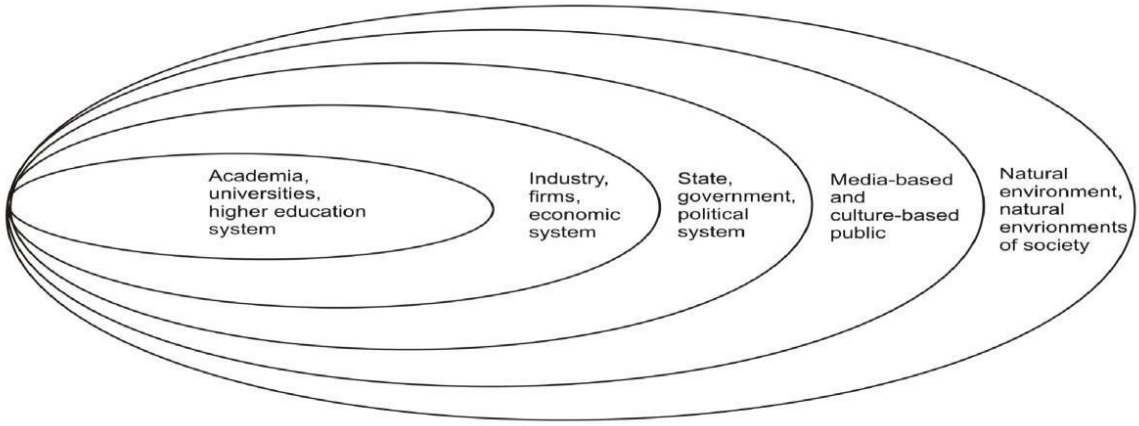


Figure 2.5 1 Quintuple Helix Subsections

(Adapted from: Carayannis et al. (2012)

Keeley, Walters, Pikkel, and Quinn (2013) in their book discuss three categories of innovation types viz how the organisation is configured, the businesses products and the external output experience. Sawhney, Wolcott, and Arroniz (2006) discuss a framework named the “Innovation Radar” which consists of twelve types of innovation.

Due to low responses in the 2010-2012 South African Business Innovation Survey (Human Sciences Research Council, 2018), aggregate reports were replaced by micro-data assessments which revealed that businesses across sectors in South Africa are innovation orientated with organisational innovation being the predominant innovation type compared to new product and marketing innovations.

Using similar holistic perspectives would enable one to further understand the intimate workings of innovation in SMMEs.

### 2.2.4 Value and Innovation

Innovation, change and challenges are synonymous, thus engaging in innovation has to bring some value to business. The question arises is ‘what is the purpose of innovation; what is the value of innovation?’ A meta-analytical assessment of 42 research studies by Rosenbusch, Brinckmann, and Bausch (2011) showed that there is a positive relationship between innovation and firm performance; adding value to the business; specifically when the firm is innovation orientated rather than focussing only on the innovation outcome such as product offerings. Martins and Fernandes (2015) concluded that value creation and innovation are fundamentally connected.

When the intensity or levels of innovation increases then financial performance is escalated (Bigliardi, 2013). These outcomes highlight the need to look at the micro-processes both internally and externally to determine, in context, SMMEs innovation activities. Breaking down the types of innovation activities unique and specific to SMMEs allows managers and owners to “realise the value that innovation can provide to organisations”(Rosenbusch et al., 2011) and how best to leverage innovation potential.

Francis and Bessant (2005, p. 1) introduced the term ‘innovation management capability’, to explain the ways to meet the challenges faced when innovating along the different types of innovation. Capabilities then need directed and managed outlet avenues.

Capabilities that increase adaptability translate to strong dynamic abilities in an organisation (Boniface & Groenewald, 2016). Boniface and Groenewald (2016) suggest SMEs in South Africa enhance such capabilities by using tools to assess and predict movements in the market and industry. Edwards et al. (2005) also point out the importance of the context within which innovation in SMEs occurs, namely market, technology and the industry.

Effects of innovation capability is linked to all aspects of business performance involving finances, processes, employees and customers and can be measured

(Saunila & Ukko, 2012). A meta-analytic review of 153 studies comprehensively proved that innovativeness directly improves a firms financial standing and most importantly its firm value (Rubera & Kirca, 2012). It is innovativeness and an enhanced firm value that gives investors' confidence of future incomes and sustainability (Rubera & Kirca, 2012).

Business exists to serve itself and provide for the needs of society. Value creation is the essence of business and innovation creates that value. Consequently capabilities, absorption and diffusion of innovation reflect the manifold characteristics that require exploring different layers of innovation.

## 2.3 Types of innovation

It is Laforet (2013) wide-ranging study which revealed that outcomes of innovation are influenced by the types of innovation effected. Innovation can be realised in many different configurations and forms. Distinguishing types of innovation according to the firm's activities internally and externally gains insight into SMME innovation.

Historically investigations into innovation activity have been classified according to the nature of innovation and the types of innovation. The nature of innovation refers to the level of newness; whether radical or incremental (Anahita Baregheh, Jennifer Rowley, Sally Sambrook, & Dafydd Davies, 2012a). The type of innovation refers to the area around and within which innovation takes place. In this study one of the objectives is to explore the diverse types of innovation SMMEs in South Africa engage in. Traditionally four types of innovation are categorised: product, process, organisational and marketing innovation. These four types of innovation have been repeatedly explored in connection to both large and small firms (Piroozfar, Tarokh, Nazemi, & Mohajeri, 2012; Sharma, 2015; Shaukat, Nawaz, & Naz, 2013). There is however a dearth of research that has been done beyond these cumulative four categories of innovation.

The four 'P's classification of innovation types by Francis and Bessant (2005) consist of new or improved product, process, positional (market) and paradigm innovations. Paradigm innovation consists of 1: organisational/administrative or culture

innovations and 2: business model innovations. The case studies in this research revealed that innovation orientation can be multi-processed and holistic with one type affecting changes in other types of innovation. Abreu et al. (2010) and nesta (2007) discuss hidden innovation types that when disseminated, include those technological innovations not related to research and development expenditure, such as organisational innovation, business model innovations, marketing and customer-centric innovations. nesta (2007) also found innovations occurred when existing processes and offerings were reconfigured. Indicators should also be able to detect the dynamic innovations that are solutions to problems and opportunities that occur on a day to day basis in all firms (Abreu et al., 2010; nesta, 2007). This is similar to Francis and Bessant (2005) category of people orientated paradigm innovation type. These daily dynamic innovations would be particularly relevant in the case of very small, micro and survivalist outlets.

Baregheh et al. (2012a) showed that Francis and Bessant's classification of innovation types meant differently to different SMEs suggesting innovation could be understood according to that firms specific goals. Baregheh et al. (2012a) study demonstrated besides the multiple types of innovations SMEs engaged in, also the varied interplay between innovation types and the context within which innovation occurred. For example SMEs in the food sector in UK engaged in similar levels for product, process and marketing innovations but slightly lower in paradigm innovation (Baregheh et al., 2012b). In another study on Italian manufacturing SMEs, the innovations consisted primarily of process innovation and were incremental in nature (Bigliardi et al., 2011). The functioning of innovation mediates between innovation types and different areas of firm performance (Gunday, Ulusoy, Kilic, & Alpkan, 2011). To determine the different types of innovation careful consideration of innovative activities along the value chain, supply chain, of the external environment, markets and context need describing. Focussing on the innovation process of SMEs Liu, Li, and Zhang (2012, p. 373) have developed an innovation strategy model encompassing innovation "planning, implementation, platform and performance". Based on their reasearch the model was found to be greatly applicable for SMEs and the link between planning and implementation was augmented.

Coombs, Harvey, and Tether (2001) discuss how the process of innovation is distributed over multiple players. This holistic perspective is essential to the study, as no sme can be viewed in isolation but rather from within and without and investigating these strands of innovation is imperative. In the current economic environment innovation in SMEs can be described as ‘innovating on your feet’, as smes are taken along the tide of technology and rapid change of circumstances, transforming the ability to appropriate, adopt and adapt.

SMEs financial performance is not only affected by the amount of technology embraced to innovate, rather, innovations such as customer-centric innovation and competitor differentiation innovation, impacts postitivly on financial performance (Bigliardi, 2013; Terziovski, 2010).

Hult et al. (2004) illustrated innovativeness is enhanced when anchored by the firm’s market orientation and learning orientation. Abereijo et al. (2007) distinguish between internal factors; of specialised levels of education, experience, training, investment in R&D efforts and, external factors, of networking with research institutions which led to innovative capabiliites of SMEs. Customer behaviour and performance was understood largely by innovation types (Karabulut, 2015). Santamaría, Nieto, and Miles (2012) highlight the need to investigate different innovation types together.

This demontrates the importance of looking at innovation activities at levels beyond technological concentration. In the review above, several different types of innovation were identified. Identifying these different types of innovations in South African SMMEs contributes to understanding innovation in South African SMMEs. Each of the different types of innovation are reviewed below.

### 2.3.1 Innovation and Business model

Geissdoerfer, Vladimirova, Fossen, and Evans (2018) suggest that business model innovation is characterised by dimensions such as greater risks, importance, complexity, strategy, skills, disciplines, stakeholders and blurry leadership. These dimensions are used to differentiate business model innovation from product innovation. Laforet (2013) study revealed that innovation outputs are linked to a firm’s goals and environments.

Having an innovation strategy is important to provide direction and purpose.

Emerging market SMEs must have an open innovation model that is based on knowledge, science and technology (Xiaobao, Wei, & Yuzhen, 2013). Terziovski (2010) study concluded that innovation strategy and a formalized organisational structure are key drivers for innovation that result in positive performance in manufacturing SMEs. The study also revealed a low correlation between business culture and performance and attributed it to poor strategy. Prakash and Gupta (2008) in their study deconstructed the variables for organisational structure and found a positive link for all the variables and innovation but a negative correlation between centralisation and innovation. This is quite interesting as the very nature of innovation conjures up a certain degree of freedom in thought and action.

Innovation should not only be viewed from a technological resource perspective but from a combination of both resource and process view with business model innovation requiring constant visitation.

### 2.3.2 Innovation and Network

Volpe et al. (2013) found a trend in their review of studies on innovation in SMEs of increased external networking to explore, exploit and adopt innovation. Networking can allow for movement of resources between partners together with being exposed to accessible opportunities. With network information for emerging market SMEs it is critical for firms to balance external resources and network information for innovation performance (Xiaobao et al., 2013). All firms must maintain core competencies and to do so they must source, filter and integrate the newest external technologies and information in their core fields. Xiaobao et al.

(2013) research supports SMEs open innovation which was found to depend on network openness and network information.

Skill and aptitude in open innovation allows for non-opportunistic partnerships which can make up for limited resources that is characteristic of SMMEs (Lichtenthaler & Ernst, 2008). For example Bigliardi and Dormio (2009) study revealed that in the food machinery industry great importance was placed in collaborations with universities and research labs for innovation capabilities. The same authors in a study published in 2011 found customers, suppliers, competitors and journals the

main sources of information for innovations in SMEs in the manufacturing sector (Bigliardi et al., 2011). Brunswicker and Vanhaverbeke
(2014) identify two types of knowledge sourcing; 'full-scope' and 'applicationoriented'. The latter enriches innovation performance and the former entrenches linkages with varied partners. So networking is important. Intellectual property rights are suggested for SMEs who use open source innovation where other players make changes to their technologies (Cusmano & Dean, 2011).

Another characteristic of SMEs is their competency in leveraging limited resources (Narula, 2004). However the costs of maintaining alliances are high in the case of SMEs compared to large organisations (Narula, 2004). Xiaobao et al. (2013) found that for network capability, SMEs must improve their innovation capacity.

A crucial finding was that business networks added to a firm's competitive advantage (Meutia & Ismail, 2012). This is crucial because one of the primary aims of business is to differentiate itself from competitors by creating an advantage.

Another benefit of open innovation is that it can act as a stimulus for investment from collaborators (Erzurumlu, 2010). This is an interesting finding as resource management and resource scarcity for SMMEs leads to collaborations to make use of others resources. Thus, open innovation via networking is extremely important in our current and rapidly changing world of internet.

### 2.3.3 Innovation and Organisation

Organisational innovation was found to be the predominant innovation type engaged by the services industry (Abreu et al., 2010). Formal structure underscored successful innovative activities in manufacturing SMEs (Terziovski, 2010). This highlights the contrast of the informal organisational structure of SMMEs and their flexibility. SMEs applying organisational innovations found it positively impacted technological innovations that involved primarily product innovation (Benallou, Bonnet, & Movahedi, 2014). In addition Azar and Ciabuschi (2017) study concluded that organisational innovation facilitates technological innovation, improving performance specifically of exporting firms.

### 2.3.4 Innovation and Process

To increase market share, to improve product quality and to improve product systems firms engage in process innovation (Bigliardi & Dormio, 2009). External knowledge acquisition to improve firm capabilities is key for process innovation and its performance should be measured by improved costs, volume and changeability rather than sales which is product based (Hervas-Oliver, 2014). It was also found that the outcome of process innovation is enhanced when linked with corresponding organisational innovation.

### 2.3.5 Innovation and Product

Product here includes both tangible and intangibles such as services. Product innovation impacts performance and firm value (Rubera & Kirca, 2012). Sawang et al. (2014) found a higher rate of product innovation with some involved in other types of innovation such as marketing, organisational and process. The nature of these innovations was more exploitative compared to exploratory. It has been shown that innovative small firms do not lead to increased product failure rates (Laforet, 2013). Different support systems are required for differing levels of newness in product innovation (Radas & Božić, 2009).

### 2.3.6 Innovation and Product Systems

In earlier literature the term “architectural innovation” meant the innovative ways components were linked and configured or reconfigured (Henderson & Clark, 1990). Product extensions and bundled products are examples of product system innovation. Brexendorf, Bayus, and Keller (2015) highlight the connection between branding and innovation in areas such as development of product extensions. The balanced pairing of an extension and parent product bears on the value perceived by consumers (Pina, Riley, & Lomax, 2013).

### 2.3.7 Innovation and Business Services

To enable a firm’s offering, additional services are provided to educate, improve and add value to the product. This also extends the lifespan of the product and creates a competitive advantage. Gebauer, Paiola, and Saccani (2013) describe the various collaborations that can be achieved to assist with services that are provided with products termed as ‘moving from products to solutions’ (Gebauer et al., 2013, p. 42).

Manufacturing companies that develop product service systems (business services) to enable their products face complexities such as change in systems and relationships and increased players and units (Zou, Brax, & Rajala, 2018). Fain, Wagner, and Kay (2018) suggest that business services innovation should be incorporated within the process of new product development creating opportunities to extend the products life cycle and building upon a schema of products with services.

Adopting business services innovation can benefit SMEs concluded Bhamra, Hernandez, Rapitsenyane, and Trimingham (2018). Paiola, Saccani, Perona, and Gebauer (2013) discuss the capabilities required to adopt such an integrative approach in smaller firms. Capabilities such as innovative after-sales services are discussed. 'Servitisation' in the manufacturing sector enhances assets such as technology, human capital, particularly training, and customer ties (Santamaría et al., 2012). Business services are necessary to meet the demands of a competitive environment and consumer needs.

### 2.3.8 Innovation and Channel

Kuswantoro, Mohd, Abdul, and Ghorbani (2012) proved that innovation in channel distribution activities such as delivery and knowledge sharing improved firm performance. The study also revealed that an effective channel system mediated between innovation and firm performance.

### 2.3.9 Innovation and Marketing

Marketing and technological innovations were found to be predominant in Taiwanese SMEs (Yeh-Yun Lin & Yi-Ching Chen, 2007). High levels of engagement in marketing innovation was also found in food sector SMEs in the UK (Baregheh et al., 2012b). Hult et al. (2004) study found that an organisation's market orientation showed positive returns on innovativeness and business performance particularly in an unstable marketplace. Market orientation being a function of customer and competitor orientation, and internal co-ordination and innovativeness when combined, improves the impact of market orientation on firm performance (Bulent & Seigyoung, 2006). Similar findings in a study conducted by Suliyanto and Rahab (2012) and Tsai and Lee (2005) showed the relationship between market orientation and innovativeness was influenced by learning orientation. A positive link between

market position and innovativeness was also found in a study done by Rubera and Kirca (2012). Selase Asamoah (2014) showed the relationship between brand equity and performance of SMEs is increased when customers are faithful to the brand.

### 2.3.10 Innovation and Customers

Sánchez-González and Herrera (2014, p. 292) assessed what occurs when firm's collaborate with customers together with its bearing on the firm's innovative workings; specifically, the "technological knowledge created" and the "economic returns obtained from such knowledge". Firstly, several determinants were found to be conducive to the collaboration: size, experience generated from research and development, technologically advanced service firms and having public financial support; with the last two found to be the most favourable. Secondly, the collaboration shapes both the "inputs and outputs of the innovation process"(Sánchez-González & Herrera, 2014, p. 299). Mazzarol et al. (2014) in their multi-country study found customers were the primary drivers for innovating sme firms. Leiponen and Helfat (2010) and Theoharakis and Hooley (2008) show as well, that customers are the main source of information. Bigliardi (2013) has shown that innovation developed according to customer needs lead to positive financial returns.

Major innovations following unusual new product development processes has been shown to involve customers (Coviello & Joseph, 2012). This involvement is portrayed in a multifaceted cataloguing of customer participation.

The review of the literature thus-far discusses innovation of organisational (internal) and institutional (external) business processes. As a result, ten innovation types (listed in Table 2.7.1) have been identified and would be used in this study to ascertain innovation in South African SMMEs.

Table 2.7 1 Innovation types

| Innovation | Innovation Type |
|---|---|
| Innovation 1 (I1) | Business Model Innovation |
| Innovation 2 (I2) | Network Innovation |
| Innovation 3 (I3) | Organizational Innovation |
| Innovation 4 (I4) | Process Innovation |
| Innovation 5 (I5) | Product Innovation |
| Innovation 6 (I6) | Product System Innovation |
| Innovation 7 (I7) | Business Services Innovation |
| Innovation 8 (I8) | Channel Innovation |
| Innovation 9 (I9) | Marketing Innovation |
| Innovation 10 (I10) | Customer Centric Innovation |

## 2.4 Intensity of Innovation

The 'synergistic' effects of innovation types was considered as levels of innovativeness in Garrett, Lee, and Lee (2017) study. Bigliardi et al. (2011) used a measured differentiation into 'more' or 'less' innovative firms to compare the levels of innovation found in SMEs and to determine their characteristics. 'More' or 'less' innovating firms were categorised as per the number of types of innovation (product, process or management) adopted (V. Gupta & Gupta, 2014). Greater market share and increased profitability was found to be the result of being 'more' innovative (V. Gupta & Gupta, 2014). This research then concludes that the added effects of adopting more innovation types benefits performance. Gunday et al.
(2011) also have shown that the 'degree' of innovation affects the level of innovation performance. The depth of innovation can then influence the transitory nature of a firm's competitive advantage.

Xiaobao et al. (2013, p. 224) and Edwards et al. (2005, p. 1121) use the term 'embeddedness' of innovation, in SMEs. According to Bulent and Seigyoung (2006) the greater the extent to which innovativeness is embedded within the firm the greater its value as a resource. Lehtoranta (2005) categorises sme innovativeness

according to their ‘innovation intensity’, measured as the number of patents (product innovations). Kilic, Ulusoy, Gunday, and Alpkan (2015) cluster innovativeness according to several innovation types.

To determine the openness of a network Xiaobao et al. (2013) measured the breadth and depth of the indicators for openness. Egbetokun, Adeniyi, Siyanbola, and Olamade (2012) in their study to assess the intensity of innovation in SMEs define ‘breadth’ as the ‘extensiveness’ of the array of innovation indicators that SMEs are capable of executing. Similarly, to establish how embedded or intensive innovation is in SMMEs, the breadth and depth of the innovation indicators are assessed. Breadth is a combination of indicators and depth is the degree or magnitude of engagement (Xiaobao et al., 2013). Verreynne, Williams, Ritchie, Gronum, and Betts (2019) investigates ‘innovation diversity’ which is measured by the sum of innovation types SMEs effect, and is cumulatively described as the breadth of innovation.

Abreu et al. (2010) also found that the breadth of innovation was high in service organisations not commonly known for innovations. Additionally, they found variability amongst service sectors in the extensiveness of innovation. For example SMEs in the food sector have the capacity to engage in a range of innovation types and at varying degree (Baregheh et al., 2012b). The degree or depth of innovativeness was determined by the nature of each innovation type; that is: whether at a radical or incremental innovation level. Incremental innovation was greater in all innovation types measured (Baregheh et al., 2012b). In one of the initial studies on the breadth of innovation it was established that engaging in widespread innovative objectives, is linked to positive innovations (Leiponen & Helfat, 2010). By having more innovation goals it is expected that costs increase however Leiponen and Helfat (2010) revealed that there was no reduction in returns. In more innovative firms there is a dedication towards innovation that is greater than less innovative firms (Bigliardi et al., 2011). Thus, extensiveness and rate of innovation modes, reap rewards.

However, there is a lack of research in investigating how often SMMEs innovate, depth, and how widespread are there innovation activities, breadth. This study

attempts to fill the gap by investigating how intensely SMMEs innovate by measuring both breadth and depth of innovation types.

## 2.5 Firm Size and Innovation

The size of a firm is ascertained by number of employees (Bigliardi, 2013; Chandy & Tellis, 2000). It is expected the size of organisations increases as they grow. Bigliardi (2013) confirmed in her study that when the size of the sme increases then the influence of innovation improves the firm's financial performance. Firm size therefore impacts on innovation and financial performance. Distinguishing between small and medium firms, Laforet (2013) study concluded that smaller firms are more innovative. Age and size are variables that are often interdependent. Here innovation was found to be more beneficial in newer firms, having distinctive abilities to devise and extract the value from innovation than older SMMEs (Rosenbusch et al., 2011).

Resources such as capabilities and finances of larger SMEs and those SMEs that pursued internet technologies were found to be more innovative by Beynon et al. (2016). At different points in history smaller firms and then larger firms were responsible for major radical innovations (Chandy & Tellis, 2000). Hence firm size does play a role in innovation ability. Chandy and Tellis (2000) study suggest that dynamic organisational structures and robust technological capability promotes agility and innovativeness.

One of the moderating factors in Rubera and Kirca (2012) study was found to be firm size. It was shown that the relationship between innovativeness and firm value is stronger for smaller firms compared to larger firms. Volpe et al. (2013) revealed firm size is significant when adopting innovation and the type of innovation. They found that in wanting to exploit and embrace an innovation, acquisitions may result but this might stymie further growth of the ensuing new business.

## 2.6 Performance and Innovation

A firm's innovative capability influences its performance. Radical administrative (organisational) innovation instead of technological innovation increased performance in Taiwanese SMEs (Yeh-Yun Lin & Yi-Ching Chen, 2007). This is rather unexpected coming from a country which has a high-tech business culture.

Innovation that is different from competitors, which is developed for customers increases financial performance (Bigliardi, 2013). The results of a study by Tsai and Lee (2005) conclude that innovation impacts, performance and market and learning orientation, but when complemented with innovativeness has a greater impact. Similarly Gunday et al. (2011) have demonstrated in their study that financial performance is an outcome of innovation, production and marketing with different types of innovation having a substantial positive impact. In addition Karabulut (2015) has shown a distinctive, significant, relationship between innovation types and firm performance.

## 2.7 Barriers to Innovation

Abreu et al. (2010) found all firms whether services or not, whether high-tech, low or medium-tech firms, all experienced barriers to innovations. These obstacles including the unpredictability of innovations, were, unskilled labour force, insufficient information, regulations, costs and funding. Sawang et al. (2014) study on small firm's established organisational culture, time limitations, money constraints and government tender difficulties as obstacles to innovation. Lack of talents and skills hindered innovative activities in SMMEs located in the Gauteng metropolis (Agwa-Ejon & Mbohwa, 2015). In their 2017 Innovation Indicators report (National Advisory Council on Innovation, 2016) the National Advisory Council on Innovation had shown that government readily invested in the venture capital industry enabling innovation and commercialisation for SMEs.

Surprisingly Xiaobao et al. (2013) revealed obstacles led to improved open innovation or network openness. Not innovating at times might be the better choice when the benefits are weighed against the investments (Abreu et al., 2010).

However long-term benefits can never be precisely predicted and a non-innovating firm equates to a static firm with no real foundational growth.

## 2.8 Summary

The South African 2030 National Development Plan prioritises economic growth, education, skills, innovation and state capabilities (South African Government, 2018). The plan aims to grow the Gross Domestic Product by 5.4% with special attention given to SMMEs and job creation. In order to grow economically and improve innovation there is a distinctive need to profile SMMEs innovative habits. To understand just how they innovate, the types they engage in, and the effect of firm performance and size on innovation together with obstacles encountered. In strengthening the strengths of SMMEs innovative capabilities and reinventing on weaknesses, SMMEs can realise a sustainable advantage. In today's uncertain and rapidly changing technological global world, direction and vision is necessary for a firm's innovative performance. This research provides an overall holistic perspective of innovation by South African SMMEs. A comprehensive exploratory framework of this study is illustrated in Figure 2.12. 1.

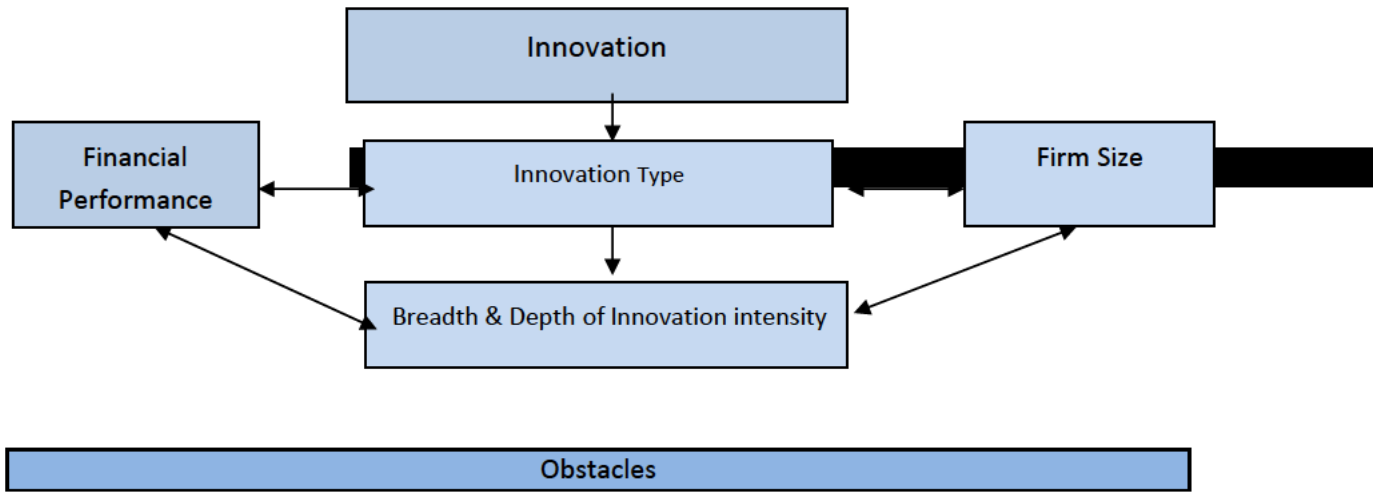


Figure 2.12 1 Framework for Exploring Innovation in SMMEs

In this study firstly which of the ten types of innovation identified in the literature review, South African SMMEs implement, is to be determined. Secondly to determine just how widespread (breadth) and deep (depth) is innovation intensity. Thirdly the bearing of innovative performance upon outcomes such as financial performance is measured. Fourthly delving into whether firm size is important for innovation. Lastly to fully understand what moderates the innovative process SMMEs categorise what are their barriers, to innovation. The methodology to attain these aims and objectives is discussed in the following chapter.

# Chapter Three: Research Methodology

## 3.1 Introduction

This chapter elaborates on how the survey was conducted and how the data was collected, processed and analysed. Included are the theoretical underpinnings of methodology that are the foundations of research. Identification of the participants of the study, sample design and selection is effected. A thorough discussion on the primary tool selected for conducting the survey together with the techniques to be used to statistically analyse the data or information collected, is carried out.

## 3.2. Aim of the Study

The singular goal of this study is to explore innovation in South African SMMEs. Data on innovation would be obtained by SMMEs attesting to innovative activities and relative financial performance. Their agreement or disagreement on obstacles to innovation would be sought.

## 3.3 Research Paradigm, Design and Methods

Research is about 'wanting to know' and in doing so an approach and method is required. The difference between the study of natural science and social science is the perception of reality (Walliman, 2017). The research approach that is adopted to interpret this reality is referred to as a paradigm. Paradigm encapsulates the theoretical framework of the study inclusive of information influences, purpose and reason (Mackenzie & Knipe, 2006). The paradigm dictates the methodology to be followed. There are different research paradigms summarised in Table 3.3.1.

Table 3.3 1 Research Paradigms

Source: (Mackenzie & Knipe, 2006; Walliman, 2017)

| Paradigm, | Description |
|---|---|
| Positivist/ Postpositivist | Positivist is based on scientific approach of observing and measuring. Postpositivist present the view that research is influenced by all other existing research. Makes use of quantitative technique. |
| Interpretivist/ Constructivist | As the term suggest constructivist construct the theory together with the progression of the study. The approach is to interpret the subjects view. Makes use of qualitative methods. Data collection can be mixed with the quantitative substantiating the qualitative data. |
| Transformative | An approach that is all encompassing. Uses many viewpoints to allow a broader social perspective. Quantitative and qualitative methods are used equally in a mixed methodology. |
| Pragmatic | The problem statement is the locus point from which any approach is used to investigate. Any type of data collection and analysis is utilized. |

The characteristics and meaning of each of the four paradigms is described in the above table. Included is the research method that each of the philosophies adopts. Saunders, Lewis, and Thornhill (2009) describe three further paradigms: functionalist, radical humanist, and radical structuralist. Underpinning the paradigms are three philosophical concepts that social science observes (Bell, Bryman, & Harley, 2018; Saunders et al., 2009):

- Epistemology concerns the nature of information in a study. The information could be more factual or non-factual such as attitudes or behaviour. If the epistemology of a study is data driven examining facts or objects it would adopt a positivist paradigm. If the information sought, for example on organisational feelings on its culture, it would have an interpretivism approach.

- Ontology concerns the nature of what is real. Either the happening is detached from the players or the happening is the perceptions of the players.
- Axiology concerns values and the assessments that are made. In all aspects of the research route the values of the researcher come into play, evaluating and judging, which distinguishes one study from another.

Saunders et al. (2009) 'research onion' clearly depicts each layer of research philosophies and design (Figure 3.3.1).

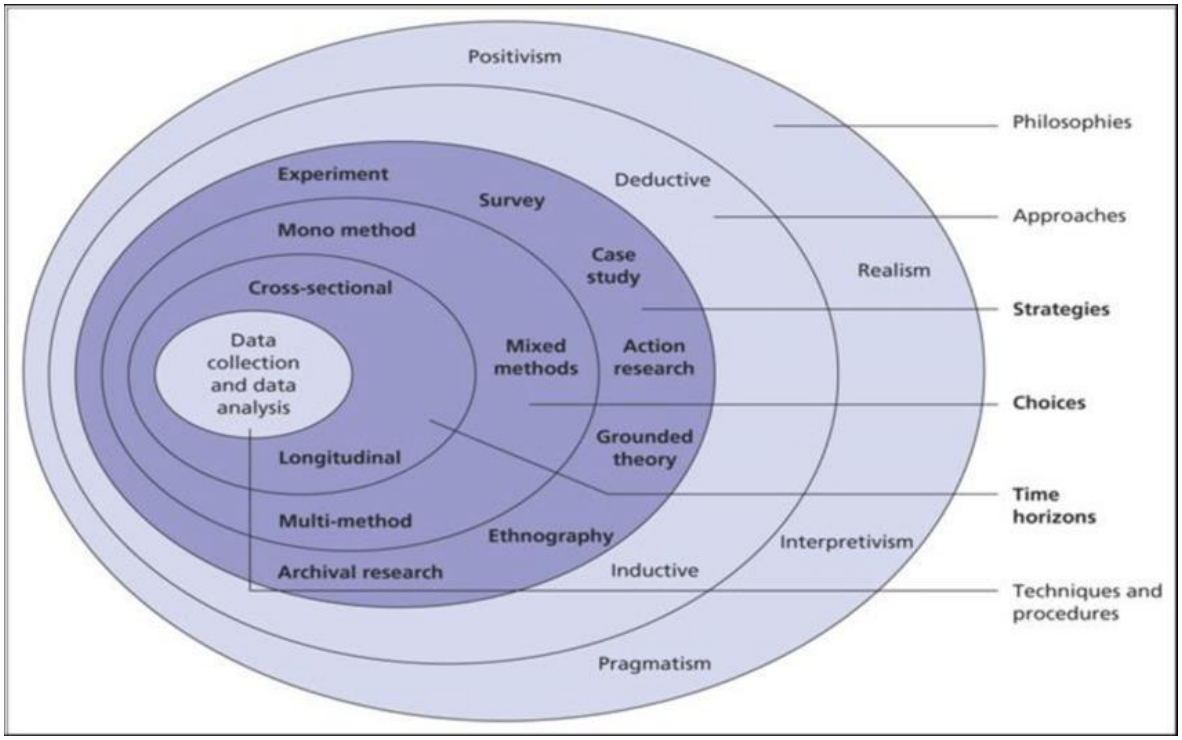


Figure 3.3 1 The research onion

(Adapted from: Saunders et al. (2009)

The various layers of research design, paradigms, strategies and methods are clearly shown in Figure 3.3.1. Like an onion the process of research is multilayered peeling one layer from the other revealing the philosophies and paradigms that underlie research and the methods that are dictated by the approach adopted. The second layer demonstrates a deductive or inductive approach. The deductive approach theorises and proves or disproves the theory. Inductive approach considers the data and then formulates a theory (Bell et al., 2018; Saunders et al.,

2009). A third approach known as the abductive approach has an interpretivist foundation, at times using analogy as a form of analysis (Bell et al., 2018).

Sekaran and Bougie (2013) emphasize the need to identify the 'purpose' of study and discuss three types that can be progressive in nature. They are exploratory, descriptive and causal designs. The strategies (third layer in Figure 3.3.1) that follow, consist primarily in business research, of quantitative and qualitative methodologies or the use of both.

Table 3.3 2 Strengths of Quantitative & Qualitative Methods

(Adapted from: Choy (2014); Hammersley (2017)

| Quantitative | Qualitative |
|---|---|
| Reliability by critical analysis | View of homogeneous exploration |
| Short time frame for administered survey | Raise more issues through broad and open-ended inquiry |
| Facilitated numerical data for groups and extents of agree or disagree from respondents | Understanding behaviours of values beliefs and assumptions |
| Deductive | Inductive |
| Realism | Idealism |
| Natural science- scientific approach | Identifying cultural patterns |
| Structured | Unstructured |

Tabulated above are the characteristics of each methodology. Quantitative and qualitative methods are either used on their own or both methods are utilised either to substantiate or to complement.

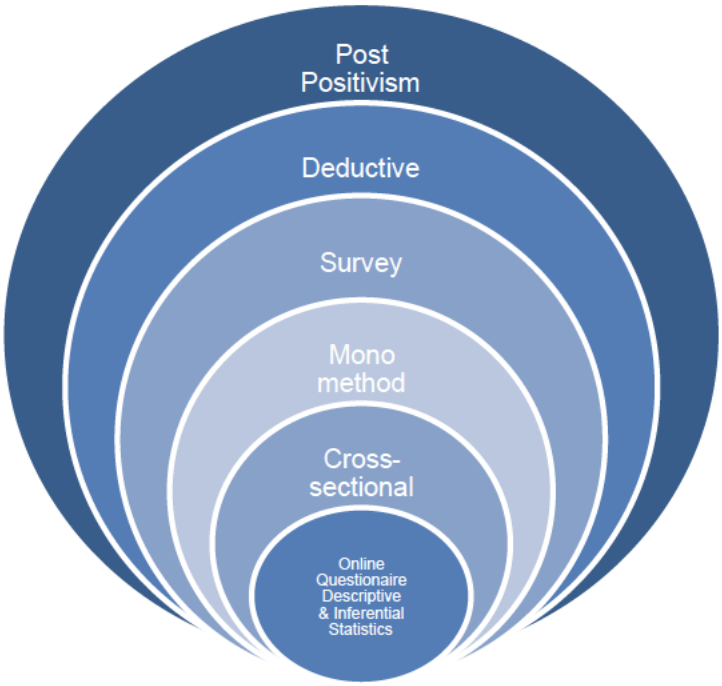


Figure 3.3 2 This Studies Design

Above is displayed this studies research methodology. The research paradigm adopted for this study is a postpositivist paradigmatic approach. The study is based on earlier research on innovation in SMEs (secondary data), making use of a quantitative structured method of an online questionnaire constructed by reviewing and extrapolating from existing theories and research. The research is based on 'observing' (problem statement and questionnaire), 'measuring' (data analysis) and 'proving' (solving the problem statement). The epistemology therefore is data and facts driven. The drive is to determine how much of innovation is occurring in SMMEs. In this study ontological foundation, the researcher is independent of the study, with no involvement with the subjects, the, SMMEs . With a positivist approach the axiology philosophy would purport analysis free of researcher judgements and values. This strict detachment is debatable demonstrating that there are no rigid divisions in research designs but could also adopt a mixed approach.

The study is designed to allow for the determination of the effects of the defined variables on innovation outcomes. Within this framework, a quantitative approach is used to collect (primary data) and analyse data. The quantitative analysis provides

the generalization, rigour and reliability that quality research dictates. The quantitative instrument used is an online questionnaire.

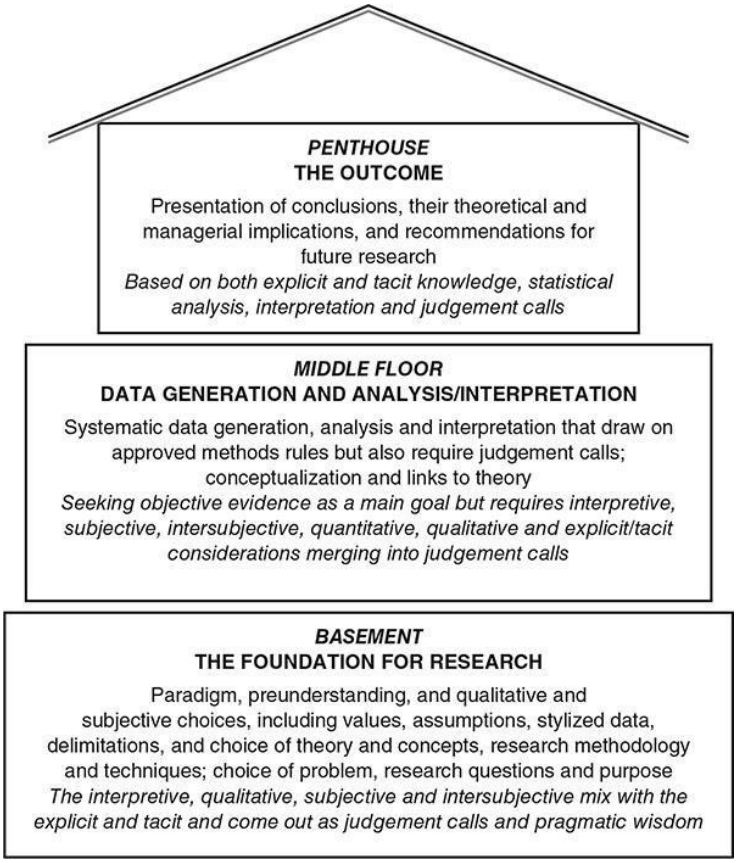


Figure 3.3 3 Research Edifice

(Adapted from: Gummesson (2017)

In totality Gummesson (2017) 'research edifice' above, exemplifies research. A clear understanding of research methodology is provided encapsulating all aspects of design.

## 3.4 Location of the Study

Location of this study is South Africa. South Africa is at a cross-road caught between meeting international expectations and its own African expectations, in attempts to gain a stable economic foothold. Understanding the challenges, enables balancing these expectations; hence exploring innovation unique to SMMEs in South Africa is useful to both SMME owners and managers, customers, suppliers, researches and policymakers.

## 3.5 Population and Sample of the Study

The population is defined as SMMEs of South Africa. A trade-off between time and cost, resources and precision efficiencies together with availability of SMME business databases dictated the sample size. With a population size of approximately seven hundred thousand formal SMMEs as reported by (Small Enterprise Develpoment Agency, 2018) a sample size of approximately 300 SMMEs is anticipated guided by Krejcie and Morgan's table of sample sizes calculated at a 95% confidence level and 5% margin of error (Krejcie & Morgan, 1970; cited in Sekaran & Bougie, 2013, p. 268). As per the table, the greater the population the greater the sample size with the increase of sample size levelling out at 380 and any size greater having no real benefit (cited in Hill, 1998, p. 6; Krejcie & Morgan, 1970, p. 6).

The sample selected is representative of sectors in accordance with the Standard Industrial Classification. The defining characteristic for SMMEs is the number of permanent employees as dictated in the National Small Business Amendment Act (NO. 26 of 2003) classification schedule. Business registries to access email addresses and contact details of SMMEs serve as the sampling frame.

The following strategies were pursued to obtain email addresses of SMMEs:

- Firstly, the following institutions were approached to obtain SMME business registries: Statistics SA, Department of Trade and industry, South African Revenue Services and Small Enterprise Development Agency (SEDA).
- The second approach was to contact or access online business directories, business websites and private research or database companies such as Worldwide Worx and sbp (business environment specialists).
- Thirdly the following municipalities and the respective city's Chamber of Commerce were approached to access their SMME databases: eThekwini (KZN), City of Johannesburg and City of Tshwane (Gauteng), Mangaung Metro (Free State), City of Cape Town (Western Cape), and Nelson Mandela Bay Metropolitan (Eastern Cape).

- Lastly networks and social media platforms such as Facebook and LinkedIn were used to source and encourage participation.

In efforts to achieve the sample size of 300 approximately 3000 invites were sent out to online business registries primarily of business chambers in the municipalities listed above. Selected participants are emailed an invite to participate in the online survey encouraging them to complete the questionnaire. Electronic posting of invites is followed up by telephone calls to promote participation.

## 3.6 Sampling Method

There are two types of sampling: probability and non-probability sampling. Known possibility of selection and generalization characterise the former and time restraints the latter. Each sampling type consists of several sample designs. Non- probability sampling consists of convenience and purposive sampling designs. The results of these sample designs are not always representative of the population and are used when quick and easily accessible participants are available or required.

Probability sampling consists of designs such as cluster (used to group subjects), area (used for geographic clustering) and double sampling (principal and subgroup sampling). Figure 3.6.1 depicts the balance of probability sample designs.

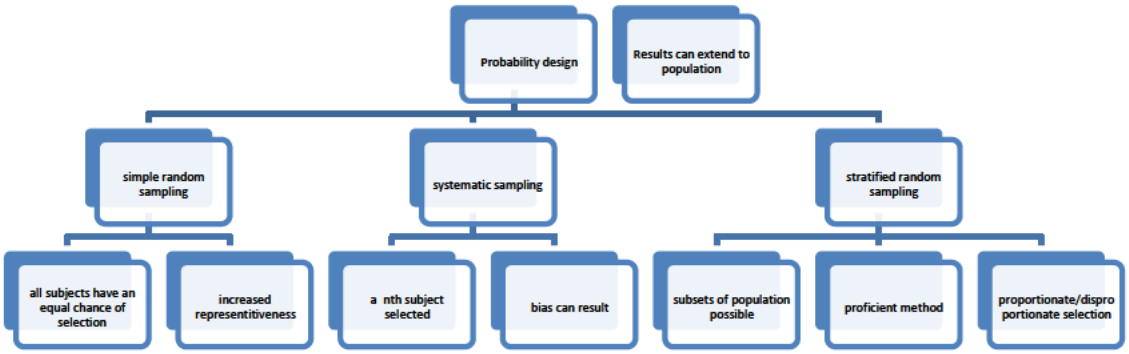


Figure 3.6 1 Sampling design

Source;(Sekaran & Bougie, 2013)

The above figure depicts the characteristics of each of the design methods. The selection of which sample design to employ would depend on the research design. The criteria for the studies sample design are representativeness of the sample of the population and the different industrial sectors of the population. Using these criteria and the types of probability designs described in Figure 3.6.1 disproportionate stratified random sampling was selected as the most appropriate sampling design for this study. Stratified because of the different industry sectors that make up the population of South African SMMEs and disproportionate and random allowed for an efficient way to deal with a large subject size.

## 3.7 Construction of the Instrument

Primary purpose is to gather data using a meticulously structured questionnaire to be completed by the owner or management of the SMME. To produce a reliable research instrument requires identifying a construct by evaluating pertinent literature. The construct domain is innovation indicators or activities which denote each of the innovation types, performance measures and innovation obstacles. Determining items that specify the domain requires examining how the literature investigates the innovation construct. The research instrument is a questionnaire. The questionnaire consists of 14 items with a level of measurement at a nominal or an ordinal level. The questionnaire has six sections which measured various themes as discussed below:

Section 1 constitutes demographic information which profiles the respondent and the SMME respectively.

Section 2 constitutes innovative activities comprising of 46 comprehensive statements which measure:

- Innovative practices of the business (organizational facilitators)
- Innovative practices of the business's products (product outputs both tangible and intangibles; goods and services)
- Innovative practices of the business’s output activities

A five-point Likert scale used, questions the respondent’s degree of acceptance or non-acceptance to statements. The scale ranges from:

| all the time | frequently | not sure | sometimes | never |
|---|---|---|---|---|

This scale is used to measure responses to innovation activities or indicators that determine types of innovation. Each type of innovation is characterised by various innovation activities or indicators.

Table 3.7 1 Innovation Indicators

(Adapted from: Gunday et al. (2011); Kilic et al. (2015); Calantone, Cavusgil, and Zhao (2002, p. 520); Leiponen and Helfat (2010, p. 228)

| **Innovation Indicators** | | |
|---|---|---|
| Organizational Innovations | Marketing Innovations | Innovation objectives |
| Renewing the organization structure to facilitate teamwork | Renewing the product promotion techniques employed for the promotion of the current and/or new products. | Replace outdated products |
| Renewing the production and quality management systems | Renewing the distribution channels without changing the logistics processes related to the delivery of the product | Improve product quality |
| Renewing the organization structure to facilitate coordination between different functions such as marketing and manufacturing | Renewing the product techniques employed for the pricing of the current and/or new products | Expand product assortment |
| Renewing the routines procedures and processes employed to execute firm activities in innovative manner | Renewing the design of the current and/or new products through changes such as in appearance packaging shape and volume without changing their basic technical and functional features. | Enter new markets or increase market share |
| Renewing the human resources management system | Renewing general marketing management activities | Increase flexibility of production |

| | | |
|---|---|---|
| | Process Innovations | |
| Renewing the supply chain management system | | Reduce labour costs |
| Renewing the organization structure to facilitate project type Organization | Determining and eliminating non-value adding activities in delivery related processes | Reduce use of materials<br>Reduce use of energy |
| | | Firm innovativeness |
| Renewing the in-firm management information system and information sharing practice | Decreasing variable cost and/or increasing delivery speed in delivery related logistics processes | Our company frequently tries out new ideas |
| Renewing the organizational structure to facilitate strategic partnerships and long-term business collaborations | Increasing output quality in manufacturing processes techniques machinery and software | Our company seeks out new ways to do things |
| | Product Innovations | |
| Decreasing variable cost components in manufacturing processes techniques machinery and software | | Our company is creative in its methods of operation |
| Determining and eliminating non-value adding activities in production processes | Developing new products with technical specifications and functionalities totally differing from the current ones | Our company is often the first to market with new products and services |
| Developing newness for current products leading to improved ease of use for customers and to improved customer satisfaction | Developing new products with components and materials totally differing from the current ones | Innovation in our company is perceived as too risky and is resisted |
| Decreasing manufacturing cost in components and materials of current products | Increasing manufacturing quality in components and materials of current products | Our new product introduction has increased |

Innovation activities used by Gunday et al. (2011, p. 38); Kilic et al. (2015, p. 122) are highly descriptive and detailed and include descriptors that go beyond the four traditional categories of innovation types of product, process, marketing and organisational. Calantone et al. (2002, p. 520) and Leiponen and Helfat (2010, p. 228) were clear and concise in describing the innovation indicators involving different innovation modes.

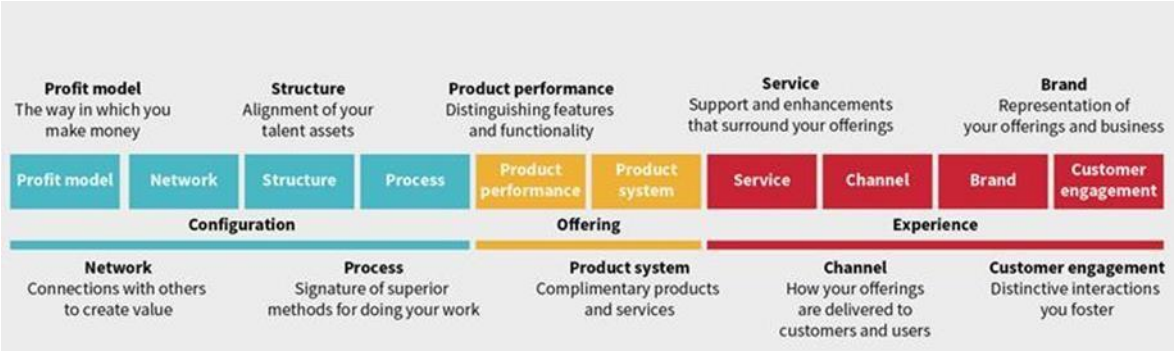


Figure 3.7 1 Ten types of innovation

(Adapted from: (Keeley et al., 2013; Lye, 2016)

Keeley et al. (2013) are instrumental in using innovation types as analytical tools and use their categorisations (Figure 3.7.1) as a way to improve an organization's innovative performance.

The above innovation activities together with innovative constructs developed in studies done by Radas and Božić (2009); Sawhney et al. (2006) and Terziovski (2010) was built upon for this studies innovation indicators. Principles of prudence and comprehensiveness were applied. The final constructs of innovation activities/indicators which describe each of the types of innovation used for the questionnaire is shown below in Figure 3.7.2.

Table 3.7 2 Innovation Indicators for Innovation Types

| Innovative Activities | Innovation Type |
|---|---|
| We try out new ideas | Innovation 1 |
| The business implements new or significant changes in business strategies | |
| The business implements new or improved management strategies | Business Model Innovaiton |
| The business lacks an operational, innovation strategy | |
| The business is continually assessing how its offerings are converted into cash | |
| The ways in which the business generates revenue for its offerings differs compared to your competitors | |
| The business associates with universities, technikons or research institutions | Innovation 2 |
| The business obtains information from exhibitions , conferences, the internet ,magazines or massmedia | |
| We collaborate with our competitors or non-industry businesses, borrowing to enable our offerings or lending to enable their offerings | Network Innovation including |
| We collaborate with our suppliers and customers to produce, test and market our offerings | open and user innovation |
| The business works with Government agencies to improve its business activities &/or offerings | |
| The business implements or has unique firm structures | Innovation 3 |
| The business has recognized structures geared towards innovation | |
| There is cohesion between departments and sharing of knowledge | Organisational Innovation |
| There is an absence of rewards for behaviours that relate to set goals | |
| The business attracts skilled employees | |
| We are creative in how we run our operations | |
| The business implements new or advanced changes in organisational processes e.g. quality control, waste management, maintenance routines etc | Innovation 4 |
| The business uses new technologies to improve its operations | |
| The business has patented certain technologies, processes or methods | Process Innovation |
| The business has certain unique processes or operations compared to industry standards or competitors | |
| The business offers unique advantages compared to competitors offerings | Innovation 5 |
| The business uses new technologies to develop new offerings or to improve existing offerings | |
| We develop new products & / or services | Product Innovation |
| We introduce new products & / or services | |
| We improve upon existing products & / or services | |
| The business offers products &/or services that are simpler and easier to use than competitors | |
| The business develops extensions to its products, services or product and service combinations | Innovation 6 |
| The businesses distinct products &/or services are also bundled as packages | Product System Innovation |
| Other businesses offerings are created to work with your business products &/or services or vice versa | |
| To assist and provide knowledge about its offerings, the business provides services such as a helpdesk, website helpline etc | Innovation 7 |
| The business provides unique warranties, guarantees etc for its offerings | Business Services Innovation |
| The business implements or provides additional services that add value to its offerings | |
| The business assesses new ways to deliver its offerings to customers or end users | Innovation 8 |
| The business uses different channels cohesively, to deliver it offerings | Channel Innovation |
| The business assess channels used to deliver products &/or services by monitoring customer experience | |
| The business looks for new ways to market its offerings | Innovation 9 |
| The business develops new local , regional markets | |
| The business develops new national markets | Marketing Innovation |
| The business develops new international markets | |
| The business has specific branding strategies for its products &/or services | |
| The business is first to market new or improved products &/ or services | |
| The business aims to addresses customer needs | Innovation 10 |
| The business engages with the customer | Customer Centric Innovation |
| The business assesses how its offerings and its business is perceived by customers | |
| The business uses social media to connect with its customers | |

Section 3 measures business's performance relative to competitors. To measure financial performance, scales adapted from the literature by Bigliardi (2013) in her study was adopted. In establishing financial performance, six measures relative to competitors comprising productivity, profitability and market measures are utilized (Bigliardi, 2013; Narver & Slater, 1990) (Table 3.7.3). The items to measure profitable performance (return on investment, sales growth, and return on assets), productivity performance (operating costs and productivity) and market performance (market share) are obtained from the literature (Bigliardi, 2013; Conant, Smart, & Solano-Mendez, 1993; Kilic et al., 2015; Laforet, 2013; Narver & Slater, 1990). Due to owners not wanting to reveal exact performance figures, records and compromised objectivity, a relative, subjective route was adopted by comparing to

competitors. Subjective relative measures are used in studies as a control for differences (Narver & Slater, 1990). A 5-point Likert scale is used ranging from:

| much worse | worse | unsure | better | much better |
|---|---|---|---|---|

In contrast owners and senior managers of SMMEs are intimately aware of performance facts and figures allowing for more realistic subjective responses.

Table 3.7 3 Performance Measures

(Adapted from: Bigliardi (2013)

| Performance | Indicators |
|---|---|
| Profitability Performance | Your organization's return on investment (ROI) relative to your competitors<br>Your organization's sales growth relative to your competitors<br>Your organization's return on assets (ROA) relative to your competitors |
| Market Performance | Your organization's market share relative to your competitors |
| Production Performance | Your organization's total operating costs relative to your competitors<br>Your organization's productivity relative to your competitors |

Performance indicators listed above are utilized for the questionnaire.

Section 4 constitutes obstacles to innovation encountered by the business.
The list of obstacles or barriers relevant to innovative activities and SMEs was compiled from literature sources Booyens (2011); Radas and Božić (2009). An 'agree' or 'do not agree' response was required.

Section 5 consists of four open-ended questions. Questions using Likert, nominal and ordinal scales are deemed as closed questions with the respondent having set choices to select from when answering the question (Sekaran & Bougie, 2013). Open-ended questions provide the respondent an opportunity to voice additional

thoughts on the subject and in a quantitative study is often used to further endorse the closed questions (Singer & Couper, 2017). Open ended questions in the questionnaire consist of whether the business was part of a larger group, business's core activity, any other obstacles encountered and comments on innovation.

## 3.8 Data Collection

To collect the data required, a structured online questionnaire using Question Pro was formulated. The internet link to the questionnaire was emailed to SMMEs together with a covering letter explaining the reason of the survey and encouraging them to participate in the survey. The questionnaire would take approximately ten minutes to complete.

Questionnaires are commonly used tools to collect data, are easily administered, coding of responses is uncomplicated and large pools of respondents can be reached across boundaries and borders (Sekaran & Bougie, 2013). This made it easier to reach participants in different provinces of the country.

Due to time and cost constraints; emails were followed up with telephone calls encouraging SMMEs to complete the questionnaire. A total of 104 SMMEs participated in the survey. The response rate was 35% (Sekaran & Bougie, 2013). The sample size of 300 was based on a confidence level of 95% with a margin of error of 5%. A 95% confidence level is the accepted level commonly used in business research. With appropriate calculations the margin of error for a response rate of 35% increases to approximately 9.25% with a 95% confidence level. This then reduces the margin to which the results can be generalized to the population. However, as the reason for the study is largely descriptive and exploratory, limited generalizations is one of its characteristics (Sekaran & Bougie, 2013). In saying so the author worked relentlessly to obtain as many responses sending out over 3000 invitations to participate, to reach a sample size of 300. The author employed a clerk for an hour a day over a two-month period to assist with emails and telephonic remainders. Survey research is fraught with difficulties in obtaining responses, especially when the subjects of the sample are unknown, widespread, large and

with a nationwide population. Nulty (2008) in their review of studies on survey response rates found an average response rate of 33% for online surveys. Guo, Kopec, Cibere, Li, and Goldsmith (2016) study on survey characteristics and response rates invited eight thousand householders to participate in a health survey and received a 30% response rate. Generally for mailed surveys, response rates range from 40% to 50% with online surveys having a lower response rate (Guo et al., 2016; Health, 2009).

## 3.9 Data Analysis

The data gathered is subjected to appropriate statistical analysis using appropriate statistical methods to ensure that the research questions are addressed. Descriptive analysis used frequencies and presented with tables and graphs. Inferential analysis involved the use of factor analysis, reliability testing, correlations and cross tabulations. Partial eta squared using regression analysis was utilized.

The chief tool of investigation was an online questionnaire. The quantitative data collected from the responses received was analysed using a statistical software called SPSS. Appropriate univariate and multivariate analysis are performed by SPSS. SPSS version 25 is able to analysis data from starting with, entering the data then statistically analysing the data and ending with visualising and reporting on the outcomes (Coakes, 2013).

The statistics of the quantitative data are presented as graphs, charts and tables. Inferential statistics make use of chi square tests which use p-values for interpretation, correlations and cross tabulations. Initially descriptive analysis using frequencies and percentages was employed to describe the demographic data and to collate the data measuring the objectives of the study. To analyse the data further the following statistical techniques were utilized:

### 3.9.1 Factor Analysis

Factor analysis is a statistical technique used primarily for data reduction. Such large amounts of data received from respondents would need to be translated into a workable format that contains the necessary information of the variables (Coakes,

2013). For example, if there are several questions measuring a construct, each question on its own would be an ineffectual measure but together would be a more meaningful measure.

Firstly, factor analysis is used to determine the validity of the data, that is, is it measuring what it is set out to measure? In the case of the above example if it is determined that all the questions measure the same concept, they can be combined into hypothetical factor variables that comprise scorings of responses. Factor techniques can be applied to diverse scenarios. Factor analysis is used on Likert scale elements. Kaiser-Meyer-Olkin Measure of Sampling Adequacy and Bartlett's Test of Sphericity test are conducted to allow for factor analysis.

### 3.9.2 Innovation Intensity Analysis

To determine the intensity of innovation two variables are introduced. They are the breadth or the extent of innovation and the depth or consistency of innovation. To measure these variables the scaling of the 46 innovative activities which constitute the types of innovation had to be recoded. Each of the activities are coded one '1' (yes) if engaged in, and '0' (no) if not (Egbetokun et al., 2012; Xiaobao et al., 2013).

For breadth the 'yes' is a combination of the scales 'all the time', 'frequently' and 'sometime' and 'no' is a combination of 'not sure' and 'never'.

For depth the 'yes' is a combination of the scales 'all the time' and 'frequently' and 'no' a combination of the scales 'not sure', 'sometimes' and 'never'.

### 3.9.3 Partial Eta Squared and Effect Size

"Eta squared measures the proportion of the total variance in a dependent variable that is associated with the membership of different groups defined by an independent variable" (Richardson, 2011). Similarly partial eta squared is a technique where the effects of independent variables and interactions are 'removed' (Richardson, 2011). Partial eta square is a measure of effect size. When a statistical test conducted reveals an effect, how impactful that effect is, is known as the effect size. So, the impact or effect can be small or medium or there can be a large effect on the identified variable. The mean difference applies in this case. To determine

the impact of firm size on the different categories of innovation types the statistical analysis of partial eta square and effect size was employed.

### 3.9.4 Crosstabulations

Crosstabulations are performed between a nominal and a Likert scale and it denotes a relationship between the measures. The customary method to reporting a result needs a statement of statistical significance. From a test statistic a p-value is appropriated**.** A significant outcome is indicated with "$p < 0.05$". These values are highlighted with asterisks. A second 'Chi square test' was conducted to determine whether there was a statistically significant relationship between the variables; rows versus columns. The null hypothesis indicated that there is no relationship between the two. The alternate hypothesis shows that there is an association.

### 3.9.5 Correlations

Bivariate correlation was also performed on the (ordinal) data. A correlation implies an association between two variables and is not necessarily causal (Sekaran & Bougie, 2013).

## 3.10 Reliability and Validity

Reliability refers to consistency and validity refers to measuring the concept one set out to measure (Sekaran & Bougie, 2013). Cronbach's coefficient alpha is used to test reliability and factor analysis validity. Both tests were applied to the data collected.

## 3.11 Bias

Respondent bias: The tool of measurement is a questionnaire and it is here that there is a possibility of encountering respondent bias. Thus, care was taken when constructing the questionnaire which needs to be developed to reduce bias in the research. A scrupulous evaluation of the questionnaire was conducted by five experts in the fields of: academia, in business management, literature, and by a CEO of an IT company. Content, clarity, format, grammar, flow, structure and overall appearance were assessed. Relevant corrections were then made to ensure there

were minimum or no biases. Before sending out the questionnaire a pilot test was done with ten selected SMMEs from the sample to determine if the respondents understood the questions, the simplicity of answering and the time taken to fill in responses.

Non response bias: Questionnaires administered electronically have a wide reach but response rates can be low (Sekaran & Bougie, 2013). To control for data bias due to the possible differences in responses between non-respondents and respondents, electronic questionnaires, were followed up with telephone calls. The author having the resources to a receptionist, employed said receptionist, for an hour a day to follow up by resending the online questionnaire a maximum of three times over the collection period of two months together with regular telephone calls encouraging participants to complete the survey. Due to challenges in accessing SMMEs, returns due to email address changes, the perception of prospective respondents of risk and uncertainty and time constraints are some of the reasons faced in obtaining responses. Draugalis and Plaza (2009) who suggest in their review of research design that many researchers consider late respondents similar to non-respondents and are used as proxies.

## 3.12 Ethical Considerations

UKZN's ethical board has reviewed the studies research proposal and found integrity in the research proposed and the principles of ethics have been observed providing the required ethical clearance to pursue the study (Appendix 3). The survey was voluntary and prospective participants were invited to participate. The covering letter to the questionnaire explained the reason for the survey, stipulated there was no monetary gain and stressed that the participant could withdraw from the survey at any point. The letter emphasized the confidentially aspect explaining all responses are coded and confidential. The confidentiality and anonymity are to be maintained by the Graduate school of Business, University of Kwazulu-Natal. The electronic survey commences once the participant ticks the 'I agree' box. An online version of the abstract and study is to be posted to those participants requesting a report on the research.

## 3.13 Summary

Research is ‘scientific’ whether a function of natural or social sciences. It is an endeavour to investigate the ‘why’, ‘where’ or ‘what’ and, to do so, a method is required. This chapter has provided a review of the methodology available to conduct reliable research that is suitable to the ethos adopted. The different theories, philosophies and paradigms that are the foundation of research dictate the design and methods to be used. The elements of the research process such as location of the subjects, the sampling method, the research instrument is reviewed. Data collection, analysis, biases and ethics in relation to the study is discussed. The statistically analysed results of the study is presented in the proceeding chapter.

# Chapter Four: Presentation of Results

## 4.1 Introduction

This chapter presents the results of the descriptive and inferential statistics applied to the quantitative data obtained from the questionnaires using the statistical analytical software SPSS. Reliability and validity of the developed constructs are presented. Factor extraction using factor analysis to test the similarity of the constructs are presented. The results are illustrated in the form of diagrams, tables and bar, line, radial and combined graphs. Brief descriptions relevant to the studies aims and objectives are reported.

## 4.2 Demographic Data

Defining the characteristics of the sample includes profiling the respondent and the enterprise. A total of 104 of the completed questionnaires were used for data analysis.

### 4.2.1 Profile of Respondent

The biographical characteristics of the respondent extracted and represented below are: gender, age, position held in the business, their highest qualification and number of years in business (Table 4.2.1.1).

Table 4.2.1 1 Profile of Respondent

| **Gender** | **Male** | **Female** | | |
|---|---|---|---|---|
| Percent | 69 | 31 | | |
| **Age(years)** | **20 - 30** | **31 - 45** | **46 - 55** | **56 - ≥65** |
| Percent | 7 | 22 | 42 | 29 |
| **Position held in the business** | **Owner** | **Executive & Management** | **Sales & Admin** | |
| Percent | 61 | 34 | 5 | |
| **Your highest Qualification** | **High School** | **College** | **University & Postgrad** | |
| Percent | 20 | 24 | 56 | |
| **Number of years of business experience** | **≤ 3 - 5** | **6 - 10** | **11 - 20** | **> 20** |
| Percent | 7 | 7 | 26 | 60 |

Within the gender category the ratio of males to females is approximately 7:3 (69% : 31%). Overall the respondent is mainly male, aged between 46 to 55 years, are predominantly the owners of the business, highly educated and have been involved in business for a long period. Just over 60% of the respondents were owners/entrepreneurs and 56% have a higher degree, indicating that the responses obtained would infer an informed or studied source.

Due to the fact that majority of the respondents are owners verify that responses come from a source that is involved directly by the research mechanisms. Nearly 60% indicated that they had more than 20 years of business experience. Majority of the respondents having gathered experiences over a longer period of being in business would deliver more realistic responses.

### 4.2.2 Profile of SMME

The data collected to characterize the small, medium and micro-enterprise are number of employees, percentage of staff involved with research and development, industry sector of the business, age of the business and approximate annual turnovers (Table 4.2.2.2).

Table 4.2.2 1 Profile of SMME

| **Firm Size** | **Micro** | **Small** | **Medium** | | |
|---|---|---|---|---|---|
| Percent | 34 | 42 | 24 | | |
| **% Staff in R & D** | **0** | **1 - 5** | **6 - 10** | **11 - 30** | **31 - ≥ 50** |
| Percent | 27 | 39 | 11 | 11 | 12 |
| **Age of Business (years)** | **1 - 5** | **6 – 10** | **11 – 20** | **> 20** | |
| Percent | 17 | 9 | 28 | 46 | |
| **Turnover** | **< 1m** | **1 M - < 10M** | **10 M - < 30 m** | **30M - ≤ 60M** | **> 60 M** |
| Percent | 33 | 21 | 16 | 9 | 21 |

The subsequent SMME profile is presented above. Firm size is derived by the number of permanent employees (up to 5=micro; up to 50=small; up to 200=medium). The majority 42 % of small enterprises consist of very small (maximum 20 employees) and small (maximum 50 employees). Percentage of businesses that form part of a larger group was 22%.

Table 4.2.2 2 Employment Rate

| Permanent Employees | | | | |
|---|---|---|---|---|
| | | 2008 | 2011 | 2014 |
| | Mean | 34.23 | 39.44 | 44.67 |
| | Standard Deviation | 4.74 | 5.10 | 5.20 |

The above table details the mean and standard deviation of the number of permanent employees for each time period, calculated using grouped data theory. Relatively similar standard deviations allow for an assessment of the means to determine a trend in the employment. It is noticed that on average, 5 more people were employed at each of the successive time periods. From the table above twenty seven percent of the respondents indicated that none of their staff were dedicated solely to research and development. Nearly 40% of the respondents specified that at most 5% of their staff are involved in research and development. Forty six percent of the businesses have been in existence for more than twenty years indicating that the majority of the responding SMMEs are mature and stable.

Overall the SMMEs that responded are older more mature businesses, have a fair representation across firm sizes, employ commonly up-to five employees for research and development and have a turnover that may fall under ten million or over sixty million rands.

Table 4.2.2 3 Turnover Rate

| Approximate Annual Turnover | | | | |
|---|---|---|---|---|
| | | 2008 | 2011 | 2014 |
| | Mean | 104543689.3 | 125189320.4 | 132735436.9 |
| | Standard Deviation | 203681160.7 | 218374213.5 | 220453909.6 |

The means of approximate annual turnovers have an increasing pattern. The standard deviations are also large as there is a similar number of respondents whose organisations make less than R5 million as there are who make more than R5 million. Approximately 20% of the organisations make more than 60 million rands.

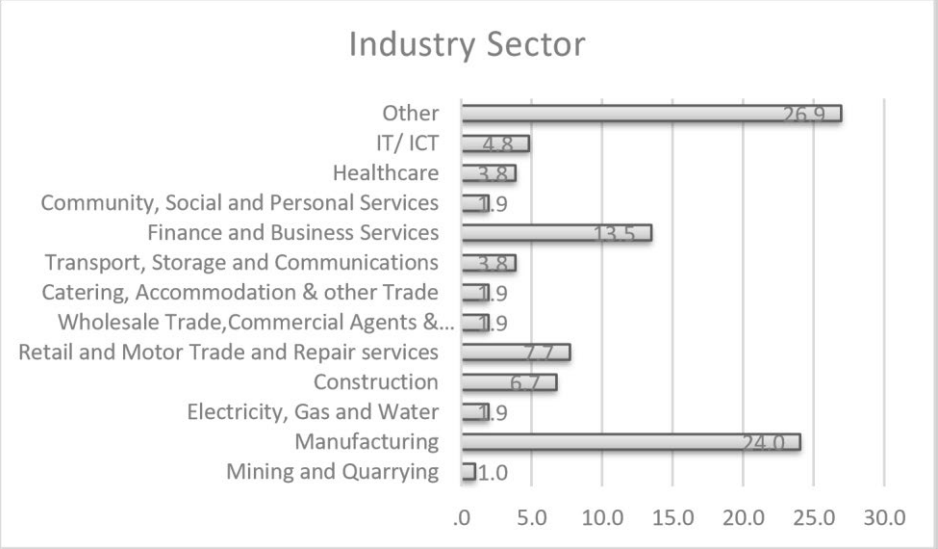


Figure 4.2.2 1 SMME Industry Sectors

Eliciting the industry sector of SMMEs demonstrates the widespread footprint of SMMEs with 24% and 14% from the manufacturing and financial sectors respectively.

## 4.3 Reliability Statistics

From the literature review above in total ten categories of innovation types with their associated descriptive innovation activities were identified. From the data collected and analysed it was determined which of the innovation types are undertaken by SMMEs. To begin with analysing data, it needs to be prepared and validated.

The two most crucial features of precision are reliability and validity. Reliability is calculated by obtaining several measurements on the same subjects. An ‘acceptable’ reliability coefficient is judged to be 0.70 or higher.

The table below reveals the Cronbach's alpha score for all the items that formed the questionnaire.

Table 4.3 1 Cronbach's Alpha

| Question | Section | Number of Items | Cronbach's Alpha |
|---|---|---|---|
| Innovation 1 | Business Model Innovation | 5 | 0.749 |
| Innovation 2 | Network Innovation including openo Inn | 5 | 0.737 |
| Innovation 3 | Organisational Innovation | 5 | 0.760 |
| Innovation 4 | Process Innovation | 4 | 0.777 |
| Innovation 5 | Product Innovation | 6 | 0.912 |
| Innovation 6 | Product System Innovation | 3 | 0.818 |
| Innovation 7 | Business Services Innovation | 3 | 0.812 |
| Innovation 8 | Channel Innovation | 3 | 0.805 |
| Innovation 9 | Marketing Innovation | 6 | 0.858 |
| Innovation 10 | Customer Centric Innovation | 4 | 0.756 |
| Q12 | Performance | 6 | .884 |

For all the sections the reliability scores surpass the recommended Cronbach's alpha value of 0.700. This denotes a high degree of acceptable, consistent scoring for each of the sections of the research.

## 4.4 Factor Analysis

The component matrix tables are preceded by a summarised table that displays the findings of KMO and Bartlett's Test. The requirement is that Kaiser-MeyerOlkin (KMO) Measure of Sampling Adequacy should be larger than 0.50 and Bartlett's Test of Sphericity less than 0.05. In all instances, the conditions have been met, which allows for the process of factor analysis.

Table 4.4 1 KMO and Bartlett's Test

| | | Olkin | Bartlett's Test of Sphericity n | | |
|---|---|---|---|---|---|
| **Question** | **Section** | Measure of Sampling | Approx.Chi-Squa | df | Sig. |
| Innovation 1 | Business Model Innovation | 0.718 | 146.172 | 15 | 0.000 |
| Innovation 2 | Network Innovation including open Innovation | 0.764 | 100.621 | 10 | 0.000 |
| Innovation 3 | Organisational Innovation | 0.763 | 130.834 | 15 | 0.000 |
| Innovation 4 | Process Innovation | 0.764 | 109.092 | 6 | 0.000 |
| Innovation 5 | Product Innovation | 0.876 | 414.384 | 15 | 0.000 |
| Innovation 6 | Product System Innovation | 0.676 | 115.944 | 3 | 0.000 |
| Innovation 7 | Business Services Innovation | 0.718 | 105.180 | 3 | 0.000 |
| Innovation 8 | Channel Innovation | 0.704 | 102.235 | 3 | 0.000 |
| Innovation 9 | Marketing Innovation | 0.792 | 291.344 | 15 | 0.000 |
| Innovation 10 | Customer Centric Innovation | 0.725 | 154.587 | 6 | 0.000 |
| Q12 | Performance | .808 | 363.712 | 15 | .000 |

Factor analysis is only applied to the Likert scale items. Certain components separated into finer components. This is shown below (Table 4.4.2) in the rotated component matrix. All of the requirements are fulfilled for factor analysis.

Table 4.4 2 Component matrix

| Innovation Type | | Component Matrix | 1 | 2 |
|---|---|---|---|---|
| Q11.1.1 | We try out new ideas | | 0.754 | 0.136 |
| Q11.1.2 | The business implements new or significant changes in business strategies | INNOVATION 1 | 0.842 | 0.295 |
| Q11.1.3 | The business implements new or improved management strategies | Business Model Innovation | 0.785 | 0.218 |
| Q11.1.4 | The business lacks an operational, innovation strategy | | -0.549 | 0.555 |
| Q11.1.5 | The business is continually assessing how its offerings are converted into cash | | 0.251 | 0.660 |
| Q11.1.6 | The ways in which the business generates revenue for its offerings differs compared to your competitors | | 0.243 | 0.739 |
| Q11.2.1 | The business associates with universities, technikons or research institutions | | 0.772 | |
| Q11.2.2 | The business obtains information from exhibitions , conferences, the internet ,magazines or massmedia | INNOVATION 2 | 0.569 | |
| Q11.2.3 | We collaborate with our competitors or non-industry businesses, borrowing to enable our offerings or lending to enable their offerings | | 0.728 | |
| Q11.2.4 | We collaborate with our suppliers and customers to produce, test and market our offerings | Network Innovation | 0.617 | |
| Q11.2.5 | The business works with Government agencies to improve its business activities &/or offerings | | 0.789 | |
| Q11.3.1 | The business implements or has unique firm structures | | 0.720 | -0.261 |
| Q11.3.2 | The business has recognized structures geared towards innovation | INNOVATION 3 | 0.816 | -0.064 |
| Q11.3.3 | There is cohesion between departments and sharing of knowledge | Organisational Innovation | 0.684 | 0.406 |
| Q11.3.4 | There is an absence of rewards for behaviours that relate to set goals | | -0.180 | 0.872 |
| Q11.3.5 | The business attracts skilled employees | | 0.625 | -0.305 |
| Q11.3.6 | We are creative in how we run our operations | | 0.703 | -0.148 |
| Q11.4.1 | The business implements new or advanced changes in organisational processes e.g. quality control, waste management, maintenance routines etc | | 0.774 | |
| Q11.4.2 | The business uses new technologies to improve its operations | INNOVATION 4 | 0.809 | |
| Q11.4.3 | The business has patented certain technologies, processes or methods | Process Innovation | 0.706 | |
| Q11.4.4 | The business has certain unique processes or operations compared to industry standards or competitors | | 0.825 | |
| Q11.5.1 | The business offers unique advantages compared to competitors offerings | | 0.770 | |
| Q11.5.2 | The business uses new technologies to develop new offerings or to improve existing offerings | INNOVATION 5 | 0.859 | |
| Q11.5.3 | We develop new products & / or services | Product Innovation | 0.894 | |
| Q11.5.4 | We introduce new products & / or services | | 0.899 | |
| Q11.5.5 | We improve upon existing products & / or services | | 0.865 | |
| Q11.5.6 | The business offers products &/or services that are simpler and easier to use than competitors | | 0.710 | |
| Q11.6.1 | The business develops extensions to its products, services or product and service combinations | | 0.850 | |
| Q11.6.2 | The businesses distinct products &/or services are also bundled as packages | INNOVATION 6 | 0.906 | |
| Q11.6.3 | Other businesses offerings are created to work with your business products &/or services or vice versa | Product System Innovation | 0.815 | |
| Q11.7.1 | To assist and provide knowledge about its offerings, the business provides services such as a helpdesk, website helpline etc | | 0.854 | |
| Q11.7.2 | The business provides unique warranties, guarantees etc for its offerings | INNOVATION 7 | 0.862 | |
| Q11.7.3 | The business implements or provides additional services that add value to its offerings | Business Service Innovation | 0.851 | |
| Q11.8.1 | The business assesses new ways to deliver its offerings to customers or end users | | 0.848 | |
| Q11.8.2 | The business uses different channels cohesively, to deliver it offerings | INNOVATION 8 | 0.877 | |
| Q11.8.3 | The business assess channels used to deliver products &/or services by monitoring customer experience | Channel Innovation | 0.828 | |
| Q11.9.1 | The business looks for new ways to market its offerings | | 0.712 | |
| Q11.9.2 | The business develops new local , regional markets | INNOVATION 9 | 0.869 | |
| Q11.9.3 | The business develops new national markets | Marketing Innovation | 0.825 | |
| Q11.9.4 | The business develops new international markets | | 0.679 | |
| Q11.9.5 | The business has specific branding strategies for its products &/or services | | 0.710 | |
| Q11.9.6 | The business is first to market new or improved products &/ or services | | 0.793 | |
| Q11.10.1 | The business aims to addresses customer needs | | 0.866 | |
| Q11.10.2 | The business engages with the customer | INNOVATION 10 | 0.860 | |
| Q11.10.3 | The business assesses how its offerings and its business is perceived by customers | Customer Centric Innovation | 0.823 | |
| Q11.10.4 | The business uses social media to connect with its customers | | 0.624 | |

Factor analysis is a statistical procedure aimed at data reduction typically used in survey research. Here a number of questions are represented with a small number of hypothetical factors. With reference to the above table:

- The extraction method used was the principle component analysis, and Varimax with Kaiser Normalization was used as the rotation method. This orthogonal rotation method reduces the number of variables which have high loadings on each factor thereby simplifying the analysis of the factors.
- Inter-correlations between variables is revealed by factor analysis.
- Comparable loadings of items of questions infer measurement is along a similar factor. Loadings greater than or equal to 0.5 when analysing the list of items (using the highest loading when items cross-loaded at more than this value) successfully measures along the various components.

It is noted that the variables that comprised all of the sections loaded perfectly along a single component. This implies that the statements in the sections measured what they set out to measure.

The comprehensive list of comments from the open-ended questions on innovation and barriers in the questionnaire was scanned and found to further support the descriptors used to measure the types of innovation and obstacles in the questionnaire.

## 4.5 Innovation Types

Section Analysis: The scoring patterns of the respondents per variable per section is evaluated in the following sections. The results are initially shown using percentages which are summarised, for the variables that constitute each section. This is shown by the scoring for the innovative activities categorised within each innovation type. Results shown below are the types of innovation identified in SMMEs (Table 4.5.1). Further analysis of the results is conducted according to the relevance of the statements.

## Table 4.5 1 Innovation Type Frequencies

| TYPE OF INNOVATION | | Percentages | | | | | Chi Square |
|---|---|---|---|---|---|---|---|
| **INNOVATION 1 Business Model Innovation** | | All the Time | Frequently | Not Sure | Sometimes | Never | p-value |
| Q11.1.1 | We try out new ideas | 34.6 | 52.9 | 0.0 | 12.5 | 0.0 | 0.000 |
| Q11.1.2 | The business implements new or significant changes in business strategie | 23.1 | 49.0 | 1.9 | 25.0 | 1.0 | 0.000 |
| Q11.1.3 | The business implements new or improved management strategies | 18.3 | 51.0 | 0.0 | 26.0 | 4.8 | 0.000 |
| Q11.1.4 | The business lacks an operational, innovation strategy | 4.0 | 8.9 | 9.9 | 43.6 | 33.7 | 0.000 |
| Q11.1.5 | The business is continually assessing how its offerings are converted into | 31.1 | 46.6 | 2.9 | 14.6 | 4.9 | 0.000 |
| Q11.1.6 | The ways in which the business generates revenue for its offerings differs | 13.6 | 37.9 | 13.6 | 27.2 | 7.8 | 0.000 |
| **INNOVATION 2 Network Innovation** | | All the Time | Frequently | Not Sure | Sometimes | Never | |
| Q11.2.1 | The business associates with universities, technikons or research institutic | 8.7 | 14.6 | 6.8 | 38.8 | 31.1 | 0.000 |
| Q11.2.2 | The business obtains information from exhibitions , conferences, the intern | 21.2 | 51.0 | 1.9 | 22.1 | 3.8 | 0.000 |
| Q11.2.3 | We collaborate with our competitors or non-industry businesses, borrowin | 6.9 | 29.4 | 3.9 | 42.2 | 17.6 | 0.000 |
| Q11.2.4 | We collaborate with our suppliers and customers to produce, test and mar | 24.3 | 43.7 | 2.9 | 19.4 | 9.7 | 0.000 |
| Q11.2.5 | The business works with Government agencies to improve its business ac | 13.6 | 11.7 | 5.8 | 34.0 | 35.0 | 0.000 |
| **INNOVATION 3 Organisational Innovation** | | All the Time | Frequently | Not Sure | Sometimes | Never | |
| Q11.3.1 | The business implements or has unique firm structures | 23.3 | 40.8 | 8.7 | 19.4 | 7.8 | 0.000 |
| Q11.3.2 | The business has recognized structures geared towards innovation | 21.2 | 35.6 | 7.7 | 28.8 | 6.7 | 0.000 |
| Q11.3.3 | There is cohesion between departments and sharing of knowledge | 32.0 | 35.9 | 5.8 | 19.4 | 6.8 | 0.000 |
| Q11.3.4 | There is an absence of rewards for behaviours that relate to set goals | 4.9 | 20.4 | 15.5 | 33.0 | 26.2 | 0.000 |
| Q11.3.5 | The business attracts skilled employees | 28.4 | 32.4 | 5.9 | 29.4 | 3.9 | 0.000 |
| Q11.3.6 | We are creative in how we run our operations | 33.3 | 40.2 | 2.0 | 22.5 | 2.0 | 0.000 |
| **INNOVATION 4 Process Innovation** | | All the Time | Frequently | Not Sure | Sometimes | Never | |
| Q11.4.1 | The business implements new or advanced changes in organisational proc | 23.1 | 36.5 | 6.7 | 28.8 | 4.8 | 0.000 |
| Q11.4.2 | The business uses new technologies to improve its operations | 26.5 | 49.0 | 1.0 | 19.6 | 3.9 | 0.000 |
| Q11.4.3 | The business has patented certain technologies, processes or methods | 11.7 | 13.6 | 3.9 | 13.6 | 57.3 | 0.000 |
| Q11.4.4 | The business has certain unique processes or operations compared to inc | 20.4 | 35.0 | 6.8 | 25.2 | 12.6 | 0.000 |
| **INNOVATION 5 Product Innovation** | | All the Time | Frequently | Not Sure | Sometimes | Never | |
| Q11.5.1 | The business offers unique advantages compared to competitors offerings | 23.1 | 44.2 | 3.8 | 26.0 | 2.9 | 0.000 |
| Q11.5.2 | The business uses new technologies to develop new offerings or to improv | 19.2 | 42.3 | 2.9 | 27.9 | 7.7 | 0.000 |
| Q11.5.3 | We develop new products & / or services | 23.1 | 39.4 | 1.9 | 27.9 | 7.7 | 0.000 |
| Q11.5.4 | We introduce new products & / or services | 18.4 | 47.6 | 1.9 | 27.2 | 4.9 | 0.000 |
| Q11.5.5 | We improve upon existing products & / or services | 25.2 | 49.5 | 0.0 | 24.3 | 1.0 | 0.000 |
| Q11.5.6 | The business offers products &/or services that are simpler and easier to u | 18.4 | 34.0 | 14.6 | 29.1 | 3.9 | 0.000 |
| **INNOVATION 6 Product System Innovation** | | All the Time | Frequently | Not Sure | Sometimes | Never | |
| Q11.6.1 | The business develops extensions to its products, services or product and | 17.3 | 49.0 | 5.8 | 25.0 | 2.9 | 0.000 |
| Q11.6.2 | The businesses distinct products &/or services are also bundled as packa | 23.1 | 33.7 | 7.7 | 28.8 | 6.7 | 0.000 |
| Q11.6.3 | Other businesses offerings are created to work with your business product | 16.3 | 31.7 | 5.8 | 38.5 | 7.7 | 0.000 |
| **INNOVATION 7 Business Services Innovation** | | All the Time | Frequently | Not Sure | Sometimes | Never | |
| Q11.7.1 | To assist and provide knowledge about its offerings, the business provides | 32.7 | 25.0 | 1.9 | 26.0 | 14.4 | 0.000 |
| Q11.7.2 | The business provides unique warranties, guarantees etc for its offerings | 21.2 | 29.8 | 3.8 | 26.0 | 19.2 | 0.000 |
| Q11.7.3 | The business implements or provides additional services that add value to | 32.7 | 47.1 | 0.0 | 13.5 | 6.7 | 0.000 |
| **INNOVATION 8 Channel Innovation** | | All the Time | Frequently | Not Sure | Sometimes | Never | |
| Q11.8.1 | The business assesses new ways to deliver its offerings to customers or e | 24.0 | 50.0 | 2.9 | 19.2 | 3.8 | 0.000 |
| Q11.8.2 | The business uses different channels cohesively, to deliver it offerings | 20.2 | 33.7 | 2.9 | 33.7 | 9.6 | 0.000 |
| Q11.8.3 | The business assess channels used to deliver products &/or services by n | 26.9 | 31.7 | 2.9 | 28.8 | 9.6 | 0.000 |
| **INNOVATION 9 Marketing Innovation** | | All the Time | Frequently | Not Sure | Sometimes | Never | |
| Q11.9.1 | The business looks for new ways to market its offerings | 36.9 | 34.0 | 1.9 | 23.3 | 3.9 | 0.000 |
| Q11.9.2 | The business develops new local , regional markets | 18.6 | 40.2 | 1.0 | 26.5 | 13.7 | 0.000 |
| Q11.9.3 | The business develops new national markets | 19.4 | 29.1 | 1.9 | 30.1 | 19.4 | 0.000 |
| Q11.9.4 | The business develops new international markets | 17.6 | 21.6 | 2.9 | 27.5 | 30.4 | 0.000 |
| Q11.9.5 | The business has specific branding strategies for its products &/or service | 34.6 | 34.6 | 3.8 | 14.4 | 12.5 | 0.000 |
| Q11.9.6 | The business is first to market new or improved products &/ or services | 19.2 | 32.7 | 2.9 | 24.0 | 21.2 | 0.000 |
| **INNOVATION 10 Customer Centric Innovation** | | All the Time | Frequently | Not Sure | Sometimes | Never | |
| Q11.10.1 | The business aims to addresses customer needs | 59.6 | 30.8 | 0.0 | 8.7 | 1.0 | 0.000 |
| Q11.10.2 | The business engages with the customer | 60.8 | 30.4 | 2.0 | 6.9 | 0.0 | 0.000 |
| Q11.10.3 | The business assesses how its offerings and its business is perceived by | 43.3 | 36.5 | 1.9 | 16.3 | 1.9 | 0.000 |
| Q11.10.4 | The business uses social media to connect with its customers | 27.2 | 20.4 | 2.9 | 20.4 | 29.1 | 0.000 |

To further substantiate the scoring trend, the chi square statistical test was applied to the data to distinguish if the scoring patterns for each statement were significantly different per option. The null hypothesis states that respondents scoring along each option for each statement, one statement at a time, were similar in number. The alternate claims dissimilarity where there is a difference, which is significant, between the options of agreement and disagreement.

The results are included in Table 4.5.1. The sig. values (p-values) are less than 0.05 (the level of significance), it implies differences in the scoring patterns. The differences between the way respondents scored (never, sometimes, not sure, frequently, all the time) were significant.

Each section or innovation type is converted to a line graph. They are then grouped into the three broad categories of: organisational facilitators, product outputs and outcome activities. The scale used progresses from all the time, frequently, not sure, sometimes, never to indicate SMMEs responses to innovation indicators. The above table illustrates each of the frequencies against each innovation indicator allowing for ease of use and the graphs for visual representation permitting the author to interpret the large dataset.

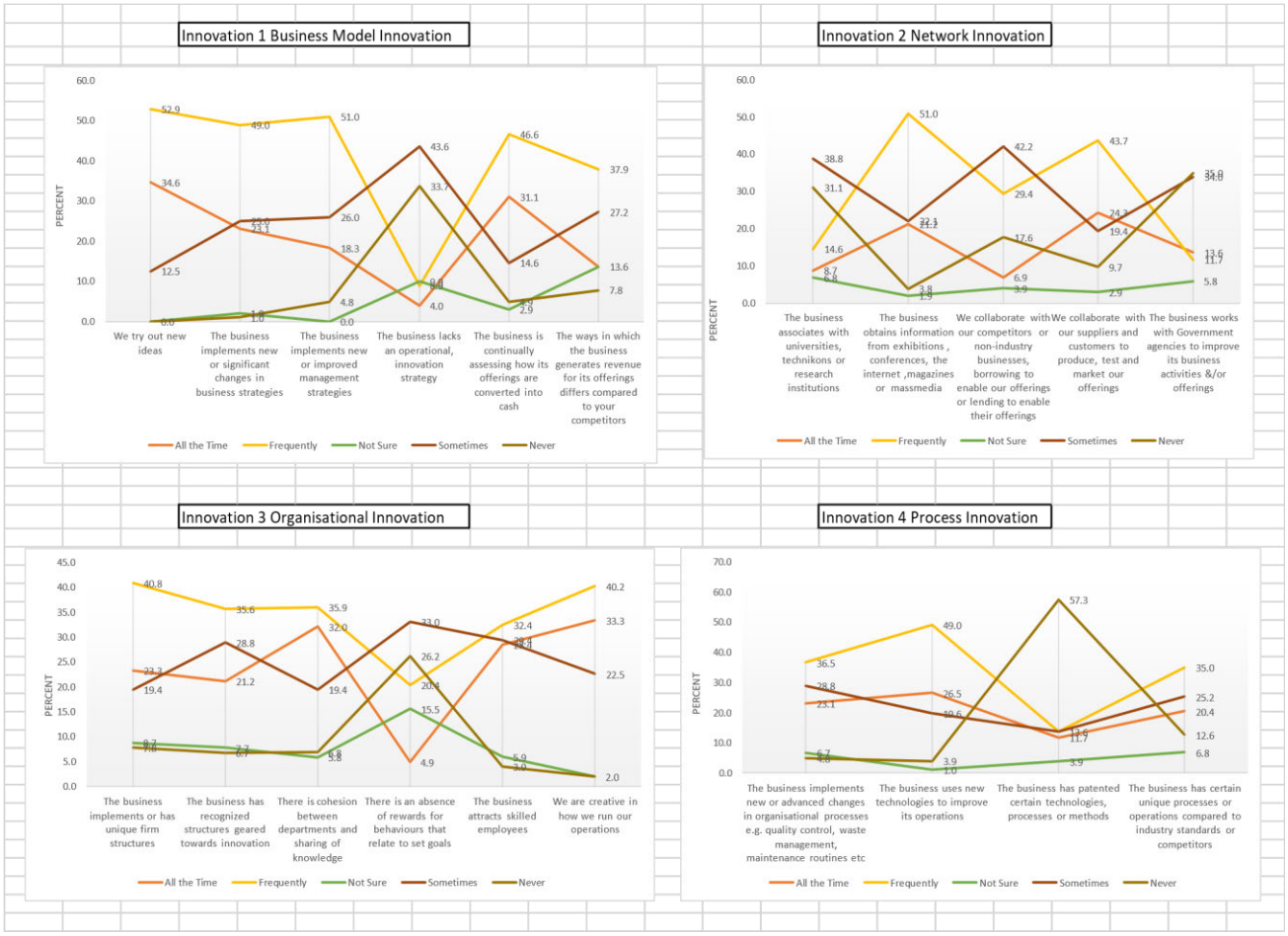


Figure 4.5 1 Innovation types – Organisational Facilitators

Majority of the SMMEs engage in business model innovation either ‘all the time’ or ‘frequently. Just under forty percent (33.7%) of SMMEs state that they do not have an operational innovation strategy with 52.9% frequently trying out new ideas. Over 50% often change management strategies with 46.6% reviewing how their offerings generate revenue.

The following patterns are observed for business model innovation:

- There are high levels of scoring percentages for the five of the six statements for ‘frequently’ and ‘all the time’, (positive) combined. There are similar levels of ‘frequent’ use. There were low levels of ‘not sure’ use.
- The fourth statement ‘the business lacks an operational, innovation strategy’ has the lowest (positive) percentage combination. Even though this is the case, the statement is negatively directed so the actual response is

that 77% of the respondents actually believe that the business does have innovative strategies.

- There is a higher level of acitvity for business model innovation.

Curiously 31.1% of SMMEs state that they have never associated with tertiary education institutions or research organisations yet 51% frequently obtain information from exhibitions, magazines and media and 43.7 % frequently collaborate externally. However, only 13.6% of the SMMEs work with government agencies. The following patterns occur for network innovation:

- A slightly higher level of scoring percentages favors the scaling toward disagreement for three of the five statements. There are low levels of ‘not sure’ usage.
- There is a lower level of activity for network innovation.

SMMEs do engage in organisational innovation of which 40.2%, most of the time run their business creatively and 40.8% frequently implement distinctive structures. Interestingly most of the time 35.6% SMMEs have some form of distinct innovation units. The patterns that occur for organisational innovation are:

- The scoring for ‘frequently’ is high for five of the six statements with ‘not sure’ and ‘never’ having low levels of scoring.
- The negative statement of ‘there is an absence of rewards for behaviors that relate to set goals’ illustrate that approximately 60% of the respondents believe that there are rewards for goal achievements.
- There are high levels of organizational innovation.

Although 49% of SMMEs often use new technologies to make their processes better 57.3% of SMMEs have not patented any processes. The following patterns emerge for process innovation:

- For three of the four indicators a combined scoring of ‘all the time’ and ‘frequently’ is higher. There is a low scoring of ‘not sure’.
- Over half of the respondents do not agree with one of the four statements.

- There is higher level of activity for process innovation.

For each of the innovation types categorised as organisational facilitators the frequencies are greater for majority of the innovation indicators in agreement with the statement. This runs true for business model innovation, organisational innovation and process innovation, indicating positive activity of SMMEs. The exception is network innovation were two of the five measures received a higher negative response.

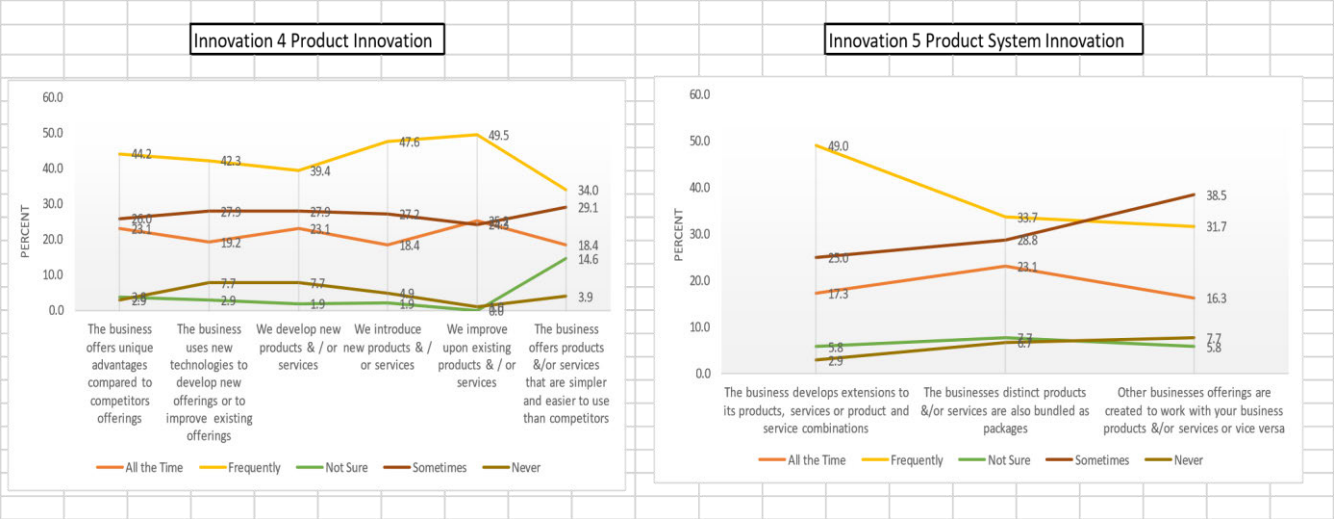


Figure 4.5 2 Innovation Types – Product Output

Almost half of the SMMEs (49.5%) engage in incremental innovation with 47.6% introducing new products and 44% have different products compared to competitors. The following patterns emerge for product innovation:

- Across all six indicators the frequencies are greater for ‘frequently. The scorings are low for ‘not sure’ and ‘never’.
- There are similar levels of ‘frequent’ use scoring.
- There is a high level of activity for product innovation.

Just under fifty percent (49%) of the respondents frequently add extensions to their offerings. The following patterns emerge for product system innovation:

- A higher scoring favour the scaling towards agreement of all three statements.
- There is low ‘not sure’ and ‘never’ scorings.
- There is a higher positive level of activity for product system innovation.

Product output innovation type results, revealed a higher scoring for respondents agreeing favourably to almost all the statements, indicating SMMEs do actively participate in product innovation and product system innovation.

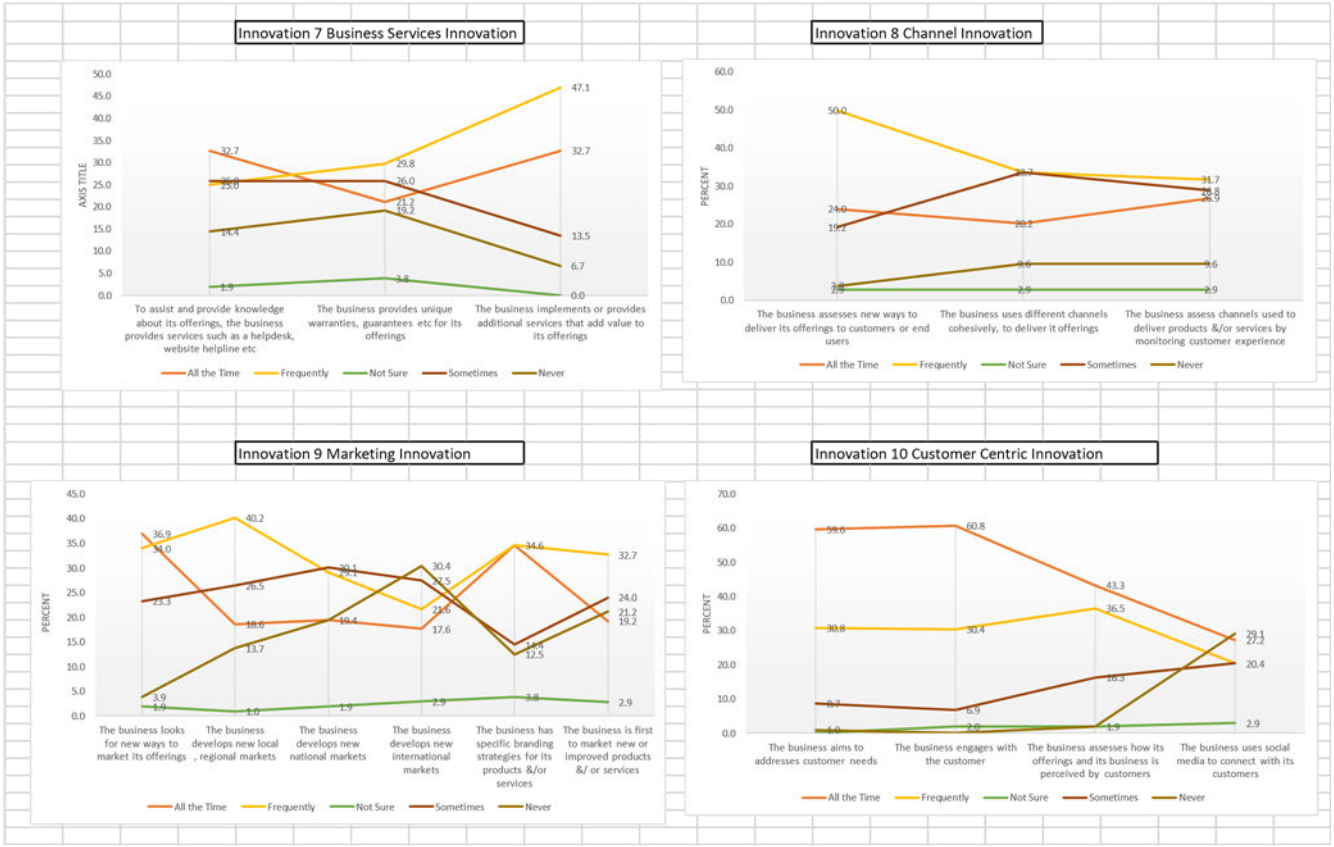


Figure 4.5 3 Innovation Types – Output Activities

Even though 32.7% provide extensive additional services to their products ‘at all times’ 47% of SMMEs indicated that their innovative activities ‘frequently’ involve providing additive services to their business offerings. The following patterns are observed for business services innovation:

- The combined scoring of ‘all the time’ and ‘frequently’ favours a high scoring in agreement with all three of the statements. There is a low usage of ‘not sure’.
- There is a fairly moderate combined scoring for ‘never’ for two of the three statements.
- There is a high level of activity for business service innovation.

Remarkably 28.8%% stated only sometimes do they asses delivery against customer experience but 50% indicated they actively looking at innovative methods of product delivery. The following patterns are observed for channel innovation:

- The scoring for ‘all the time’ and ‘frequently’ is high with the latter the highest across the scale for all three statements. There is a low scoring for ‘not sure’.
- The frequency for the statement ‘the business uses different channels cohesively to deliver its offerings’ is the same for ‘frequently’ and ‘sometimes’. The balance of scoring along the scale is evident in the graphical representation of channel innovation.
- There is a higher level of activity for channel innovation.

Respondents engage in many of the marketing innovation indicators. However, 30% of the SMMEs do not trade in international markets but 40% develop new local and regional markets. The following trends emerge for marketing innovation:

- There is a higher scoring for ‘frequently’ for four out of six of the statements. There is a low usage of ‘not sure’.

- Almost half of the respondents favour the statement ‘the business develops new national markets’ with the other half favouring the scale towards disagreement.
- There is a high level of activity for marketing innovation.

Apart from 29% not using social media to connect with customers, 60% of the SMMEs are ‘at all times’ actively engaging with customers and addressing their needs. The following patterns are observed for customer-centric innovation:

- There are high scorings for ‘all the time’ for three of the four statements.
- There is a fairly equal distribution of scoring across the scale for the statement ‘the business uses social media to connect with its customers’.
- There is a low usage of ‘not sure’.
- There is substantial activity for customer-centric innovation.

For each of the innovation types categorised under output activities, the frequencies are greater in majority, if not all, of the innovation indicators, agreeing with the respective statements. Hence SMMEs are actively innovating for business services innovation, channel innovation, marketing innovation and customer centric innovation.

### 4.5.1 Predominant Innovation Type

Cumulative presentation of innovations 1 to 10 by percentages is presented below. High frequency is a combination of responses to innovative activities scales: ‘all the time’ and ‘frequently’. Low frequency is a combination of responses to innovative activities scales ‘sometimes’ and ‘never’. Neutral is equivalent to the scale response ‘not sure’.

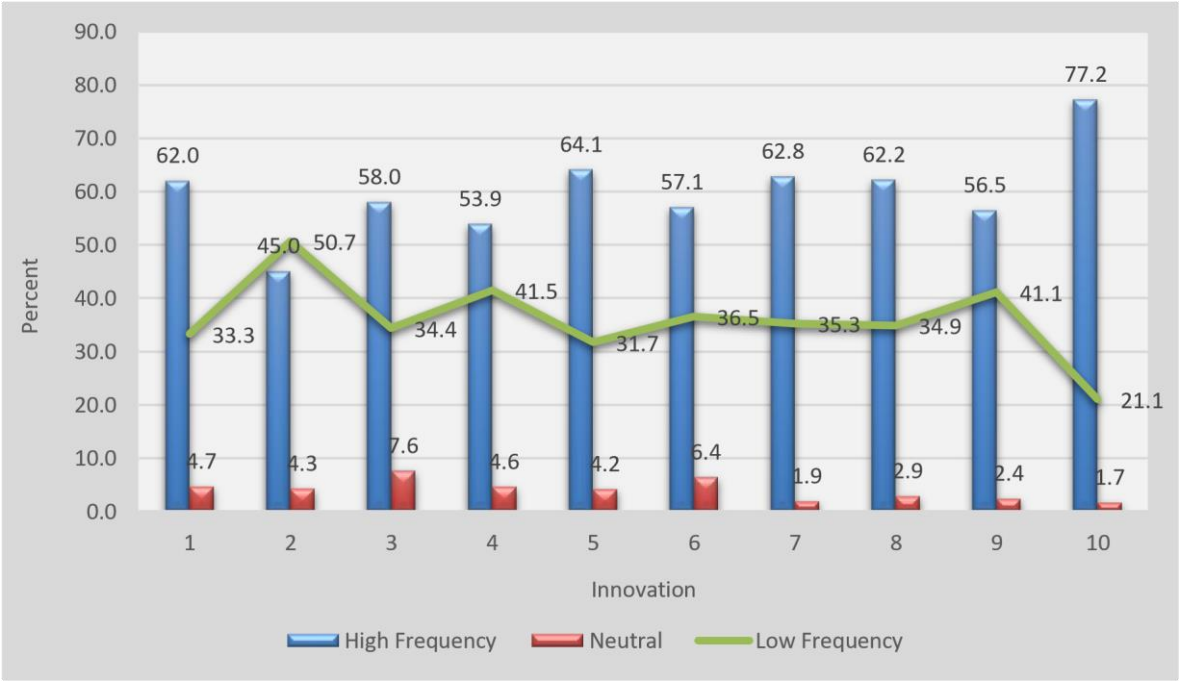


Figure 4.5.1 1 Innovation Type Predominance

From the above graph it is noted clearly that South African SMMEs engage in all of the identified innovation types except for Innovation 2; network innovation.
According to the high and low frequency results the innovation types that SMMEs engage in most, to the least, is ranked in Table 4.5.1.1.

Table 4.5.1 1 Predominant Innovation Types

| Innovation Type | % High Frequency |
|---|---|
| Customer Centric Innovation | 77.2 |
| Product Innovation | 64.1 |
| Business Services Innovation | 62.8 |
| Channel Innovation | 62.2 |
| Business Model Innovation | 62.0 |
| Organisational Innovation | 58.0 |
| Product System Innovation | 57.1 |
| Marketing Innovation | 56.5 |
| Process Innovation | 53.9 |
| Network Innovation | 45.0 |

As can be seen from the above table, results have resoundingly shown that SMMEs engage in nine of the ten innovation types. Customer centric innovation is the most predominant followed by product innovation, business services innovation, channel innovation, and business model innovation.

## 4.6 Intensity of Innovation

To determine how embedded or how much SMMEs innovate, two variables were introduced namely: breadth and depth.

### 4.6.1 Breadth

Breadth refers to how extensive or widespread is innovation. The table below demonstrates the percentage of activity along each of the innovation types. Note with rescoring there are 'Yes' and 'No' responses along the breadth of innovation types. There is a resultant 53.8% aggregate scoring.

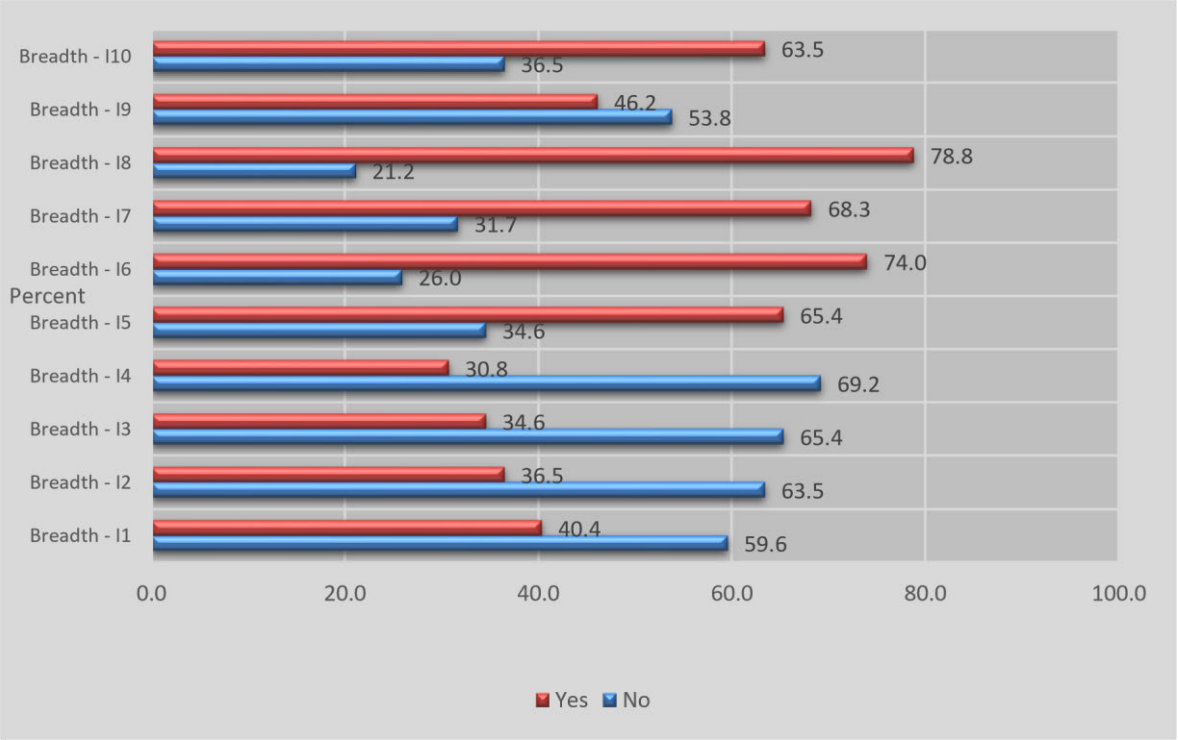


Figure 4.6.1 1 Innovation Type Breadth

A graphical representation to demonstrate the value of the breadth of innovative activities along the innovation types is illustrated above. The breadth of innovation is greater for Innovation 5 (product), Innovation 6 (product systems), Innovation 7 (business services), Innovation 8 (marketing) and Innovation 10 (customer centric). SMMEs intensely innovate along five of the ten innovation types.

### 4.6.2 Depth

Depth refers to how deep or how often SMMEs innovate along the innovation types. Again, note the rescoring. An aggregate of 26.8% is obtained in the percentage depth of innovation types.

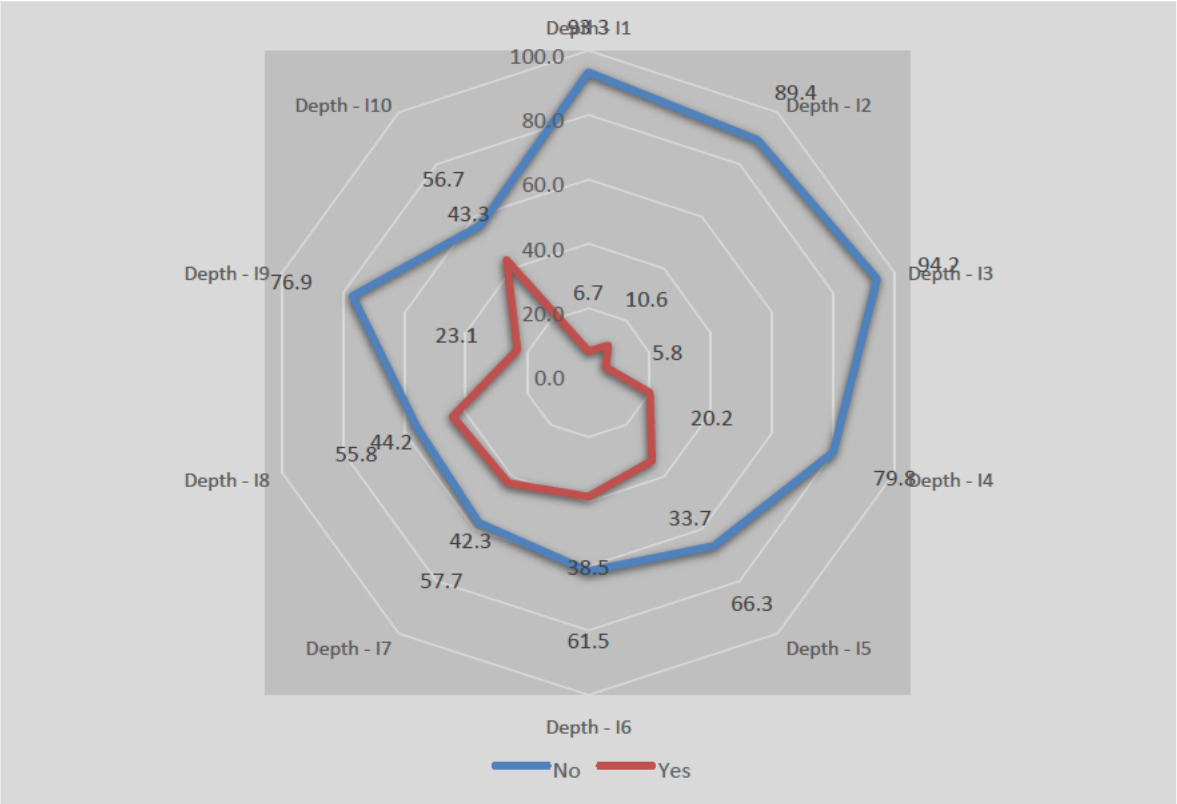


Figure 4.6.1 2 Innovation Type Depth

Note, in some instances, 'yes' is significantly more, whilst in others, significantly more indicated 'no'. The depth of innovation is low for all of the ten innovation types. In Innovation 8 (channel) there is a slightly higher activity rate amongst the low depth of innovation.

## 4.7 Firm Size impact on Intensity Breadth and Depth

Table 4.7 1 The Kruskal-Wallis test on Firm Size

| Kruskal-Wallis test | |
|---|---|
| P value | 0.8301 |
| Exact or approximate P value? | Gaussian Approximation |
| P value summary | ns |
| Do the medians vary signif. (P < 0.05) | No |
| Number of groups | 3 |
| Kruskal-Wallis statistic | 0.3725 |

The statistical analysis of firm size data of three years has shown there is no significant difference in the composition of the staff complement (p = 0.8301) (Table 4.7.1). This allows for ease of further statistical analysis.

For Pearson's chi -square Test, the p-value (asymptotic significance (2-sided) of < 0.05, indicates a significant relationship between the variables. For Fisher's Exact Test p-value (Exact Sig. (2-sided) of < 0.05, means, between the variables there is also a significant relationship. Values greater than 0.05, signifies no relationship. The results of the preferred Fisher's test value are illustrated. Only those that have been found to have a significant relationship with firm size are shown below.

Table 4.7 2 Firm Size and Breadth

| | Chi-Square Tests | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Fisher's Exact Test | | | | | |
| Innovation Breadth | INV 1 | INV 2 | INV 3 | INV 4 | INV 5 | INV 6 | INV 7 | INV 8 | INV 9 | INV 10 |
| vs | | | | | | | | | | |
| Average Staff Complement | 0.213 | 0.047 | 0.090 | 0.024 | 0.982 | 0.350 | 0.371 | 0.604 | 0.410 | 0.734 |

The impact of firm size on the intensity of innovation is measured along the breadth and depth of innovation types. It has been found that there is a relationship between firm size and the breadth of innovation 2 (network) and 4 (process). This is shown in Tables 4.7.2.

Table 4.7 3 Firm Size and Depth

| | Chi-Square Tests | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Fisher's Exact Test | | | | | |
| Innovation Depth | INV 1 | INV 2 | INV 3 | INV 4 | INV 5 | INV 6 | INV 7 | INV 8 | INV 9 | INV 10 |
| vs | | | | | | | | | | |
| Average Staff Complement | 0.200 | 0.217 | 0.245 | 0.305 | 0.475 | 0.420 | 0.026 | 0.792 | 0.347 | 0.657 |

It has been found that firm size impacts only the depth of innovation 7 (business services), as seen in Table 4.7.3.

## 4.8 Firm Size impact on Type

Using partial eta squared which measures effect size it is shown that there is a large impact of firm size on innovation types 4 and 9.

Table 4.8 1 Partial eta Squared, Effect Size and Firm size

| Dependent Variable | | Partial Eta | Effect |
|---|---|---|---|
| Question | Section | Squared | Size |
| Innovation 1 | Business Model Innovation | 0.028 | Small |
| Innovation 2 | Network Innovation including open In | 0.076 | Medium |
| Innovation 3 | Organisational Innovation | 0.061 | Medium |
| Innovation 4 | Process Innovation | 0.100 | Large |
| Innovation 5 | Product Innovation | 0.044 | Small to Medium |
| Innovation 6 | Product System Innovation | 0.051 | Medium |
| Innovation 7 | Business Services Innovation | 0.088 | Medium |
| Innovation 8 | Channel Innovation | 0.054 | Medium |
| Innovation 9 | Marketing Innovation | 0.129 | Large |
| Innovation 10 | Customer Centric Innovation | 0.079 | Medium |
| Independent Variable = Firm Size | | | |

The mean innovation scores were used as the dependent variable (one at a time) with the independent variable being firm size (for each instance). According to the categorization guide, the partial eta squared values are allotted an effect size. For example: Firm size has a small effect on Business Model Innovation (Innovation 1) (partial eta squared $\eta^2 = 0.028$). An inspection of the mean values across the six different firm sizes shows no significant difference (overall average = 2.58).

Table 4.8 2 Firm Size and Innovation Types

**Report**

| Average permanent employees in the business | Number of | usiness Model Innovation | Network nnovation including open Innovation and user Innovation | Organisational Innovation | Process Innovation | Product Innovation | Product System Innovation | Business Services Innovation | Marketing Innovation | Customer Centric Innovation |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 – 4 | Mean | 2.5676 | 2.1192 | 2.2486 | 1.9889 | 2.3638 | 2.3514 | 2.2522 | 2.1605 | 2.9392 |
| | N | 37 | 37 | 37 | 37 | 37 | 37 | 37 | 37 | 37 |
| | Std. Deviatio | 0.94400 | 0.90325 | 0.73546 | 1.09799 | 0.99758 | 1.19527 | 1.11246 | 1.17649 | 0.94539 |
| 5 – 9 | Mean | 2.5556 | 1.8889 | 2.5111 | 2.3056 | 2.9367 | 2.1111 | 2.1833 | 2.1489 | 3.4444 |
| | N | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 | 9 |
| | Std. Deviatio | 1.26106 | 0.72044 | 0.61734 | 1.04416 | 0.79191 | 1.19315 | 1.33520 | 0.80264 | 0.59658 |
| 10 – 19 | Mean | 2.5455 | 1.7027 | 2.2727 | 1.7045 | 2.3373 | 2.0455 | 2.0300 | 1.7882 | 2.4545 |
| | N | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 | 11 |
| | Std. Deviatio | 1.19278 | 0.92455 | 1.11453 | 1.25906 | 1.33602 | 1.15010 | 1.72958 | 1.26478 | 1.30297 |
| 20 – 49 | Mean | 2.3636 | 1.8173 | 2.3455 | 2.2236 | 2.5714 | 1.9091 | 2.6509 | 2.1168 | 3.0227 |
| | N | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 |
| | Std. Deviatio | 1.08213 | 0.84965 | 0.72816 | 0.89072 | 0.95976 | 1.25960 | 1.08675 | 0.99459 | 0.69398 |
| 50 – 99 | Mean | 2.5625 | 1.7913 | 2.1750 | 1.7500 | 2.3025 | 2.1250 | 2.0425 | 1.9700 | 2.7188 |
| | N | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| | Std. Deviatio | 0.97970 | 0.78014 | 0.64531 | 0.92582 | 1.01598 | 1.24642 | 1.29167 | 0.99615 | 1.03023 |
| 100 - 199 | Mean | 2.9063 | 2.4250 | 2.7500 | 2.7656 | 2.7788 | 2.7188 | 3.1044 | 3.1206 | 3.2188 |
| | N | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 | 16 |
| | Std. Deviatio | 0.63819 | 0.65761 | 0.52915 | 0.64852 | 0.73472 | 0.93039 | 0.81355 | 0.75795 | 0.65749 |
| Total | Mean | 2.5728 | 2.0121 | 2.3670 | 2.1384 | 2.5150 | 2.2427 | 2.4237 | 2.2448 | 2.9757 |
| | N | 103 | 103 | 103 | 103 | 103 | 103 | 103 | 103 | 103 |
| | Std. Deviatio | 0.98620 | 0.84914 | 0.74523 | 1.02782 | 0.97868 | 1.17336 | 1.20523 | 1.09899 | 0.89970 |

However, firm size does have a large effect on Innovation 9 (partial eta squared $\eta^2$ = 0.129) and Innovation 4 (partial eta squared $\eta^2$= 0.100). An inspection of the mean values indicates that the larger firms have larger mean values. This means that larger firms (i.e. medium SMMEs) impact Innovation 9 (marketing) and Innovation 4 (process) more. It must be noted that for this analysis, the coding was reversed: 5 = all of the time and 1 = never. Therefore, the bigger the mean, the higher the frequency.

## 4.9 Financial Performance impact on Intensity Breadth and Depth

Six comparative financial measures are used to measure financial performance.

Table 4.9 1 Financial Performance vs Innovation Breadth

| | Chi-Square Tests | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | Fisher's Exact Test | | | | | |
| Innovation Breadth | INV 1 | INV 2 | INV 3 | INV 4 | INV 5 | INV 6 | INV 7 | INV 8 | INV 9 | INV 10 |
| vs | | | | | | | | | | |
| Your business's return on investment (ROI) compared to your competitors | 0.780 | 0.074 | 0.289 | 0.208 | 0.733 | 0.628 | 0.108 | 0.017 | 0.015 | 0.079 |
| Your business's sales growth compared to your competitors' | 0.953 | 0.324 | 0.644 | 0.026 | 0.745 | 0.173 | 0.078 | 0.004 | 0.005 | 0.106 |
| Your business's market share compared to your competitors' | 0.285 | 0.501 | 0.043 | 0.341 | 0.203 | 0.785 | 0.159 | 0.050 | 0.028 | 0.029 |
| Your business's operating costs compared to your competitors' | 0.471 | 0.031 | 0.108 | 0.107 | 0.572 | 0.252 | 0.259 | 0.027 | 0.226 | 0.788 |
| Your business's productivity compared to your competitors' | 0.165 | 0.827 | 0.496 | 0.044 | 0.249 | 0.014 | 0.138 | 0.004 | 0.003 | 0.002 |
| Your business's return on assets (ROA) compared to your competitors' | 0.117 | 0.197 | 0.260 | 0.666 | 0.312 | 0.033 | 0.082 | 0.002 | 0.095 | 0.405 |

There is a significant relationship between the breadth of almost all innovation types and financial performance. The intensity breadth, of Innovation types 2 (network), 3 (organisational), 4 (process), 6 (product system), 8 (channel), 9 (marketing) and 10 (customer centric) impact financial performance and vice versa. All the significant relationships with each of the specific performance measure and innovation type breadth are shown in the table above (Table 4.9.1).

Table 4.9 2 Financial Performance vs Innovation Depth

| | Chi-Square Tests | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Fisher's Exact Test | | | | |
| Innovation Depth | INV 1 | INV 2 | INV 3 | INV 4 | INV 5 | INV 6 | INV 7 | INV 8 | INV 9 | INV 10 |
| vs | | | | | | | | | | |
| Your business's return on investment (ROI) compared to your competi | 0.349 | 0.200 | 1.000 | 0.297 | 0.013 | 0.587 | 0.049 | 0.321 | 0.322 | 0.033 |
| Your business's sales growth compared to your competitors' | 0.766 | 0.581 | 0.659 | 0.038 | 0.238 | 0.601 | 0.018 | 0.014 | 0.027 | 0.003 |
| Your business's market share compared to your competitors' | 0.860 | 0.319 | 1.000 | 0.321 | 0.066 | 0.658 | 0.337 | 0.165 | 0.118 | 0.086 |
| Your business's operating costs compared to your competitors' | 0.143 | 0.594 | 0.909 | 0.695 | 0.070 | 0.482 | 0.356 | 0.289 | 0.427 | 0.108 |
| Your business's productivity compared to your competitors' | 0.835 | 0.957 | 0.853 | 0.368 | 0.074 | 0.373 | 0.005 | 0.065 | 0.191 | 0.011 |
| Your business's return on assets (ROA) compared to your competitors | 0.438 | 0.427 | 1.000 | 0.680 | 0.005 | 0.617 | 0.060 | 0.106 | 0.409 | 0.172 |

Significant relationships are found between innovation depth of innovations types 4 (process), 5 (product), 7 (business services), 8 (channel), 9 (marketing), 10 (customer centric) and specific financial performance measures. Each relationship is shown in the tables above (Table 4.10.2).

## 4.10 Financial Performance Impact on Type

As can be seen there is a significant correlation between financial performance and all innovation types. The financial performance measure of operating costs is not correlated to any of the ten Innovation types. All correlations are highlighted in Table 4.10.1.

Table 4.10 1 Performance and Innovation Types

| | | Business Model Innovation | Network Innovation including open Innovation and user Innovation | Organisational Innovation | Process Innovation | Product Innovation | Product System Innovation | Business Services Innovation | Channel Innovation | Marketing Innovation | Customer Centric Innovation | Your business's return on investment (ROI) compared to your competitors' | Your business's sales growth compared to your competitors' | Your business's market share compared to your competitors' | Your business's operating costs compared to your competitors' | Your business's productivity compared to your competitors' | Your business's return on assets (ROA) compared to your competitors' |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Business Model Innovation | Pearson Correlation | 1 | .450** | .416** | .438** | .583** | .369** | .293** | .443** | .456** | .449** | 0.188 | 0.184 | .216* | 0.076 | .239* | .279** |
| | Sig. (2-tailed) | | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.003 | 0.000 | 0.000 | 0.000 | 0.062 | 0.067 | 0.031 | 0.452 | 0.018 | 0.005 |
| | N | 104 | 104 | 104 | 104 | 104 | 104 | 104 | 104 | 104 | 104 | 99 | 100 | 100 | 100 | 98 | 100 |
| Network Innovation including open Innovation and user Innovation | Pearson Correlation | .450** | 1 | .464** | .544** | .551** | .567** | .472** | .597** | .645** | .567** | 0.035 | 0.177 | 0.109 | -0.060 | .211* | 0.136 |
| | Sig. (2-tailed) | 0.000 | | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.732 | 0.078 | 0.280 | 0.550 | 0.037 | 0.179 |
| | N | 104 | 104 | 104 | 104 | 104 | 104 | 104 | 104 | 104 | 104 | 99 | 100 | 100 | 100 | 98 | 100 |
| Organisational Innovation | Pearson Correlation | .416** | .464** | 1 | .718** | .676** | .597** | .670** | .586** | .667** | .621** | .279** | .365** | .260** | 0.177 | .336** | .257** |
| | Sig. (2-tailed) | 0.000 | 0.000 | | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.005 | 0.000 | 0.009 | 0.078 | 0.001 | 0.010 |
| | N | 104 | 104 | 104 | 104 | 104 | 104 | 104 | 104 | 104 | 104 | 99 | 100 | 100 | 100 | 98 | 100 |
| Process Innovation | Pearson Correlation | .438** | .544** | .718** | 1 | .712** | .455** | .622** | .652** | .683** | .652** | .398** | .535** | .414** | 0.105 | .470** | .323** |
| | Sig. (2-tailed) | 0.000 | 0.000 | 0.000 | | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.300 | 0.000 | 0.001 |
| | N | 104 | 104 | 104 | 104 | 104 | 104 | 104 | 104 | 104 | 104 | 99 | 100 | 100 | 100 | 98 | 100 |
| Product Innovation | Pearson Correlation | .583** | .551** | .676** | .712** | 1 | .631** | .650** | .666** | .665** | .649** | .324** | .415** | .306** | 0.183 | .388** | .329** |
| | Sig. (2-tailed) | 0.000 | 0.000 | 0.000 | 0.000 | | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.001 | 0.000 | 0.002 | 0.068 | 0.000 | 0.001 |
| | N | 104 | 104 | 104 | 104 | 104 | 104 | 104 | 104 | 104 | 104 | 99 | 100 | 100 | 100 | 98 | 100 |
| Product System Innovation | Pearson Correlation | .369** | .567** | .597** | .455** | .631** | 1 | .519** | .543** | .618** | .529** | 0.193 | .240* | 0.190 | 0.140 | .220* | 0.144 |
| | Sig. (2-tailed) | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | | 0.000 | 0.000 | 0.000 | 0.000 | 0.055 | 0.016 | 0.058 | 0.164 | 0.030 | 0.152 |
| | N | 104 | 104 | 104 | 104 | 104 | 104 | 104 | 104 | 104 | 104 | 99 | 100 | 100 | 100 | 98 | 100 |
| Business Services Innovation | Pearson Correlation | .293** | .472** | .670** | .622** | .650** | .519** | 1 | .747** | .706** | .672** | .279** | .408** | .205* | 0.104 | .341** | .227* |
| | Sig. (2-tailed) | 0.003 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | | 0.000 | 0.000 | 0.000 | 0.005 | 0.000 | 0.040 | 0.302 | 0.001 | 0.023 |
| | N | 104 | 104 | 104 | 104 | 104 | 104 | 104 | 104 | 104 | 104 | 99 | 100 | 100 | 100 | 98 | 100 |
| Channel Innovation | Pearson Correlation | .443** | .597** | .586** | .652** | .666** | .543** | .747** | 1 | .776** | .747** | .278** | .432** | .241* | 0.066 | .345** | .283** |
| | Sig. (2-tailed) | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | | 0.000 | 0.000 | 0.005 | 0.000 | 0.016 | 0.511 | 0.001 | 0.004 |
| | N | 104 | 104 | 104 | 104 | 104 | 104 | 104 | 104 | 104 | 104 | 99 | 100 | 100 | 100 | 98 | 100 |
| Marketing Innovation | Pearson Correlation | .456** | .645** | .667** | .683** | .665** | .618** | .706** | .776** | 1 | .732** | .329** | .430** | .254* | 0.068 | .337** | .207* |
| | Sig. (2-tailed) | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | | 0.000 | 0.001 | 0.000 | 0.011 | 0.503 | 0.001 | 0.038 |
| | N | 104 | 104 | 104 | 104 | 104 | 104 | 104 | 104 | 104 | 104 | 99 | 100 | 100 | 100 | 98 | 100 |
| Customer Centric Innovation | Pearson Correlation | .449** | .567** | .621** | .652** | .649** | .529** | .672** | .747** | .732** | 1 | .382** | .506** | .334** | 0.134 | .493** | .341** |
| | Sig. (2-tailed) | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | | 0.000 | 0.000 | 0.001 | 0.184 | 0.000 | 0.001 |
| | N | 104 | 104 | 104 | 104 | 104 | 104 | 104 | 104 | 104 | 104 | 99 | 100 | 100 | 100 | 98 | 100 |
| Your business's return on investment (ROI) compared to your competitors' | Pearson Correlation | 0.188 | 0.035 | .279** | .398** | .324** | 0.193 | .279** | .278** | .329** | .382** | 1 | .679** | .585** | .617** | .659** | .739** |
| | Sig. (2-tailed) | 0.062 | 0.732 | 0.005 | 0.000 | 0.001 | 0.055 | 0.005 | 0.005 | 0.001 | 0.000 | | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| | N | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 99 | 98 | 99 |
| Your business's sales growth compared to your competitors' | Pearson Correlation | 0.184 | 0.177 | .365** | .535** | .415** | .240* | .408** | .432** | .430** | .506** | .679** | 1 | .719** | .265** | .707** | .565** |
| | Sig. (2-tailed) | 0.067 | 0.078 | 0.000 | 0.000 | 0.000 | 0.016 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | | 0.000 | 0.008 | 0.000 | 0.000 |
| | N | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 99 | 100 | 100 | 100 | 98 | 100 |
| Your business's market share compared to your competitors' | Pearson Correlation | .216* | 0.109 | .260** | .414** | .306** | 0.190 | .205* | .241* | .254* | .334** | .585** | .719** | 1 | .312** | .470** | .474** |
| | Sig. (2-tailed) | 0.031 | 0.280 | 0.009 | 0.000 | 0.002 | 0.058 | 0.040 | 0.016 | 0.011 | 0.001 | 0.000 | 0.000 | | 0.002 | 0.000 | 0.000 |
| | N | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 99 | 100 | 100 | 100 | 98 | 100 |
| Your business's operating costs compared to your competitors' | Pearson Correlation | 0.076 | -0.060 | 0.177 | 0.105 | 0.183 | 0.140 | 0.104 | 0.066 | 0.068 | 0.134 | .617** | .265** | .312** | 1 | .412** | .628** |
| | Sig. (2-tailed) | 0.452 | 0.550 | 0.078 | 0.300 | 0.068 | 0.164 | 0.302 | 0.511 | 0.503 | 0.184 | 0.000 | 0.008 | 0.002 | | 0.000 | 0.000 |
| | N | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 99 | 100 | 100 | 100 | 98 | 100 |
| Your business's productivity compared to your competitors' | Pearson Correlation | .239* | .211* | .336** | .470** | .388** | .220* | .341** | .345** | .337** | .493** | .659** | .707** | .470** | .412** | 1 | .664** |
| | Sig. (2-tailed) | 0.018 | 0.037 | 0.001 | 0.000 | 0.000 | 0.030 | 0.001 | 0.001 | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | | 0.000 |
| | N | 98 | 98 | 98 | 98 | 98 | 98 | 98 | 98 | 98 | 98 | 98 | 98 | 98 | 98 | 98 | 98 |
| Your business's return on assets (ROA) compared to your competitors' | Pearson Correlation | .279** | 0.136 | .257** | .323** | .329** | 0.144 | .227* | .283** | .207* | .341** | .739** | .565** | .474** | .628** | .664** | 1 |
| | Sig. (2-tailed) | 0.005 | 0.179 | 0.010 | 0.001 | 0.001 | 0.152 | 0.023 | 0.004 | 0.038 | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | |
| | N | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 99 | 100 | 100 | 100 | 98 | 100 |

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

## 4.11 Overview

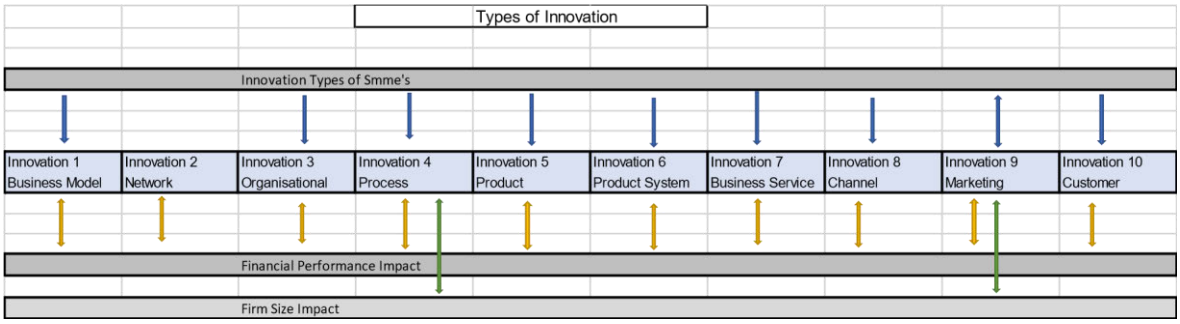


Figure 4.11 1 Overview of Types and Impact

The above figure provides an overview of the results for types of innovation in SMMEs and which of the innovation types impact or is impacted by financial performance and firm size.

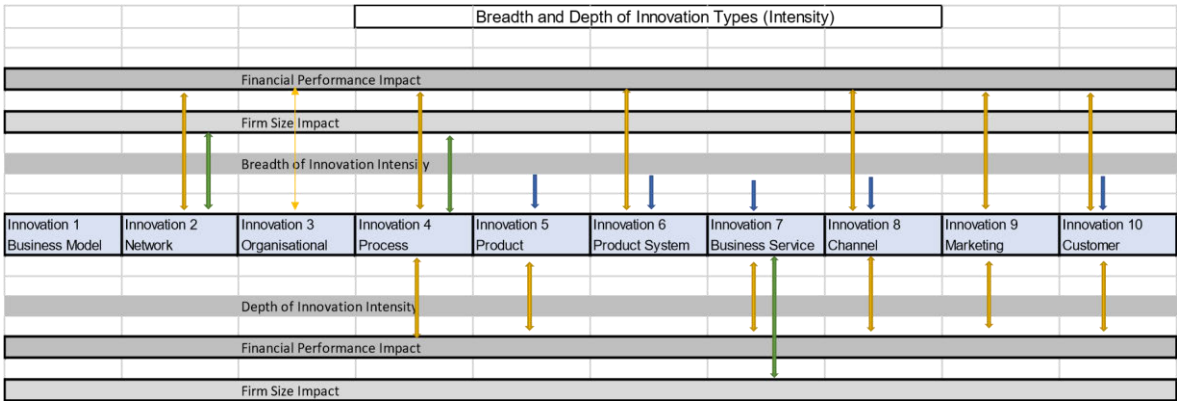


Figure 4.11 2 Overview of Intensity and Impact

An overview of the results for intensity of innovation in SMMEs is shown above together with the impact innovation intensity on financial performance and firm size.

## 4.12 Obstacles to Innovation

Two options of “Do not agree” or “Agree” were used to measure responses to obstacles that are encountered by SMMEs.

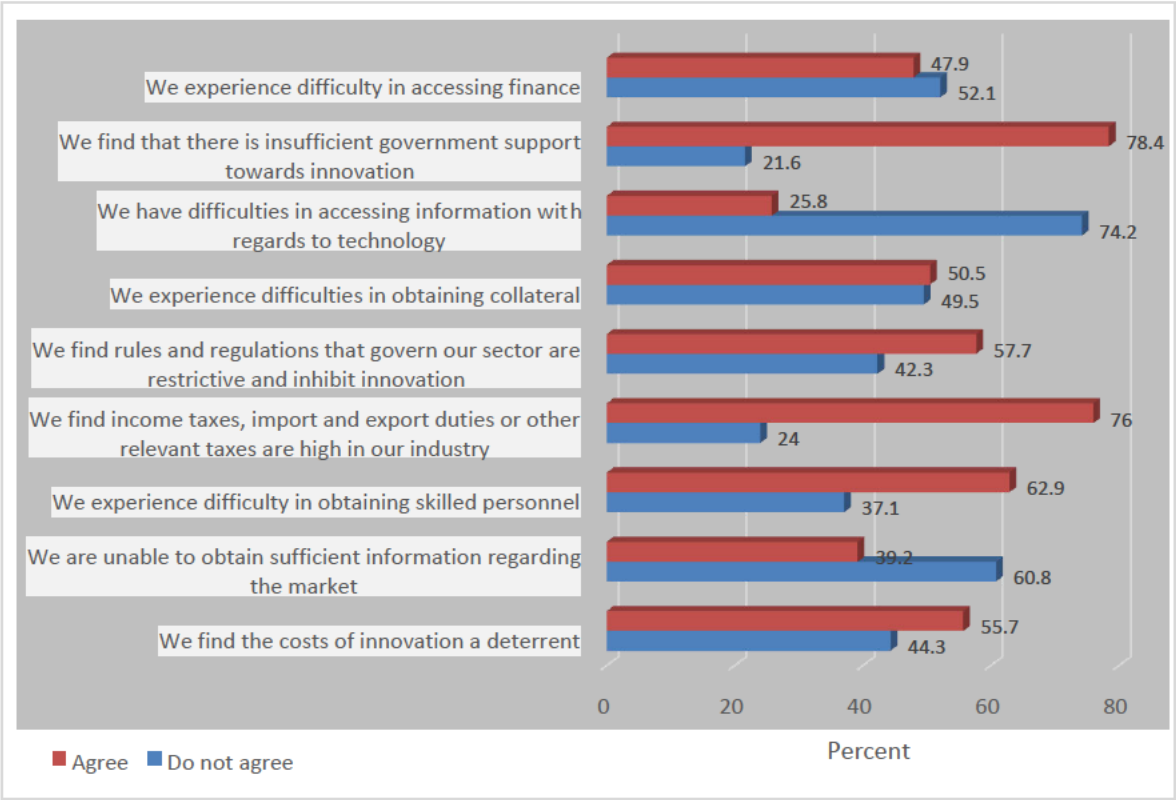


Figure 4.12 1 Obstacles to Innovation

Of all the obstacles listed 78.4% reported that government support is a significant barrier to innovation. Taxes and duties are a challenge for SMMEs with 76% of SMMEs reporting it hindered innovation. Obtaining skilled staff is a difficulty experienced by 62.9% of SMMEs.

## 4.13 Crosstabulations

Traditionally a statement of statistical significance is needed when presenting results. From a test static a resultant p-value is produced. A significant result of '$p < 0.05$' is marked with an asterisk. To determine if there was a statistically significant association between the variables, rows vs columns, a second Chi square test was conducted. There is no relationship between the two variables for the null hypothesis. The alternate hypothesis signifies that there is a relationship.

## Table 4.13 1 Significant Crosstabulations

**Pearson Chi-Square Tests (Sig p < 0.05 )**

| | | Gender | Age | Position held in the business | Number of years of business experience | Number of permanent employees in the business - 2008 | Number of permanent employees in the business - 2011 | Number of permanent employees in the business - 2014 | Percentage of staff involved in Research and Developmen t |
|---|---|---|---|---|---|---|---|---|---|
| The business implements new or significant changes in business strategies | Business Model Innovation | | .000* | | | | | | |
| The business implements new or improved management strategies | | | .005* | | | | | | |
| The business utilizes information from exhibitions, conferences, the internet, magazines or the mass media | Network Innovation | | | .000* | | | | | |
| The business works with Government agencies to improve its business activities &/or offerings | | | | .010* | | | | | |
| There is cohesion between departments and sharing of knowledge | Organisational Innovation | | | .048* | | | | | |
| We are creative in how we run our operations | | | | .004* | | | | | |
| The business offers unique advantages compared to competitors' offerings | Product Innovation | | | | | | | | .036* |
| The business uses new technologies to develop new offerings or to improve existing offerings | | | | | | | | | .030* |
| We improve upon existing products &/or services | | | | | | | | | .009* |
| To assist and provide knowledge about its offerings, the business provides services such as a helpdesk, website helpline etc | Business Services Innovation | .033* | | | | | | | |
| The business provides unique warranties, guarantees etc for its offerings | | .022* | | | | .045* | | | |
| The business implements or provides additional services that add value to its offerings | | | | | | .020* | | | |
| The business develops new national markets | Marketing Innovation | | | | | | | .029* | |
| The business develops new international markets | | | | .001* | | | | .019* | |
| The business is first to market new or improved products &/or services | | | | .017* | | | | .030* | |
| Your business's sales growth compared to your competitors' | Financial Performance | | | | .000* | | | | |
| Your business's market share compared to your competitors' | | | | | .000* | | | | |
| Your business's operating costs compared to your competitors' | | | | | .002* | | | | |
| Your business's productivity compared to your competitors' | | | | | .000* | | | | |
| Your business's return on assets (ROA) compared to your competitors' | | | | | .000* | | | | |
| We experience difficulty in accessing finance | Obstacles | | | | | .005* | .001* | .000* | |
| We have difficulties in accessing information with regards to technology | | | | | | | | | |
| We experience difficulties in obtaining collateral | | | | | | .000* | .000* | .000* | |
| We find income taxes, import and export duties or other relevant taxes are high in our industry | | | | | | | | | |

Due to the large dataset the complete crosstabulation table has been placed in the appendix (Appendix 1). Quite a few significant relationships have been revealed and are highlighted in Table 4.13.1. For business model innovation: The p-value between “the business implements new or significant changes in business strategies and management strategies” and “age” is 0.000 and 0.005 respectively. This means that there is a significant relationship between the variables. The age of the respondent did play a significant role in terms of how respondents viewed business implementing new or significant changes in business and management strategies (business model innovation).

All values without an asterisk (or p-values more than 0.05) do not have a significant relationship (Appendix 1). Position held in the business is significantly related to both network and organisational innovation. The size of the business plays a meaningful role on innovative activities of both business services and marketing. Interestingly the percentage staff involved in research and development bears upon product development. Respondents business experience plays a considerable role in how they view financial measures such as sales growth, productivity, market share, operating costs and return on assets. There is also a relationship between firm size and difficulties in obtaining funds and collaterals by SMMEs.

## 4.14 Correlations

The data was also analysed using bivariate correlations. Significant relationships are marked with one or two asterisks. A directly proportional relationship between variables is established by resultant positive values and a negative value demonstrates an inverse relationship.

Table 4.14 1 Correlations by Innovation Types

| | | Business Model Innovation | Network Innovation including open Innovation and user Innovation | Organisational Innovation | Process Innovation | Product Innovation | Product System Innovation | Business Services Innovation | Channel Innovation | Marketing Innovation | Customer Centric Innovation |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Business Model Innovation | Pearson Correlation | 1 | | | | | | | | | |
| | Sig. (2-tailed) | | | | | | | | | | |
| | N | 103 | | | | | | | | | |
| Network Innovation including open Innovation and user Innovation | Pearson Correlation | .459** | 1 | | | | | | | | |
| | Sig. (2-tailed) | 0.000 | | | | | | | | | |
| | N | 103 | 104 | | | | | | | | |
| Organisational Innovation | Pearson Correlation | .457** | .465** | 1 | | | | | | | |
| | Sig. (2-tailed) | 0.000 | 0.000 | | | | | | | | |
| | N | 103 | 104 | 104 | | | | | | | |
| Process Innovation | Pearson Correlation | .449** | .545** | .718** | 1 | | | | | | |
| | Sig. (2-tailed) | 0.000 | 0.000 | 0.000 | | | | | | | |
| | N | 103 | 104 | 104 | 104 | | | | | | |
| Product Innovation | Pearson Correlation | .589** | .551** | .676** | .711** | 1 | | | | | |
| | Sig. (2-tailed) | 0.000 | 0.000 | 0.000 | 0.000 | | | | | | |
| | N | 103 | 104 | 104 | 104 | 104 | | | | | |
| Product System Innovation | Pearson Correlation | .409** | .567** | .597** | .455** | .631** | 1 | | | | |
| | Sig. (2-tailed) | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | | | | | |
| | N | 103 | 104 | 104 | 104 | 104 | 104 | | | | |
| Business Services Innovation | Pearson Correlation | .333** | .472** | .670** | .622** | .650** | .519** | 1 | | | |
| | Sig. (2-tailed) | 0.001 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | | | | |
| | N | 103 | 104 | 104 | 104 | 104 | 104 | 104 | | | |
| Channel Innovation | Pearson Correlation | .444** | .598** | .586** | .652** | .666** | .543** | .747** | 1 | | |
| | Sig. (2-tailed) | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | | | |
| | N | 103 | 104 | 104 | 104 | 104 | 104 | 104 | 104 | | |
| Marketing Innovation | Pearson Correlation | .476** | .645** | .667** | .683** | .665** | .618** | .706** | .776** | 1 | |
| | Sig. (2-tailed) | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | | |
| | N | 103 | 104 | 104 | 104 | 104 | 104 | 104 | 104 | 104 | |
| Customer Centric Innovation | Pearson Correlation | .442** | .567** | .621** | .652** | .649** | .529** | .672** | .747** | .732** | 1 |
| | Sig. (2-tailed) | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | |
| | N | 103 | 104 | 104 | 104 | 104 | 104 | 104 | 104 | 104 | 104 |

**. Correlation is significant at the 0.01 level (2-tailed).

Above are correlations between the ten innovation types. It is noted that all of the innovation types are strongly related with each other. The directly related proportionality indicates activity in one innovation type most often results in activity in another innovation type.

## 4.15 Summary

Graphical representation and tables are used to present results of the analysed data. Pertinent results are listed together with evident deductions. Further comprehensive discussion is needed to fully understand its implications. The following chapter elaborates on the results.

# Chapter Five: Discussion

## 5.1 Introduction

In this chapter discussion on the findings presented in chapter four is conducted. The statistically analysed results are discussed and then compared to other research studies. Necessary aspects relevant to the studies aims and objectives are debated.

## 5.2 Discussion of Research Results

All variables raised have tested positively for reliability and validity. Cronbach's Alpha readings have shown that the content is consistent. Factor analysis revealed that the content has measured what it set out to measure. These strengthen the findings of the survey. For, each of the innovation constructs: types one to ten and performance construct resulted in a reliability scoring (Cronbach alpha) of greater than 0.7, demonstrating stability, acceptability and consistency of the measures.

In contrast to studies such as Qiao, Ju, and Fung (2014) which showed the impact of formal research and development units on innovation, this study has shown SMMEs are innovating, even though 39.4% responded that less than 6% are involved in research and development. This is similar to Booyens (2011) findings which demonstrated that the levels of innovation in South African SMMEs are high.

Almost 60% of respondents have greater than twenty years of experience and 46.2% of SMME enterprises are more than twenty years old. This is confirmed by studies that have shown that innovation is impacted by the age of the business and managerial characteristics such as leadership abilities and experience (Laforet, 2013; Mbizi, Hove, Thondhlana, & Kakava, 2013).

### 5.2.1 Innovation Types

In this research the assessment has profiled the South African smme according to the three categories of innovation indicators: organisational facilitators, firm-level product outputs and output activities. These three categories shadow the three

broad categories of the South African innovation scorecard framework (National Advisory Council on Innovation, 2016).

Organisational facilitators consist of:

- business model innovation (Innovation 1),
- network innovation (Innovation 2),
- organizational innovation (Innovation 3) and
- process innovation ((Innovation 4).

The firm's product outputs (both tangible and intangibles; goods and services) consist of:

- product innovation (Innovation 5) and
- product system innovation (Innovation 6).

Output activities consist of:

- business services innovation (Innovation 7),
- channel innovation (Innovation 8),
- market innovation (Innovation 9) and
- customer-centric innovation (Innovation 10).

The extensive innovation indicators have been able to capture the intensity and the various innovation types of SMMEs. Cronbach's Alpha positive reliability scoring demonstrated that respondents could ascertain innovations suitably aligned, with the descriptions of the different innovation types.

**Research Objective 1. To identify the types of innovation in South African SMMEs**

Results have revealed that SMMEs engage in nine of the ten innovation typesidentified. They are:

- Customer Centric Innovation
- Product Innovation
- Business Services Innovation
- Channel Innovation
- Business Model Innovation
- Organizational Innovation
- Product System innovation
- Marketing Innovation
- Process Innovation

This has demonstrated that SMMEs are innovative. The study has also shown that SMMEs innovate beyond the traditionally recognised innovation types of product, process, marketing and organisational. This heterogeneous nature of innovation in SMMEs is reiterated in Forsman (2011) study which demonstrated that small businesses are 'rich' in an array of innovation configurations. This richness in the diversity of innovation lends a clarity that allows stakeholders to grow and sustain SMMEs.

Business Model Innovation type is a relatively new construct and concept being researched. Surprisingly majority of the SMMEs actively participate in reviewing and implementing new strategies. Only 4% of the SMMEs stated they lacked an innovation strategy. Often it is the firm's business model which is the fixed aspect of a business. These results, adds credence to SMME characteristics of being organic and flexible.

Customer centric innovation (innovation 10) was found to be the most predominant innovation type amongst SMMEs. Mazzarol et al. (2014) in their multi-country study found customer relations were key to innovation. There are four innovative measures that constitute this category. Of those the measure 'the business engages with customer' received over 60% of 'all the time' scoring. This highlights the unique characteristic of SMMEs, flexible and small enough, compared to very larger enterprises, such that they are continually in contact with customers. Being customer centric has benefited SMMEs in their innovative efforts. This is

substantiated in the correlation analysis of the impact of financial measures on customer-centric innovation and vice versa. A correlation has been found between five of the six financial measures viz return on assets (ROA), productivity, market share, sales growth and return on investment (ROI). Increasing customer centric innovations sees increases in financial performance. Both Bigliardi (2013) and Sánchez-González and Herrera (2014) concur that customer innovation has economic returns. Coviello and Joseph (2012) have shown that small firms are capable of major innovations that required customer participation.

SMMEs appear to engage in almost all of the different innovation types except for innovation 2, network innovation. Fafchamps and Söderbom (2014) have shown for African manufacturing firms that are in the same vicinity that they do not necessarily network and in fact have differing firm practices.

An interesting finding of this study was that just over 30% of the respondents did not use educational or research institutions as sources of knowledge. Zeng, Xie, and Tam (2010) made a similar conclusion in their study on Chinese SMEs were collaborations with research organisations, universities and government aids did not play as distinctive a role in the process of innovation. In contrast Abereijo et al. (2007) study on innovative capabilities of SMEs revealed a significant impact between external outputs of universities and research units and sme innovative potentials. Qiao et al. (2014) study demonstrated the benefits of affiliating with industry associations when innovating. Narula (2004) have shown that costs to maintain collaborations play a moderating role in networking. However, an environment of separateness is inexorably contrary to the new world of connectivity. Networking and open innovation is a facet of the new business environment that is in contrast to the traditional self-directed autonomous nature of very small businesses. Balancing security of intellectual assets and even a ‘democratic collaboration strategy’ as termed by Duarte and Sarkar (2011) can lead isolated SMMEs to extract the benefits of connectivity.

Product innovation which ranked second in the predominance listing with a high frequency of 64.1%, confirmed Coviello and Joseph (2012) study that increased customer interaction led to positive product innovation. Clark (2010) also found

SMEs engaged in predominately product innovation. The 'high frequency' differences in Table 4.5.1.1 between business services (62.8%), channel (62.2%) and business model innovations (62%) is very slight, so SMMEs appear to be focused on output innovations together with aligning their strategies.

Just under sixty percent of SMMEs engaged in organisational innovation. Laforet (2013) study found no output benefits in engaging specifically in administrative innovation. As can be seen in Table 4.14.1 there is a direct correlation between each of the innovation types. For example, the correlation value between network innovation and business model innovation is 0.459. This is a directly related proportionality. Respondents indicate that the more often there is network innovation the more often, there is strategy review. This impact of innovation types on each other is reiterated in Radas and Božić (2009) study on SMEs in emerging countries. Doran (2012) has shown that innovation types complement each other but do not substitute for the other. This highlights the importance of understanding each of the innovation forms and modes individually. The positive correlation between all of the ten innovation types demonstrated the impact of innovation and value creation. Aterido et al. (2011) study found that in adverse business conditions, larger firms experience difficulties but business was found to flow towards micro-enterprises benefiting their productivity. This could explain the wide-ranging innovation activity of South African SMMEs found in this study.

### 5.2.2 Innovation Intensity

**Research Objective 2. To establish the intensity of innovation in South African SMMEs** Two variables were introduced to establish the intensity of innovation. They are the breadth of innovation and the depth of innovation. Results have shown that in 50% of the innovation types, activity is widespread (breadth) in SMMEs. The breadth of innovation is intensive for the following innovation types:

- Product Innovation
- Product System Innovation
- Business Services Innovation
- Channel Innovation

- Customer Centric Innovation

Depth of innovation is found to be low indicating that SMMEs do not innovate at all times. Hence the intensity at which SMMEs innovate is widespread (breadth) but not deep. In this study 95% of the respondents were either the owners, entrepreneurs or belonged to the senior management levels. Similarly Bigliardi et al. (2011) in their study found that CEO''s or owners of 'more' innovative firms were greatly involved in many forms of innovation such as product, process and organisational innovation compared to less innovative firms.

In understanding the low depth of innovation it indicates how crucial it is for owners and managers to maintain a balance between sustaining regular practices and directing the unknown when innovating (Edwards et al., 2005). 'Organizational ambidexterity' (Fain et al., 2018; Tushman & O'Reilly III, 1996) is a term that describes how an organisation is able to balance the need to maintain its existing processes against the need to exploit new avenues. Laursen and Salter (2006) parallel landmark study illustrated that the breadth and depth of knowledge sourcing has a curvilinear relationship to innovation performance.

In this study it was found that the breadth of innovation intensity was much larger. Similarly Love, Roper, and Bryson (2011) found in service firms, growth is associated with being engaged in the extensiveness or diversity of innovation types. In Kilic et al. (2015) research which included small and medium firms a taxonomy of innovativeness was developed and it was found that 'leading innovators' have better performance, exploit significant multiple firm functions and engage in many innovation types. 'Followers' engaged in different types of innovation, incremental in nature, also lead to improved performance (Kilic et al., 2015).

Comparatively the breadth of innovation intensity was much larger than the depth. This implies that the extensiveness of smme innovation is widespread but the regularity of innovation is muted. This balance of high breadth and low depth indicates a balance between maintenance and sustaining by innovating or a balance between exploration and exploitation; a form of organisational ambidexterity specific to SMMEs.

From Table 4.5.1.1 the predominance ranking of innovation types, SMMEs engage significantly in customer and channel innovation. Yet, if SMMEs also focus on intensively innovating marketing and process types it further impacts financial performance. This is especially so with the ten innovation types correlating with each other.

An interesting result shows a significant relationship between the depth of business services and performance, specifically; return on investment, sales and productivity. That means that SMMEs consistently innovate business services. Weigel and Hadwich (2018) have also shown that when firms use service networks to provide services with their products, a successful service network improves innovation and business performance, and customer relationships.

It has been shown that intensity of innovation does matter but maintaining day to day activities and exploring improvements or new avenues is a fine balance that requires constant reviewing.

Almost 60% of SMMEs do not engage in breadth of business model innovation, 93.3% do not engage in depth of business model innovation, yet, 62% said they do engage in overall business model innovation. Perhaps increasing the intensity of business model innovation would improve the firm's ability to review strategies and implement changes. Kilic et al. (2015) study emphasises the importance of innovation strategy and an approach that has specific direction. Investigating the intensity of innovation is reiterated in Love et al. (2011) study which found that the 'extent' and 'diversity' of innovation impacts firm growth.

Examining the intensity of innovation provides a detailed mapping of innovation at different levels. Understanding types and intensity of innovation allows firms to increase their awareness of the process giving direction to a firms aims and strategies. Managing the innovative process allows firms to leverage innovation successfully. This enables SMMEs to extract maximum value from innovation and enrich intellectual assets lending to an advantage that can be sustained.

**Research Objective 3. To explore if innovation impacts on South African SMMEs performance.**

### 5.2.3 Innovation and Performance

The study has found categorically, that innovation impacts business performance. All ten innovation types impact financial performance. The relationship is between financial indicators return on investment, return on assets, sales, market share and productivity. However, of the measures only operating costs has no correlation with any of the innovation types. This is in-line with Gunday et al. (2011) study which revealed that innovation types sustain performance measures such as market share, firm sales and exports.

Similarly in Laforet (2013) study which focused specifically on outcomes, it was found that innovation in SMEs increased productivity, revenues, market share, market control and resulted in an enriched working environment. SMEs firm performance is positively influenced by innovation (Gunday et al., 2011; Kilic et al., 2015; Qiao et al., 2014). Mbizi et al. (2013) study concluded that there is a relationship between operations sustainability (sales, market share, productivity, customer retention) and innovation.

Financial Performance impacts and is impacted by the breadth of innovation along the following innovation types:

- Network Innovation
- Organizational Innovation
- Process Innovation
- Channel Innovation
- Marketing Innovation
- Customer Centric Innovation

By increasing breadth of innovative activities for process, channel, marketing and customer innovation types, results reveal a significant relationship with productivity performance. Vasconcelos and Oliveria (2018) research suggest the impact of innovation differs along the degree of performance with marketing and customer innovation being the main contributors to performance.

Financial Performance impacts and is impacted by the depth of innovation along the following innovation types:

- Process Innovation
- Product Innovation
- Business Services Innovation
- Channel Innovation
- Marketing Innovation
- Customer Centric Innovation

By increasing the depth of innovative activities for process, business services, channel, marketing and customer innovation type has a significant relationship on sales performance.

Results infer intensively innovating along the breadth and depth of process, channel, marketing and customer innovation types has an increased impact on financial performance specifically productivity and sales.

### 5.2.4 Innovation and Firm Size

Firm Size has a minimal impact on innovation with respect to types and intensity. Results have shown that medium sized firms impact process and marketing innovation. Similarly Sharma (2015) study on SMEs in India showed that medium firms participate more in process innovation than product innovation. Firm size only impacts the breadth of innovation intensity for network and process and the intensity depth for business services innovation. Similarly crosstabulation results showed a relationship between firm and both marketing and business services innovation. Booyens (2011) found no distinction in the innovation rate between South African SMMEs and large enterprises. To overcome size differences small businesses can draw value from both marketing and business services innovation by focussing on output innovative activities. Market share and market orientation are values that provide a competitive edge. Being consistent with business services innovation (depth) is an area that can influence smme performance. In contrast Parvin Hosseini

(2014) study found that for Malaysian SMEs, mature smaller firms are less innovative compared to fledgling businesses and medium sized enterprises. The contrast highlights the influence of economic and business climates on SMME growth and performance.

## Research Objective 4. Exploring obstacles to innovation in South African SMMEs

### 5.2.5 Obstacles to innovation

The predominant barriers that SMMEs struggle with are insufficient government support (78.4%) and high taxes (76%). Booyens, Hart, and Ramoroka (2018) also found low regional government aid towards innovation in an investigation that included both rural and urban innovation orientated enterprises. SMEs just starting out in South Africa discovered lack of government support as an impediment to their growth (Olawale & Garwe, 2010). The directives, rules and support these institutions offer can essentially lead a SMME to succeed or drain it considerably.

Radas, Anić, Tafro, and Wagner (2015) have demonstrated the positive effect of subsidizations and tax incentives on innovation orientation and output. Of the two they found subsidies to be more impactful in determining smme success. 62.9% of respondents experienced difficulties engaging skilled employees. Bigliardi et al. (2011); Xiaobao et al. (2013); Radas and Božić (2009); Abor and Quartey (2010) ascertained in their study that SMEs found it difficult to obtain suitable personnel.

Sourcing, developing and retaining skilled personnel are foundational assets for innovation efforts. To maintain an innovative small enterprise, a sustained human resource for research and development is desirable (Kim, Kim, Sawng, & Lim, 2018). Allen, Adomdza, and Meyer (2015) study has shown that management control of employee's innovation efforts affects firm performance, belongingness behaviours and trust. Mbizi et al. (2013) suggests that training is essential for innovation performance. More than half (55.7%) of the SMMEs are restricted by innovation costs. A finding reiterated by Rubera and Kirca (2012) study which revealed a negative impact of performance outputs of innovation for small firms having reduced advertising budgets to realise market orientation. Yet the importance of innovation is highlighted in Menguc and Auh (2006) study which

explained that low levels of innovativeness reduces the impact of market orientation on firm performance.

In a sector specific study such as the food machinery industry, financial and knowledge constraints were deterrents to innovation (Bigliardi & Dormio, 2009). Being a cross sector study, a large portion of the respondents,78.4%, agreed that insufficient government support was the main barrier for innovation. Radas and

Božić (2009) study found obstacles to innovation did not lessen SMEs innovative activities. However, obstacles unique to an industry is expected.

## 5.3 Summary

Results are interpreted and compared against existing literature. The results and debates have led to deductions, elaborating or agreeing or disagreeing with each of the research objectives. Results have shown that South African SMMEs are actively innovating, innovating widely and innovation does impact financial performance. Firm size does not affect small and medium sized businesses from innovating. What are then the implications? Better performance transcends to firm growth, job creation and building a better economy.

However, these goals seem far from being realised in a present day volatile economic climate. Are the benefits of SMME innovation directed to survival dynamics or more advanced technologies such as ERP systems and AI? Are human resource assets more specific as compared to mass job creation? These are varied and new challenges that require further debates and empirical testing. Overall the study has revealed that South African SMMEs are actively engaged in innovation. Each of the aims and objectives enumerating the problem statement of the study are succinctly answered in the following chapter.

# Chapter Six: Conclusions and Recommendations

## 6.1 Introduction

This chapter states succinctly if all objectives have been satisfied. Recommendations and benefits are discussed.

## 6.2 Conclusions

In view of this studies' aims and objectives it has been established that South African SMMEs are innovative. They engage in the following types of innovation: customer centric innovation, product innovation, business services innovation, channel innovation, business model innovation, organizational innovation, product system innovation, marketing innovation and process innovation. SMMEs are active in nine out of the ten types of innovations identified with customer-centric and product innovation being most predominant. The intensity at which South African SMMEs innovate is more widespread than deep. They innovate more across the different innovation types but with time boundaries.

Firm size does not significantly impact innovation types except for marketing and process innovation. Firm size does not significantly impact innovation intensity except for network and process innovation for breadth and business services innovation for depth. Overall the size of a firm has minimal impact on innovation.

Innovation types and the intensity of innovation have a definitive impact on financial performance and vice versa. South African SMMEs, find government support and taxes to be significant barriers to innovation.

## 6.3 Recommendations

This study contributes to the fraternity of innovation and business management in the context of SMMEs management of innovation. The results of the study can be used to raise further questions in future studies examining innovation in SMMEs. The study has shown it is possible to disentangle factors that drive innovation transversely; from SMMEs characteristics to innovate along different types of

innovations, the breadth and depth of their innovations, obstacles they encounter to the firm size and financial impact of said innovations.

By investigating the diverse characteristics of innovations in SMMEs; government is better off focussing on improving SMMEs innovation capabilities than looking for specific innovation outcomes. An efficient and effective innovation oriented smme has enhanced absorptive and diffusion capacities. Creating an innovation dashboard for use by policymakers and stakeholders at large, similar to that created for Wales by Nesta (nesta, 2018), a UK based world-wide organisation involved in innovation, would benefit government in such ways that large information sets could be translated into useful actionable knowledge.

Owners and managers should not focus only on technological gain to innovate but rather also focus on the other aspects of innovation types and extensiveness to add value to the firm and realize full innovative potential. Policymakers and support structures should also focus on the intangible aspects of innovation (Abreu et al., 2010). Becoming aware of the scope of each type of innovation and benefits and drawbacks of intensity of innovating, facilitates innovation in SMMEs and aids policymakers in the understanding of innovation in SMMEs. Becoming aware of the process of innovation rather than an arbitrary unknown system, allows for a more strategic and beneficial approach to innovation (Mbizi et al., 2013). The interplay of understanding the accurate nature and nurturing of innovation, aids smme managers and owners to grow and sustain their organisations.

This study has attempted to fill the gap in literature by investigating innovation types in SMMEs beyond the four types of product, process, marketing and organisational innovation. Contribution is also made by examining how intensely SMMEs innovate by measuring the breadth and depth of innovation. Verreynne et al. (2019) longitudinal study on SMEs has demonstrated the beneficial effects of innovating along the breadth of innovation types and have shown that innovation diversity alleviates the effects of volatility on performance. Determining the impact of types and intensity of innovation on performance and firm size then adds to providing a comprehensive holistic view of innovation in SMMEs. However, further study is recommended extrapolating on this studies results. The study has demonstrated

that an overall exploration of innovation can disentangle factors that drive innovation via innovation types, innovation intensity and innovation barriers. Leveraging these multidimensional aspects, through innovation, can lead to sustained growth underlined by a competitive edge.

## 6.4 Limitations

The intricacy and flexibility of the innovation process indicates that sector differences do occur. Forsman (2011) found minimal differences between the manufacturing and service sector innovation performance but instead found meaningful differences between industries within each of the sectors. Laforet (2013) study has shown that a firm's innovation outcomes are impacted by age, size, sector and innovation types. The small sample size is indicative of further studies which would be beneficial in expanding and adding to the knowledge gained from this study. Generalizability is limited although the nature of the study is largely descriptive and exploratory.

## 6.5 Summary

The data collected has uncovered a prevalent nature of innovation amongst South Africa SMMEs and despite a difficult local and global economy, innovation has a positive bearing on financial performance. The research has provided an exacting profile of South African SMMEs. This profile has identified innovation types, innovation intensities, impact of innovation on size and performance, and barriers to innovation. The research has delved into the intensity of innovation by measuring the breadth and depth of innovation which has given clarity towards the ambiguity on how to maintain a firm's activities whilst also remaining innovatively active. This is an important contribution to the literature. In summary the dynamics of innovation must be acknowledged to allow for value creation both shared and intrinsic.

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# Appendix 1 Crosstabulations

| | | Gender | Age | Posi ion held in the business | Your h ghest Qual f cat o n | Number of years of business experience | Number of permanent emp oyees in the business - 2008 | Number of permanent emp oyees in the business - 2011 | Number of permanent employees in the business - 201 | Percentage of s af involved in Research and Developme nt | industry sector your business ope ates in | Number of yea s the business is i ex stence | Approximat e Annual Turnover - 2008 | App oximat e Annual Turnover - 2011 | App oximat e Annual Turnover - 201 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| We try out new ideas | Chi-square | 1 655 | 17.269 | 1 .8 3 | 6. 68 | .155 | 7.223 | 5. 29 | 5.290 | 15.187 | 18 322 | 3 876 | 15.887 | 10.722 | 15.211 |
| | df | 2 | 12 | 22 | 12 | 8 | 10 | 10 | 10 | 10 | 2 | 8 | 16 | 16 | 16 |
| | Sig. | 0. 37 | 0.1 | 0.869 | 0.891 | 0.8 3 | 0.70 | 0.861 | 0.871 | 0.125 | 0.787 | 0 868 | 0. 61 | 0.826 | 0.509 |
| The business implements new or sign f cant changes in business strategies | Chi-square | 6 050 | 57. 75 | 27.997 | 23.07 | 32.1 0 | 23.250 | 23.561 | 25 736 | 15 018 | 37 736 | 15. 2 | 23.8 9 | 25.3 9 | 3 . 32 |
| | df | | 2 | | 2 | 16 | 20 | 20 | 20 | 20 | 8 | 16 | 32 | 32 | 32 |
| The business implements new or improved management strategies | Sig. | 0.195 | .000* | 0.971 | 0.515 | .010* | 0.277 | 0.262 | 0.175 | 0.775 | 0.856 | 0. 93 | 0.85 | 0.792 | 0.352 |
| | Chi-square | .835 | 37.309 | 23.630 | 5.598 | 18. 1 | 16.951 | 12.695 | 16 55 | 20. 81 | 0 600 | 13.316 | 30.071 | 2 .529 | 30.553 |
| | df | 3 | 18 | 33 | 18 | 12 | 15 | 15 | 15 | 15 | 36 | 12 | 2 | 2 | 2 |
| The business lacks an opera ional, innovation strategy | Sig. | 0.8 1 7.25 | .005* | 0.885 | 0.998 | 0.10 | 0.322 9.389 | 0.626 | 0 3 6 8.05 | 0.15 | 0.275 | 0 3 6 | 0.182 | 0. 32 | 0.167 |
| | Chi-square | | 26.386 | 8.395 | 2 .76 | 26.366 | | 18.09 | | 1 .258 | 67 033 | 20.369 | 30.918 | 1.595 | 7.585 |
| | df | | 2 | | 2 | 16 | 20 | 20 | 20 | 20 | 8 | 16 | 32 | 32 | 32 |
| The business is continually assessing how its of erings are conver ed in o cash | Sig. | 0.123 | 0 33 | 0.3 | 0. 19 | .0 9* | 0.978 | 0.581 | 0.992 | 0.817 | 036* | 0 20 | 0 521 | 0.119 | .038* |
| | Chi-square | 980 | 31.967 | 35.2 3 | 11.136 | 21.662 | 18.687 | 19.09 | 11 818 | 18 312 | 2.1 1 | 19.7 2 | 25.627 | 19.578 | 28.665 |
| | df | | 2 | | 2 | 16 | 20 | 20 | 20 | 20 | 8 | 16 | 32 | 32 | 32 |
| | Sig. | 0 289 | 0.128 | 0.82 | 0.988 | 0.15 | 0.5 2 | 0.516 | 0.922 | 0.567 | 0.711 | 0 232 | 0.78 | 0.958 | 0.636 |
| The ways in which the business generates revenue for i s offerings di fers compared to your competi tors' | Chi-square | 3 753 | 27.638 | 56.708 | 20.502 | 17.786 | 21. 23 | 15.238 | 21 508 | 19 8 2 | 1 51 | 15.033 | 2 .029 | 3 .719 | 32.767 |
| | df | | 2 | | 2 | 16 | 20 | 20 | 20 | 20 | 8 | 16 | 32 | 32 | 32 |
| | Sig. | 0. 1 | 0 276 | 0.095 | 0.668 | 0.337 | 0.373 | 0.763 | 0.368 | 0. 68 | 0.73 | 0 522 | 0 8 3 | 0.3 | 0. 29 |
| The business associates w th universit es, technikons or research inst tut ons | Chi-square | 986 | 21.733 | 52.188 | 30.85 | 16.783 | 13.138 | 20.326 | 20 638 | 3 363 | 52 688 | 9.170 | 23.611 | 2 .905 | 29.192 |
| | df | | 2 | | 2 | 16 | 20 | 20 | 20 | 20 | 8 | 16 | 32 | 32 | 32 |
| The business u il zes in o mat on from exhibi t ons, conferences, the internet, magazines or the mass media | Sig. | 0 289 | 0 595 | 0.186 | 0.158 | 0. | 0.871 | 0. 38 | 0. 19 | .02 * | 0.298 | 0 906 | 0 858 | 0.81 | 0.609 |
| | Chi-square | 2 615 | 26.957 | 108.697 | 22.09 | 37.398 | 29.663 | 27.198 | 23 539 | 27 095 | 66 692 | 12.5 6 | 29.571 | 26.838 | 3 .282 |
| | df | | 2 | | 2 | 16 | 20 | 20 | 20 | 20 | 8 | 16 | 32 | 32 | 32 |
| We co llaborate w th our competi tors or nonindustry businesses; bo rowing to enable our of erings or ending o enable e their o fer ings | Sig. | 0 62 | 0 306 | .000* | 0.57 | .002* | 0.076 | 0.13 | 0.263 | 0.133 | 038* | 0 706 | 0.59 | 0.725 | 0.359 |
| | Chi-square | 5 222 | 3 .759 | 35.380 | 20.722 | 20.83 | 18.726 | 12.576 | 17 577 | 21 52 | 55 93 | 12.027 | 30.083 | 38. 7 | 23.953 |
| | df | | 2 | | 2 | 16 | 20 | 20 | 20 | 20 | 8 | 16 | 32 | 32 | 32 |
| | Sig. | 0 265 | 0 072 | 0.82 | 0.655 | 0.185 | 0 5 | 0.895 | 0.615 | 0.367 | 0.202 | 0 7 2 | 0 56 | 0.201 | 0.8 6 |
| We co llaborate w th our suppli ers and custome s to p oduce, est and market our of e ings | Chi-square | 605 | 25.755 | 5 .096 | 36.977 | 9.737 | 5.79 | 8.86 | 5 00 | 25 50 | 32 675 | 9.526 | 5.207 | 30.52 | 32.6 9 |
| | df | | 2 | | 2 | 16 | 20 | 20 | 20 | 20 | 8 | 16 | 32 | 32 | 32 |
| The business wo ks with Gove nment agenc es o imp ove i s business activi es &/or offerings | Sig. | 0.33 | 0 366 | 0.1 2 | .0 * | 0.232 | 0.729 | 0.531 | 0.776 | 0.183 | 0.955 | 0 2 2 | 0 061 | 0.5 1 | 0. 36 |
| | Chi-square | 3 0 8 | 21.655 | 68.809 | 18.5 7 | 25.506 | 23.668 | 22.771 | 21 526 | 12 623 | 0 789 | 15.587 | 29.967 | 3 .382 | 21.20 |
| | df | | 2 | | 2 | 16 | 20 | 20 | 20 | 20 | 8 | 16 | 32 | 32 | 32 |
| The business implements or has unique irm structures | Sig. | 0.55 | 0.6 | .010* | 0.776 | 0.061 | 0.257 | 0.3 | 0.367 | 0.893 | 0.76 | 0. 82 | 0.57 | 0.35 | 0.927 |
| | Chi-square | 7 083 | 25.151 | 31.875 | 22.378 | 18.0 9 | 30.780 | 2 .708 | 27 690 | 31 037 | 75 721 | 1 .193 | 3 .081 | 29.07 | 3. 08 |
| | df | | 2 | | 2 | 16 | 20 | 20 | 20 | 20 | 8 | 16 | 32 | 32 | 32 |
| The business has recogn zed structures geared towards innovat on | Sig. | 0.132 | 0 398 | 0.913 | 0.557 | 0.321 | 0.058 | 0.213 | 0.117 | 0.055 | 007* | 0 58 | 0 368 | 0.615 | 0.086 |
| | Chi-square | 023 | 20.800 | 30.627 | 17.079 | 12.689 | 20. 96 | 12.0 7 | 2 833 | 2 972 | 50 696 | 17.03 | 22. 3 | 31.23 | 28. 20 |
| | df | | 2 | | 2 | 16 | 20 | 20 | 20 | 20 | 8 | 16 | 32 | 32 | 32 |
| | Sig. | 0. 03 | 0 65 | 0.937 | 0.8 5 | 0.695 | 0. 27 | 0.91 | 0.208 | 0.203 | 0.368 | 0 383 | 0 895 | 0.505 | 0.6 8 |
| There s cohesion between departments and sharing of knowledge | Chi-square | . 58 | 20. 3 | 60.655 | 25.962 | 26.167 | 38.251 | 23.679 | 0 25 | 18 989 | 37 370 | 30.335 | 32.767 | 36.816 | 39.557 |
| | df | | 2 | | 2 | 16 | 20 | 20 | 20 | 20 | 8 | 16 | 32 | 32 | 32 |
| There s an absence of rewards for behav ours that e a e to set goa s | Sig. | 0 3 8 | 0 672 | .0 8* | 0.355 | 0.052 | .008* | 0.257 | 005* | 0.523 | 0.866 | .016* | 0. 29 | 0.256 | 0.168 |
| | Chi-square | 7 233 | 17.769 | 56.588 | 13.783 | 16.9 6 | 22.967 | 13.70 | 1 . 7 | 11 201 | 5 569 | 8 827 | 22.116 | 37.962 | 27.767 |
| | df | | 2 | | 2 | 16 | 20 | 20 | 20 | 20 | 8 | 16 | 32 | 32 | 32 |
| | Sig. | 0.12 | 0 81 | 0.097 | 0.951 | 0.389 | 0.289 | 0.8 5 | 0.806 | 0.9 1 | 0.573 | 0.92 | 0 90 | 0.216 | 0.681 |
| The business a trac s sk l ed emp oyees | Chi-square | 5 586 | 23.73 | 36.063 | 20.801 | 9.768 | 19.2 6 | 16.265 | 2 389 | 19 6 7 | 50 069 | 20.067 | 32.727 | 35. 37 | 33. 26 |
| | df | | 2 | | 2 | 16 | 20 | 20 | 20 | 20 | 8 | 16 | 32 | 32 | 32 |
| | Sig. | 0 232 | 0. 77 | 0.797 | 0.65 | 0.878 | 0.506 | 0.7 | 0.226 | 0. 8 | 0.391 | 0 217 | 0. 31 | 0.309 | 0.398 |
| We a e creative in how we run our ope a ions | Chi-square | 6 561 | 35.131 | 72. 89 | 17.996 | 29.002 | 17.277 | 20.608 | 19 672 | 22.113 | 7 890 | 1 .261 | 29.891 | 15.108 | 30.736 |
| | df | | 2 | | 2 | 6 | 20 | 20 | 20 | 20 | 8 | 6 | 32 | 32 | 32 |
| The business implemen s new or advanced changes in organisa iona processes e.g. qua ity control, waste management, | Sig. | 0.161 9.581 | 0 066 | .00 * | 0.803 | .02 * | 0.635 | 0. 21 | 0. 79 | 0.33 | 0. 77 | 0 579 | 0 57 | 0.995 | 0.53 |
| | Chi-square | | 61. 72 | 6. 03 | 19.370 | 33.0 0 | 29.3 1 | 26.103 | 3 916 | 22 6 3 | 0. 33 | 53.318 | 3.030 | 31. 69 | 35.715 |
| | df | | 2 | | 2 | 16 | 20 | 20 | 20 | 20 | 8 | 16 | 32 | 32 | 32 |
| maintenance routines e c | Sig. | .0 8* | .000* | 0.37 | 0.732 | .007* | 0.081 | 0.162 | 021* | 0.307 | 0.773 | .000* | 0 092 | 0. 93 | 0.298 |
| The business uses new echnologies to improve ts operat ons | Chi-square | 3 277 | 27.502 | 30.723 | 1 .162 | 9.3 0 | 28.310 | 2 .068 | 21 8 6 | 31 227 | 33 618 | 1 . 53 | 32. 32 | 28.573 | 1. 77 |
| | df | | 2 | | 2 | 6 | 20 | 20 | 20 | 20 | 8 | 6 | 32 | 32 | 32 |
| | Sig. | 0 513 | 0 282 | 0.935 | 0.9 3 | 0.899 | 0.102 | 0.239 | 0.3 9 | 0.052 | 0.9 3 | 0 565 | 0. 5 | 0.6 1 | 0.122 |
| The business has patented certain echnologies, processes or methods | Chi-square | 2. 18 | 26. 57 | 75.079 | 22.536 | 11.307 | 38.192 | 25.752 | 22 922 | 25 572 | 51. 03 | 23.387 | 30.921 | 50. 57 | 31.590 |
| | df | | 2 | | 2 | 16 | 20 | 20 | 20 | 20 | 8 | 16 | 32 | 32 | 32 |
| The business has cer ain unique processes or opera ions compared o indust y standards or competi o s' | Sig. | 0 659 | 0.33 | .002* | 0.5 7 | 0.79 | .008* | 0.17 | 0.293 | 0.18 | 0.3 2 | 0.10 | 0 521 | .020* | 0. 87 |
| | Chi-square | 2 018 | 30.091 | 35.665 | 26.1 3 | 13. 03 | 26.738 | 23.7 3 | 25 229 | 38 605 | 55 7 9 | 10.771 | 25.638 | 30.658 | 32.62 |
| | df | | 2 | | 2 | 16 | 20 | 20 | 20 | 20 | 8 | 16 | 32 | 32 | 32 |
| The business of e s unique advan ages compared to compe itors offerings | Sig. | 0.732 1.335 | 0.182 | 0.81 | 0.3 6 | 0.6 3 | 0.1 3 | 0.25 | 0.193 | 007* | 0.206 | 0.823 | 0 779 | 0.53 | 0. 36 |
| | Chi-square | | 31.83 | 22.726 | 19.920 | 19.067 | 32.116 | 38.200 | 23 676 | 32 729 | 56. 01 | 20.7 7 | 3 .788 | 3 .139 | 6. 98 |
| | df | | 2 | | 2 | 16 | 20 | 20 | 20 | 20 | 8 | 16 | 32 | 32 | 32 |
| The business uses new techno ogies o develop new of erings or o improve exis ing of erings | Sig. | 0 855 | 0.131 | 0.997 | 0.701 | 0.265 | .0 2* | 008* | 0.257 | 036* | 0.19 | 0.188 | 0 337 | 0.365 | .0 7* |
| | Chi-square | 3.153 | 25.39 | 30.0 | 1 . 98 | .671 | 31.011 | 17. 76 | 20.175 | 33. 8 | 52 381 | 20.811 | 32.886 | 3.177 | 0.772 |
| | df | | 2 | | 2 | 16 | 20 | 20 | 20 | 20 | 8 | 16 | 32 | 32 | 32 |
| We deve op new produc s &/or services | Sig. | 0 532 | 0 385 | 0.9 6 | 0.935 | 0.997 | 0.055 | 0.622 | 0. 7 | 030* | 0.308 | 0.186 | 0. 23 | 0.09 | 0.138 |
| | Chi-square | 5 786 | 21.67 | 31.295 | 22.07 | 12.625 | 2 .8 3 | 20.075 | 21. 9 | 31 812 | 63 987 | 19.795 | 31.102 | 2 .897 | 8.9 |
| | df | | 2 | | 2 | 16 | 20 | 20 | 20 | 20 | 8 | 16 | 32 | 32 | 32 |
| We introduce new products &/or se v ces | Sig. | 0 216 | 0 599 | 0.925 | 0.575 | 0 7 | 0.207 | 0. 53 | 0.369 | 0 5* | 0.061 | 0.23 | 0 512 | 0.81 | .028* |
| | Chi-square | 8 397 | 27.8 | 39.276 | 19.979 | 25.071 | 33.359 | 12.199 | 20 0 8 | 28 3 8 | 7 0 7 | 21.091 | 35.186 | 57.329 | 28.662 |
| | df | | 2 | | 2 | 16 | 20 | 20 | 20 | 20 | 8 | 16 | 32 | 32 | 32 |
| We improve upon ex s ing p oduc s &/or services | Sig. | 0 078 | 0.267 | 0.67 | 0.698 | 0.069 | .031* | 0.909 | 0. 55 | 0.101 | 009* | 0.175 | 0.32 | .00 * | 0.636 |
| | Chi-square | 5. 7 | 22.75 | 28.820 | 10.665 | 12.781 | 19.108 | 5.1 6 | 9.339 | 30 755 | 9 388 | 1 . 59 | 39.020 | 21.068 | 37.612 |
| | df | 3 | 18 | 33 | 18 | 12 | 15 | 15 | 15 | 15 | 36 | 12 | 2 | 2 | 2 |
| The business o fe s products &/or se v ces that are simpler and eas er o use than competi ors' | Sig. | 0.1 2 | 0.2 | 0.675 | 0.908 | 0.385 | 0.209 | 0.991 | 0.859 | 009* | 0.068 | 0.272 | .027* | 0.635 | .038* |
| | Chi-square | 9.121 | 28.927 | 29.191 | 27.303 | 23.827 | 18.658 | 16.697 | 16. 97 | 2 817 | 3 762 | 15.606 | 30. 9 0 | 3 .2 | 33.772 |
| | df | | 2 | | 2 | 16 | 20 | 20 | 20 | 20 | 8 | 16 | 32 | 32 | 32 |
| | Sig. | 0 058 | 0 223 | 0.958 | 0.291 | 0.093 | 0.5 | 0.673 | 0.685 | 0.209 | 0.6 7 | 0. 81 | 0.52 | 0.36 | 0.382 |
| The business develops extensions to ts produc s, services or product and service combina ions | Chi-square | 7 0 8 | 28.581 | 33.277 | 20.379 | 21.37 | 16.065 | 13.131 | 15 678 | 29 031 | 78 285 | 13.782 | 38.009 | 31.29 | 3.788 |
| | df | | 2 | | 2 | 6 | 20 | 20 | 20 | 20 | 8 | 6 | 32 | 32 | 32 |
| The business's distinct produc s &/or se v ces are a so bundled as packages | Sig. | 0.133 | 0 236 | 0.881 | 0.675 | 0.165 | 0.713 | 0.872 | 0.736 | 0.087 | 00 * | 0 615 | 0 215 | 0.502 | 0.08 |
| | Chi-square | 8 792 | 32.226 | 51.869 | 16. 71 | 1 .66 | 31.137 | 2 .22 | 2 20 | 18 095 | 59 860 | 11.9 5 | 36.603 | 3 .078 | 35.153 |
| | df | | 2 | | 2 | 16 | 20 | 20 | 20 | 20 | 8 | 16 | 32 | 32 | 32 |
| | Sig. | 0 067 | 0.121 | 0.19 | 0.87 | 0.5 9 | 0.053 | 0.233 | 0.23 | 0.581 | 0.117 | 0 7 8 | 0 26 | 0.368 | 0.321 |
| Other businesses' of erings are c eated o wo k with your business's products & or services or vice versa | Chi-square | 6 2 3 | 28.72 | 38.598 | 21.753 | 28. 6 | 11.585 | 22.205 | 20. 5 | 16 538 | 28 817 | 29.677 | 25.962 | 35.603 | 36.723 |
| | df | | 2 | | 2 | 16 | 20 | 20 | 20 | 20 | 8 | 16 | 32 | 32 | 32 |
| To ass st and provide knowledge about ts o fe ings, the business prov des se v ces such as a helpdesk, website helpline etc | Sig. | 0.182 | 0 231 | 0.702 | 0.59 | .028* | 0 93 | 0 33 | 0. 3 | 0.683 | 0.987 | .020* | 0 765 | 0.302 | 0.259 |
| | Chi-square | 10. 52 | 3 .003 | 31.9 3 | 21.908 | 12.978 | 17. 8 | 20.678 | 28 808 | 20 260 | 63.118 | 15.719 | 38.212 | 32.055 | 29.978 |
| | df | | 2 | | 2 | 16 | 20 | 20 | 20 | 20 | 8 | 16 | 32 | 32 | 32 |
| The business provides unique warrant es, guarantees etc or its offerings | Sig. | .033* | 0 085 | 0.912 | 0.585 | 0.67 | 0.621 | 0. 16 | 0.092 | 0. 2 | 0.071 | 0. 73 | 0 308 | 0. 6 | 0.569 |
| | Chi-square | 11.395 | 36.236 | 90.901 | 18.013 | 11.210 | 31.830 | 22.633 | 2 8 | 23 2 | 51 978 | 10.010 | 31.588 | 32.537 | 2.805 |
| | df | | 2 | | 2 | 16 | 20 | 20 | 20 | 20 | 8 | 16 | 32 | 32 | 32 |
| The business imp emen s or prov des addi ional services that add value to i s o fe ings | Sig. | .022* | 0 052 | .000* | 0.802 | 0.796 | .0 5* | 0.307 | 0.207 | 0.277 | 0.322 | 0 866 | 0. 87 | 0. | 0.096 |
| | Chi-square | 5 059 | 2 .890 | 30.229 | 9.101 | 16.257 | 28.289 | 27.378 | 18. 01 | 12 900 | 3 887 | 9 651 | 16.085 | 28.5 7 | 30.1 3 |
| | df | 3 | 18 | 33 | 18 | 12 | 15 | 15 | 15 | 15 | 36 | 12 | 2 | 2 | 2 |
| The business assesses new ways to de iver ts offerings to customers or end users | Sig. | 0.168 | 0.128 | 0.606 | 0.957 | 0.18 | .020* | 026* | 0.2 2 | 0 61 | 0.521 | 0 6 7 | 0 885 | 0.238 | 0.18 |
| | Chi-square | 8 733 | 19.7 8 | 25.699 | 1 .873 | 16.518 | 21.322 | 21.770 | 16 022 | 26 512 | 58 521 | 8 889 | 38.223 | 66.690 | 50.003 |
| | df | | 2 | | 2 | 16 | 20 | 20 | 20 | 20 | 8 | 16 | 32 | 32 | 32 |
| The business uses d fferent channels cohesively to de iver ts offerings | Sig. | 0 068 | 0 711 | 0.987 | 0.92 | 0. 17 | 0.378 | 0.353 | 0.715 | 0.15 | 0.1 2 | 0 918 | 0 208 | .000* | .022* |
| | Chi-square | 7 876 | 33.021 | 55.57 | 2 .619 | 5.9 9 | 23.169 | 21. 15 | 18 739 | 22 209 | 51 058 | 13.008 | 27.766 | 30.336 | 29.818 |
| | df | | 2 | | 2 | 16 | 20 | 20 | 20 | 20 | 8 | 16 | 32 | 32 | 32 |
| | Sig. | 0 096 | 0.10 | 0.113 | 0. 27 | 0.989 | 0.281 | 0.373 | 0.539 | 0.329 | 0.35 | 0 672 | 0 681 | 0.551 | 0.577 |
| The business assesses channe s used to de iver produc s &/or se v ces by moni oring customer exper ence | Chi-square | 2 565 | 35. 2 | 32. 02 | 29.055 | 20.312 | 19.812 | 20.880 | 27. 11 | 21 811 | 55 265 | 1 . 86 | 29.867 | 30.786 | 29.899 |
| | df | | 2 | | 2 | 16 | 20 | 20 | 20 | 20 | 8 | 16 | 32 | 32 | 32 |
| | Sig. | 0 633 | 0 062 | 0.902 | 0.218 | 0.207 | 0. 7 | 0. 0 | 0.12 | 0.351 | 0.219 | 0 563 | 0 575 | 0.528 | 0.573 |
| The business looks for new ways to market i s of e ings | Chi-square | 6 729 | 26.933 | 32.519 | 6.956 | 1 .636 | 17.969 | 18.255 | 17. 1 | 2 893 | 39 609 | 15.258 | 8.052 | 8. 36 | 0.055 |
| | df | | 2 | 0 | 2 | 16 | 20 | 20 | 20 | 20 | 8 | 16 | 32 | 32 | 32 |
| The business deve ops new local reg onal marke s | Sig. | 0.151 | 0 308 | 0.79 | 1 21.387 | 0.551 | 0.589 | 0.571 | 0.626 | 0.206 | 0.8 | 0 506 | .03 * | .031* | 0.155 |
| | Chi-square | 1 656 | 27.692 | 36.077 | | 13.690 | 16.593 | 23.677 | 19 6 2 | 21 38 | 39 303 | 1 .807 | 27.593 | 20.32 | 39. 27 |
| | df | | 2 | | 2 | 16 | 20 | 20 | 20 | 20 | 8 | 16 | 32 | 32 | 32 |
| | Sig. | 0 799 | 0 273 | 0.796 | 0.616 | 0.622 | 0.679 | 0.257 | 0. 8 | 0.375 | 0.81 | 0 539 | 0 689 | 0.9 5 | 0.172 |
| The business deve ops new nat onal marke s | Chi-square | 2 516 | 22. 36 | 6.869 | 17.320 | 15.929 | 26.706 | 37.2 5 | 33 5 5 | 28 256 | 61 027 | 26.55 | 39.067 | 26. 22 | 3 .37 |
| | df | | 2 | | 2 | 16 | 20 | 20 | 20 | 20 | 8 | 16 | 32 | 32 | 32 |
| The business deve ops new internat onal marke s | Sig. | 0.6 2 2.376 | 0 553 | 0.356 | 0.835 | 0. 58 | 0.1 | 011* | 029* | 0.103 | 0.098 | .0 7* | 0.182 | 0.7 5 | 0.355 |
| | Chi-square | | 21.21 | 77.328 | 15.90 | 16.31 | 30.106 | 27.6 7 | 35 28 | 19 598 | 51.11 | 18.623 | 38.7 0 | 39.980 | 39.802 |
| | df | | 2 | | 2 | 16 | 20 | 20 | 20 | 20 | 8 | 16 | 32 | 32 | 32 |
| The business has specif c branding stra egies for ts products & or services | Sig. | 0.667 5.535 | 0 626 | .001* | 0.892 | 0. 31 | 0.068 | 0.118 | 019* | 0. 83 | 0.352 | 0 289 | 0.192 | 0.157 | 0.19 |
| | Chi-square | | 3 .283 | 32. 67 | 16.3 3 | 1 .651 | 20.2 6 | 23.713 | 21.167 | 13 876 | 59 326 | 20. 63 | 33.552 | 38.713 | 3 .555 |
| | df | | 2 | | 2 | 16 | 20 | 20 | 20 | 20 | 8 | 16 | 32 | 32 | 32 |
| | Sig. | 0 237 | 0.08 | 0.9 | 0.875 | 0.55 | 0. 3 | 0.255 | 0.387 | 0.837 | 0.127 | 0.2 | 0 392 | 0.192 | 0.3 7 |
| The business is first o market new or improved products & or services | Chi-square | 3 595 | 2 .852 | 66.287 | 13.911 | 11.827 | 27.212 | 25.711 | 33. 88 | 26.106 | 1 9 1 | 19.512 | 19.300 | 2 .683 | 21.187 |
| | df | | 2 | | 2 | 6 | 20 | 20 | 20 | 20 | 8 | 6 | 32 | 32 | 32 |
| The business aims to address cus omer needs | Sig. | 0. 6 | 0. 1 | .017* | 0.9 9 | 0.756 | 0.129 | 0.176 | 030* | 0.162 | 0.718 | 0 2 3 | 0 962 | 0.819 | 0.927 |
| | Chi-square | 2 337 | 3 .997 | 17.255 | 12.6 3 | 10.850 | 10.115 | 16.982 | 1 9 1 | 13 373 | 5 095 | 13.683 | 17.895 | 30.727 | 38.822 |
| | df | 3 | 18 | 33 | 18 | 12 | 15 | 15 | 15 | 15 | 36 | 12 | 2 | 2 | 2 |
| The business engages with the cus omer | Sig. | 0 505 | .009* | 0.989 | 0.812 | 0.5 2 | 0.812 | 0 32 | 0. 56 | 0.57 | 0.1 2 | 0 321 | 0 808 | 0.162 | .029* |
| | Chi-square | 1. 16 | 1 . 09 | 17.183 | 15.160 | 9.807 | 1 .550 | 29.766 | 1 872 | 13 2 9 | 1 263 | 11.807 | 23.752 | 29.582 | 26.826 |
| | df | 3 | 8 | 30 | 8 | 2 | 5 | 5 | 5 | 5 | 36 | 2 | 2 | 2 | 2 |
| The business assesses how ts offerings and i s business s perceived by custome s | Sig. | 0.702 9.029 | 0 702 | 0.97 | 0.651 | 0.633 | 0. 8 | 013* | 0. 61 | 0.583 | 0.251 | 0. 61 | 0. 76 | 0.663 | 0.313 |
| | Chi-square | | 23.113 | 21.556 | 28.002 | 1 .16 | 17.205 | 20.231 | 21 297 | 19. 32 | 53 309 | 2 .652 | 20. 95 | 27.200 | 39. 50 |
| | df | | 2 | | 2 | 16 | 20 | 20 | 20 | 20 | 8 | 16 | 32 | 32 | 32 |
| | Sig. | 0.06 | 0 513 | 0.998 | 0.26 | 0.587 | 0 6 | 0. | 0 38 | 0. 9 | 0.277 | 0 076 | 0 9 2 | 0.708 | 0.171 |
| The business uses social media o connect with i s customers | Chi-square | 8.152 | 3 .313 | 30.7 2 | 18.080 | 15. 26 | 16.991 | 12.277 | 15 9 | 2 8 1 | 39 59 | 1 .655 | 36.9 9 | 30.788 | 5.627 |

| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | df | | 2 | 0 | 2 | 16 | 20 | 20 | 20 | 20 | 8 | 16 | 32 | 32 | 32 |
| | Sig. | 0 086 | 0 079 | 0.85 | 0.799 | 0. 9 | 0.65 | 0.906 | 0 72 | 0.208 | 0.801 | 0.55 | 0 251 | 0.528 | 0.056 |
| Your business s return on investment ROI) compared to your competi o s' | Chi-square | 2 78 | 39.839 | 32.559 | 12.169 | 5 .990 | 18.787 | 25.6 5 | 22 870 | 22 823 | 39 7 0 | 17.135 | 33.0 3 | 39. 1 | 33.707 |
| | df | | 2 | | 2 | 16 | 20 | 20 | 20 | 20 | 8 | 16 | 32 | 32 | 32 |
| Your business s sa es growth compared o your competi ors' | Sig. | 0 595 | .022 | 0.898 | 0.978 | .000 | 0.536 | 0.178 | 0.295 | 0.298 | 0.796 | 0 377 | 0. 16 | 0.171 | 0.385 |
| | Chi-square | 709 | 30.636 | 2 .090 | 20.377 | .533 | 25. 03 | 29.250 | 3 011 | 1 528 | 67 30 | 25.355 | 1.621 | 3 .955 | 31.678 |
| | df | | 2 | | 2 | 16 | 20 | 20 | 20 | 20 | 8 | 16 | 32 | 32 | 32 |
| Your business s ma ket share compared to your competi tors' | Sig. | 0 318 | 0.165 | 0.99 | 0.675 | .000* | 0.186 | 0.083 | .026* | .002* | 03 * | 0 06 | 0.119 | 0.339 | 0. 83 |
| | Chi-square | 3 77 | 38. 91 | 21.8 0 | 18.792 | 7.237 | 25.685 | 25.2 8 | 19 6 8 | 17.110 | 31 736 | 17.5 8 | 0.099 | 0.5 6 | 2.9 1 |
| | df | | 2 | | 2 | 16 | 20 | 20 | 20 | 20 | 8 | 16 | 32 | 32 | 32 |
| Your business s opera ing costs compared o your competi ors' | Sig. | 0. 37 | .031* | 0.998 | 0.763 | .000* | 0.176 | 0.192 | 0. 8 | 0.6 6 | 0.966 | 0 351 | 0.15 | 0.1 3 | 0.09 |
| | Chi-square | 967 | 27. 31 | 3 .519 | 21. 76 | 37.3 | 20.363 | 13.798 | 10 690 | 15 306 | 53 88 | 28.239 | 33.706 | 29.019 | 31.237 |
| | df | | 2 | | 2 | 16 | 20 | 20 | 20 | 20 | 8 | 16 | 32 | 32 | 32 |
| Your business s produc ivity compared to your competi tors' | Sig. | 0 291 | 0 285 | 0.8 6 | 0.611 | .002* | 0. 35 | 0.8 1 | 0.95 | 0.759 | 0.259 | .030* | 0 385 | 0.618 | 0.505 |
| | Chi-square | 3 005 | 7.122 | 20.980 | 11.710 | 110.209 | 9. 0 | 27.611 | 20 252 | 6 076 | 6 653 | 27.023 | 23.683 | 19.270 | 37.985 |
| | df | | 2 | | 2 | 16 | 20 | 20 | 20 | 20 | 8 | 16 | 32 | 32 | 32 |
| Your business s return on assets (ROA) compared to your competi tors' | Sig. | 0 557 | .003* | 0.999 | 0.983 | .000* | 0.978 | 0.119 | 0. 2 | 001* | 0.055 | .0 1* | 0 856 | 0.963 | 0.215 |
| | Chi-square | 016 | 28.733 | 23. 77 | 16.162 | 57.577 | 11. 87 | 18.529 | 17 911 | 29 891 | 58 535 | 2 .99 | 19.796 | 26.532 | 31.039 |
| | df | | 2 | | 2 | 16 | 20 | 20 | 20 | 20 | 8 | 16 | 32 | 32 | 32 |
| We expe ience d f icu ty in accessing finance | Sig. | 0. 0 | 0.23 | 0.995 | 0.882 | .000* | 0.933 | 0.553 | 0.593 | 0.072 | 0.1 2 | 0.07 | 0 955 | 0.7 | 0.515 |
| | Chi-square | .002 | 3 292 | 18.870 | 6.288 | . 11 | 16.826 | 21.37 | 22 280 | 5.267 | 2 699 | 6 551 | 10.610 | 21.998 | 26.723 |
| | df | 1 | 6 | 9 | 6 | | 5 | 5 | 5 | 5 | 12 | | 8 | 8 | 8 |
| We find that there is insuff cient gove nment support towards innovat on | Sig. | .963 | 0 771 | .026* | 0.392 | 0.353 | .005* | 001* | 000 | 0.38 | 016* | 0.162 | 0 225 | .005* | .001* |
| | Chi-square | .860 | 2 822 | 11.981 | 2. 51 | 858 | 9.3 9 | 7.3 6 | 7.5 2 | 1.155 | 16 309 | 3 583 | 3 6 5 | 2.522 | 6.625 |
| | df | 1 | 6 | 9 | 6 | | 5 | 5 | 5 | 5 | 12 | | 8 | 8 | 8 |
| | Sig. | .35 | 0 831 | 0.21 | 0.87 | 0.93 | 0.096 | 0.196 | 0.183 | 0.9 9 | 0.178 | 0. 65 | 0 888 | 0.961 | 0.578 |
| We have d ff cu ties in accessing informa ion with ega ds o echnology | Chi-square | .058 | 3 5 9 | 5.678 | 7.225 | 3.2 9 | 2.9 1 | 6.061 | 10 885 | 2.286 | 9.715 | 13.578 | 980 | 7.996 | 11.296 |
| | df | 1 | 6 | 9 | 6 | | 5 | 5 | 5 | 5 | 12 | | 8 | 8 | 8 |
| We expe ience d f icu t es in obtaining co late al | Sig. | .810 | 0 737 | 0.772 | 0.301 | 0.517 | 0.709 | 0.3 | 0.05 | 0.808 | 0.6 1 | .009* | 0.76 | 0. 3 | 0.185 |
| | Chi-square | .535 | 2.179 | 19.372 | .1 8 | 6.288 | 28.115 | 23.238 | 22. 3 | 5.529 | 13 090 | 21.079 | 19.736 | 17.729 | 20.753 |
| | df | 1 | 6 | 9 | 6 | | 5 | 5 | 5 | 5 | 12 | | 8 | 8 | 8 |
| We find rules and regu a ions that govern our sector are restrictive and inhibit innovation | Sig. | . 6 | 0 903 | .022* | 0.657 | 0.179 | .000* | 000* | 000 | 0.355 | 0.363 | .000* | .011* | .023* | .008* |
| | Chi-square | 2 823 | 8 57 | 5.10 | 9.091 | 7.185 | 1.7 6 | 6. 96 | 8.16 | 2.910 | 10 083 | 357 | 7.130 | 6.238 | 6.752 |
| | df | 1 | 6 | 9 | 6 | | 5 | 5 | 5 | 5 | 12 | | 8 | 8 | 8 |
| | Sig. | .093 | 0.199 | 0.825 | 0.169 | 0.126 | 0.883 | 0.261 | .1 7 | 0.71 | 0.609 | 0.36 | 0 523 | 0.621 | 0.56 |
| We find income taxes, import and expo t du ies or other relevant axes are high in our industry | Chi-square | 2 526 | 7 598 | 1 .616 | 10.233 | 5. 08 | 7.17 | .635 | 11 860 | 5.151 | 8.937 | 1 579 | 12.169 | 6.3 9 | 9.157 |
| | df | 1 | 6 | 9 | 6 | | 5 | 5 | 5 | 5 | 12 | | 8 | 8 | 8 |
| We expe ience d f icu ty in obtaining sk l ed pe sonnel | Sig. | .112 | 0 269 | 0.102 | 0.115 | 0.2 8 | 0.208 | 0. 62 | 037 | 0.398 | 0.708 | 0 812 | 0.1 | 0.608 | 0.329 |
| | Chi-square | 1 055 | 012 | 15.896 | . 86 | 9.2 6 | .75 | 9.755 | 1.7 1 | 5.939 | 20 8 6 | 6 7 0 | 7 335 | 5.857 | 6.106 |
| | df | 1 | 6 | 9 | 6 | | 5 | 5 | 5 | 5 | 12 | | 8 | 8 | 8 |
| | Sig. | .30 | 0 675 | 0.069 | 0.611 | 0.055 | 0. 7 | 0.082 | .88 | 0.312 | 0.053 | 0.15 | 0 501 | 0.663 | 0.635 |
| We a e unable o obtain su fic ent info mat on ega ding the market | Chi-square | .555 | 3 927 | 16.07 | 9.227 | .587 | 9.025 | 10.26 | 6.356 | 2.687 | 15 990 | 7 6 2 | 8 862 | 12.527 | 10.600 |
| | df | | 6 | 9 | 6 | | 5 | 5 | 5 | 5 | 2 | | 8 | 8 | 8 |
| | Sig. | .56 | 0 687 | 0.065 | 0.161 | 0.332 | 0.108 | 0.068 | .273 | 0.7 8 | 0.192 | 0.106 | 0 35 | 0.129 | 0.225 |
| We find the costs of innova ion a deterrent | Chi-square | .00 | 6 728 | 10.185 | 5.790 | 1. 05 | 5.097 | 2.929 | .108 | 1.539 | 13 972 | 2 273 | 8 525 | 2.129 | 7.288 |
| | df | 1 | 6 | 9 | 6 | | 5 | 5 | 5 | 5 | 12 | | 8 | 8 | 8 |
| | Sig. | .9 9 | 0 3 7 | 0.336 | 0. 7 | 0.8 3 | 0. 0 | 0.711 | .53 | 0.908 | 0.302 | 0 686 | 0 38 | 0.977 | 0.506 |
| s your business part of a larger group? | Chi-square | .201 | 5 820 | 16.092 | 5.169 | . 13 | 13.126 | 11.792 | 6.183 | 2.981 | 23 991 | . 86 | 19. 1 | 11. 3 | 11.073 |
| | df | 1 | 6 | 9 | 6 | | 5 | 5 | 5 | 5 | 12 | | 8 | 8 | 8 |
| | Sig. | .65 | 0. | 0.065 | 0.522 | 0.353 | .022* | 038* | 0.289 | 0 703 | .020* | 0 3 | .013* | 0.178 | 0.198 |

Appendix 2 Questionnaire

**UNIVERSITY OF KWAZULU-NATAL GRADUATE SCHOOL OF BUSINESS & LEADERSHIP**

**MBA Research Project**

**Researcher**: Mz HP Vallabh (0837837104/ 031-5075665)
**Supervisor**: Professor Shahida Cassim (031-2601479)
**Research Office**: Ms P Ximba (031-2603587)

**Investigating Innovation in South African SMMEs**

The purpose of this survey is to obtain information regarding innovation practices and their barriers. The information and ratings you provide us will go a long way in helping us understand innovation in SMMEs together with ways to stimulate innovation in SMMEs.

The questionnaire should only take **10-15** minutes to complete. In this questionnaire, you are asked to indicate what is true for you, so there are no "right" or "wrong" answers to any question. Work as rapidly as you can. If you wish to make a comment please make use of the open question section at the end. Make sure not to skip any questions. Thank you for participating.

Questionnaire on Innovation in SMMEs

Please indicate with an asterisk the number representing the most suitable response for you:

Q1 Gender

| | |
|---|---|
| Male | 1 |
| Female | 2 |

Q2 Age

| | |
|---|---|
| 20 - 25 | 1 |
| 26 - 30 | 2 |
| 31 - 35 | 3 |
| 36 - 45 | 4 |
| 46 - 55 | 5 |
| 56 - 65 | 6 |
| Over 65 | 7 |

Q3 Position held in the business

| | |
|---|---|
| Owner/Entrepreneur | 1 |
| Chief Manager (Director) | 2 |
| Senior Manager | 3 |
| Junior Manager | 4 |
| Technical Manager | 5 |
| Employee (state position held) | 6 |

Q4 Your highest Qualification

| | |
|---|---|
| Primary School | 1 |
| High School (including Grade 12) | 2 |
| College Certificate | 3 |
| University Degree | 4 |
| Others (please state) | 5 |

Q5 Number of years of business experience

| | |
|---|---|
| Less than 3 years | 1 |
| 3 – 5 years | 2 |
| 6 – 10 years | 3 |
| 11 – 20 years | 4 |
| Greater than 20 years | 5 |

Q6 Number of permanent employees in the business for the following years

| Number | 2008 | 2011 | 2014 |
|---|---|---|---|
| 1 – 4 | 1 | 1 | 1 |
| 5 – 9 | 2 | 2 | 2 |
| 10 – 19 | 3 | 3 | 3 |
| 20 – 49 | 4 | 4 | 4 |
| 50 – 99 | 5 | 5 | 5 |
| 100 - 199 | 6 | 6 | 6 |

Q7 Percentage of Staff involved in Research and Development

| | |
|---|---|
| 0% | 1 |
| 1 – 5% | 2 |
| 6 – 10% | 3 |
| 11 – 30% | 4 |
| 31 – 50% | 5 |
| Greater than 50% | 6 |

Q8 Industry sector your business operates in

| | |
|---|---|
| Agriculture | 1 |
| Mining and Quarrying | 2 |
| Manufacturing | 3 |
| Electricity, Gas and Water | 4 |
| Construction | 5 |
| Retail and Motor Trade and Repair services | 6 |
| Wholesale Trade,Commercial Agents & Allied Ser | 7 |
| Catering, Accommodation & other Trade (state) | 8 |
| Transport, Storage and Communications | 9 |
| Finance and Business Services | 10 |
| Community, Social and Personal Services | 11 |

| | |
|---|---|
| Healthcare | 12 |
| IT/ ICT | |
| Others (State) | |

Q9 Number of years the business is in existence

| | |
|---|---|
| Less than 3 years | 1 |
| 3 – 5 | 2 |
| 6 – 10 | 3 |
| 11 – 20 | 4 |
| More than 20 years | 5 |

Q10 Approximate Annual Turnover in the following years

| Amount | 2008 | 2011 | 2014 |
|---|---|---|---|
| R0 – R500 000 | 1 | 1 | 1 |
| >R500 000 < R1m | 2 | 2 | 2 |
| ≥R1m < R5m | 3 | 3 | 3 |
| ≥R5m < R10m | 4 | 4 | 4 |
| ≥R10m < R20m | 5 | 5 | 5 |
| ≥R20m < R30m | 6 | 6 | 6 |
| ≥R30 < R40m | 7 | 7 | 7 |
| ≥R40 ≤ R60m | 8 | 8 | 8 |
| More than R60m | 9 | 9 | 9 |

Q11 Please score your response to the following statements regarding innovative practices in your business

| Response options | All the Time | Frequently | Not Sure | Sometimes | Never |
|---|---|---|---|---|---|
| Code | 1 | 2 | 3 | 4 | 5 |

| Statement | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| We try out new ideas | | | | | |
| The business implements new or significant changes in business strategies | | | | | |
| The business implements new or improved management strategies | | | | | |
| The business lacks an operational, innovation strategy | | | | | |

| Statement | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| The business is continually assessing how its offerings are converted into cash | | | | | |
| The ways in which the business generates revenue for its offerings differs compared to your competitors' | | | | | |
| The business associates with universities, technikons or research institutions | | | | | |
| The business utilizes information from exhibitions , conferences, the internet ,magazines or the massmedia | | | | | |
| We collaborate with our competitors or non-industry businesses; borrowing to enable our offerings or lending to enable their offerings | | | | | |
| We collaborate with our suppliers and customers to produce, test and market our offerings | | | | | |
| The business works with Government agencies to improve its business activities &/or offerings | | | | | |
| The business implements or has unique firm structures | | | | | |
| The business has recognized structures geared towards innovation | | | | | |
| There is cohesion between departments and sharing of knowledge | | | | | |
| There is an absence of rewards for behaviours that relate to set goals | | | | | |
| The business attracts skilled employees | | | | | |
| We are creative in how we run our operations | | | | | |
| The business implements new or advanced changes in organisational processes e.g. quality control, waste management, maintenance routines etc | | | | | |
| The business uses new technologies to improve its operations | | | | | |
| The business has patented certain technologies, processes or methods | | | | | |
| The business has certain unique processes or operations compared to industry standards or competitors' | | | | | |

| Statement | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| The business offers unique advantages compared to competitors' offerings | | | | | |
| The business uses new technologies to develop new offerings or to improve existing offerings | | | | | |
| We develop new products &/or services | | | | | |
| We introduce new products &/or services | | | | | |
| We improve upon existing products &/or services | | | | | |

| | | | | | |
|---|---|---|---|---|---|
| The business offers products &/or services that are simpler and easier to use than competitors | | | | | |
| The business develops extensions to its products, services or product and service combinations | | | | | |
| The business's distinct products &/or services are also bundled as packages | | | | | |
| Other businesses' offerings are created to work with your business products &/or services or vice versa | | | | | |

| Statement | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| To assist and provide knowledge about its offerings, the business provides services such as a helpdesk, website helpline etc | | | | | |
| The business provides unique warranties, guarantees etc for its offerings | | | | | |
| The business implements or provides additional services that add value to its offerings | | | | | |
| The business assesses new ways to deliver its offerings to customers or end users | | | | | |
| The business uses different channels cohesively, to deliver its offerings | | | | | |
| The business assesses channels used to deliver products &/or services by monitoring customer experience | | | | | |
| The business looks for new ways to market its offerings | | | | | |
| The business develops new local regional markets | | | | | |
| The business develops new national markets | | | | | |
| The business develops new international markets | | | | | |
| The business has specific branding strategies for its products &/or services | | | | | |
| The business is first to market new or improved products &/or services | | | | | |
| The business aims to address customer needs | | | | | |
| The business engages with the customer | | | | | |
| The business assesses how its offerings and its business is perceived by customers | | | | | |
| The business uses social media to connect with its customers | | | | | |

Q12 Please score your response to the following statements regarding your business's performance relative to your competitors'

| Response options | Much worse | Worse | Unsure | Better | Much better |
|---|---|---|---|---|---|

| Code | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|

| Statement | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| Your business's return on investment (ROI) compared to your competitors' | | | | | |
| Your business's sales growth compared to your competitors' | | | | | |
| Your business's market share compared to your competitors' | | | | | |
| Your business's operating costs compared to your competitors' | | | | | |
| Your business's productivity compared to your competitors' | | | | | |
| Your business's return on assets (ROA) compared to your competitors' | | | | | |

Q13 Please score your response to the following statements on obstacles to innovation encountered by your business

| Response Option | Do not agree | Agree |
|---|---|---|
| Code | 0 | 1 |

| Statement | 0 | 1 |
|---|---|---|
| We experience difficulty in accessing finance | | |
| We find that there is insufficient government support towards innovation | | |
| We have difficulties in accessing information with regards to technology | | |
| We experience difficulties in obtaining collateral | | |
| We find rules and regulations that govern our sector are restrictive and inhibit innovation | | |
| We find income taxes, import and export duties or other relevant taxes are high in our industry | | |
| We experience difficulty in obtaining skilled personnel | | |
| We are unable to access sufficient information regarding the market | | |
| We find the costs of innovation a deterrent | | |

Q14 Open questions

| Is your business part of a larger group? Yes or No. If 'Yes' where? |
|---|
| |

| What is your businesses main income generating activity or core activity? |
| --- |
| |

| Are there specific obstacles to innovation that your business encounters? |
| --- |
| |

| Comment on innovation in your business |
| --- |
| |

Thank you for taking the time to complete the questionnaire. Please go back to ensure that all questions have been answered. I sincerely appreciate your cooperation and effort. Many thanks!

## Appendix 3 Ethical Clearance

UNIVERSITY OF KWAZULU-NATAL
INYUVESI YAKWAZULU-NATALI

31 July 2018

**Ms Hemlata Parbhoo Vallabh &319930**
**Graduate School of Business and Leadership**
**Westville Campus**

**Protocol reference number: HSS/0262/014M**
Project title: **Investigating Innovation in South African SMMEs**

**Full approval – Recertification/Amendment**
Your request for Recertification dated 19 July 2018 was received.

This letter confirms that you have been granted **Recertification Approval** for a period of one year from the date of this letter. This approval is based strictly on the research protocol submitted in 2014 and request for amendment has been granted **Full Approval**

- ***Change in Supervisor Prof S Cassim to Prof M Hoque***

**Any alteration s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study must be reviewed and approved through the amendment /modification prior to its implementation. Please quote the above reference number for all queries relating to this study.**

**PLEASE NOTE: Research data should be securely stored in the school/department for a period of 5 years.**

Yours faithfully
[redacted]
Professor Shenuka Singh (Chair)
Humanities & Social Sciences Research Ethics Committee

**/pm**

cc Supervisor: Prof M Hoque
cc Academic Leader Research: Professor C Proches
cc School administrator: Ms Zarina Bullyraj

Humanities & Social Sciences Research Ethics Committee
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Website: www.ukzn.ac.za

1910 - 2010
100 YEARS OF ACADEMIC EXCELLENCE
Founding Campuses: Edgewood, Howard College, Medical School, Pietermaritzburg, Westville