



## **The real constraint to innovation in South African manufacturing organisations**

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University of Pretoria, in partial fulfilment of the requirement for the degree  
of Master of Business Administration.

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## **Declaration**

I declare that this research project is my own work. It is submitted in partial fulfilment of the requirements for the degree of Master of Business Administration at the Gordon Institute of Business Science, University of Pretoria. It has not been submitted before for any degree and I have obtained the necessary authorisation and consent to carry out this research.

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**Rudi van Schoor**

**13 November 2009**

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## GLOSSARY

Definition of terms and acronyms:

GCI – Global Competitive Index

WEF – World Economic Forum

FMCG – Fast Moving Consumer Goods

RandD – Research and Development

RDMT – Rational Decision-Making Theory

RBV – Resource Based View

KBV – Knowledge Based View

PSU – Primary Sampling Unit

SSU – Secondary Sampling Unit

## **Chapter 1: Problem Definition**

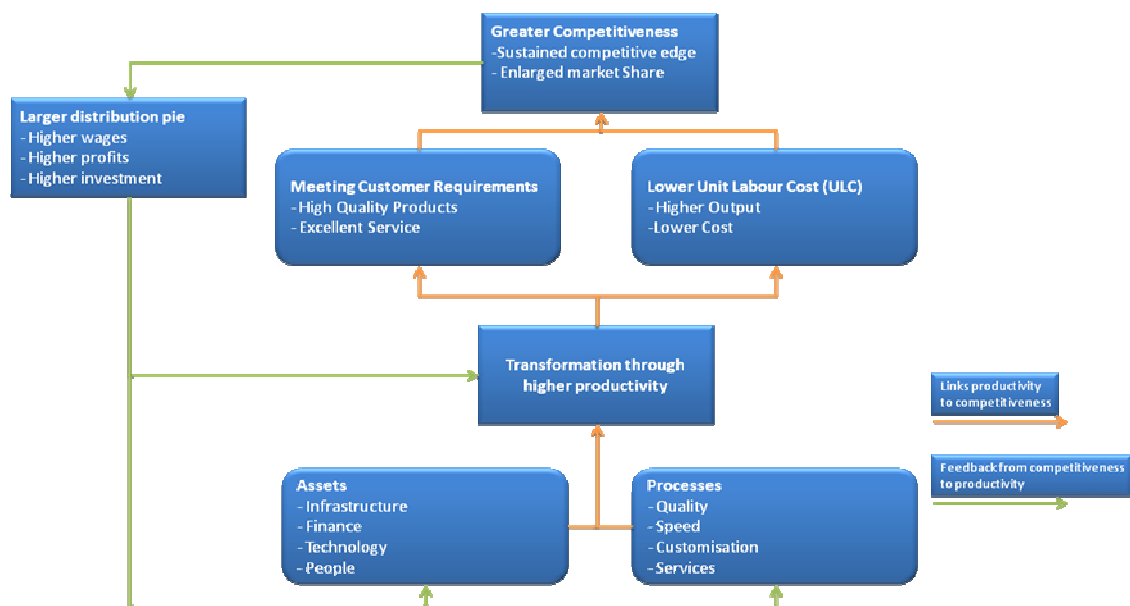
### **1.1 Introduction**

Competing in the global arena and succeeding as a country, a strong competitive base of businesses is required (Denton, 1999). These businesses will only compete and be successful if the individuals running these businesses are competitive (Binnedel, 2008). Reviewing how South Africa is performing within the global arena, we find that South Africa's global competitive index (GCI) as published by the World Economic Forum (WEF), has declined since 2005 (World Economic Forum, 2007) and South Africa is projecting its lowest economic growth rate since 1998, slowing to 1.2% (Fin24.com, 2009).

Terrif (2006) presents insightful research showing that innovation is paramount to business survival when there are external factors like economic decline, increased local/global competition and/or more demanding consumers. Sustainable value delivery to shareholders, the primary driver for profit driven organisations, becomes increasingly difficult within this context. Globalisation further brings about competitors that are not bounded by traditional borders and these competitors will compete for existing and new consumer pools with increasingly new products at a lower costs (Pun, Yam and Sun, 2003). In order to survive, firms increasingly have to meet constantly changing consumer demands (Emerald Group Publishing, 2008).

Shurchuluu (2002) expands on the World Competitiveness Formula used to assess competitiveness and links firm competitiveness to firm productivity. He concludes that transformation across assets and processes will lead to greater firm competitiveness (*Figure 1*). The previous discussion serves as an important milieu for a deeper view of how South African firms compete through innovation.

**Figure 1 - Dynamic productivity and competitiveness linkages**



“The South African Innovation Survey 2005”, conducted by Blankley (2008) shows the important statistics related to manufacturing firms (*Table 1*).

**Table 1 - Manufacturing firms surveyed – The South African Innovation Survey 2005**

	All	Enterprises with innovation activity	Enterprises without innovation activity
<b>Number of enterprises</b>	13 518	7 410	6 108
<b>Percentage of enterprises (%)</b>	100	54,8	45,2

Source: The South African Innovation Survey 2005 (Blankley, 2008)

A disturbing statistic from Blankley's report (2008) shows that only 54.8% of manufacturing firms in South Africa indicate that some kind of innovation activities occur within the firm. Further analysis shows (Table 2) that cost related factors are the biggest hampering factor to innovation within these manufacturing firms.

**Table 2 - Factors hampering innovation – The South African Innovation Survey 2005**

	All (Weighted)	Enterprises with innovation activity	Enterprises without innovation activity
<b>Cost Factors</b>	<b>62,26</b>		
Lack of funds internal	26,30	32,4	18,9
Lack of funds external	16,66	16,3	17,1
Innovation cost too high	18,30	15,5	21,7
<b>Knowledge Factors</b>	<b>42,27</b>		
Lack of qualified personnel	17,11	15,3	19,3
Lack of information on technology	8,48	5,9	11,6
Lack of information on markets	5,35	1,1	10,5
Difficulty in finding cooperation partners	11,34	5,1	18,9
<b>Market Factors</b>	<b>27,1</b>		
Market dominated by established enterprise	20,51	14,0	28,4
Uncertain demand for innovative good / service	6,60	3,3	10,6
<b>Reasons not to innovate</b>	<b>9,18</b>		
No need due to previous innovations	5,00	0,8	10,1
No need because of no demand for innovation	4,18	0,7	8,4

Source: The South African Innovation Survey 2005 (Blankley, 2008)

As briefly discussed above, innovation is a means to deal with economic downturn, competition and more demanding consumers. This leads to the research question: ***Why then if all of these factors are probably prevalent in***

**South Africa today, has Blankley (2008) identified a substantial lack of innovation in South African Manufacturing firms?** The ultimate research question to be answered by this study is therefore whether these factors are really hampering innovation in South African manufacturing organisations and if this applies to all types of manufacturing firms.

## **1.2 The Research Problem**

Previous national studies on drivers of innovation and innovation outcomes in South Africa (Blankley, 2008; Oerlemans *et al.*, 2006) measuring firm-level data suggest that innovation activities in South African firms are insufficient and unsuccessful. Oerlemans and Pretorius (2006) illustrate the importance of a strong internal and external knowledge-base on positive innovation outcomes. They further expand on previous research done by Blankley and Kahn (2005) and show that there is no direct correlation between research and development (RandD) spending and positive innovation outcomes.

The key issue in South African industries is to understand the factors hampering innovation in key industries, such as manufacturing, and how it shapes the competitive landscape and economic circumstance to ensure sustainable growth at both firm and country level. Consequently, the remaining chapters of this research will focus on existing literature which defined factors that hamper innovation and will draw a parallel specifically to fast moving consumer goods (FMCG) manufacturing firms in South Africa. This will facilitate the understanding of industry specifics with the aim to explore the factors

hampering innovation, and it is why cost is seen as the biggest hampering factor to innovation in manufacturing firms as stated by Blankley (2008).

### 1.3 Research Purpose

Oerlemans and Pretorius (2006) recognise that the long term growth of nations depends on the ability of its firms to continuously develop and produce innovative products and services. This implies that South Africa's prosperity as a nation rests on the shoulders of private and public sector growth and productivity.

The purpose of this research is to:

**Firstly**, reassess views on the hampering factors or constraints to innovation as previously presented by researchers.

**Secondly**, determine if cost is identified as a primary constraint to innovation, and

**Finally**, establish if South African manufacturing firms do conform to previous findings related to factors hampering innovation.

### 1.4 Scope of Research

This research study will not only review the current and relevant academic literature on the topic of innovation and constraints to innovation. It will also test the factors hampering innovation as suggested by the most recent 'South African Innovation Survey' by Blankley (2008), specifically in fast moving

consumer goods (FMCG) manufacturing firms and further explore if cost has a true impact on innovation activities within these firms.

One should understand why cost specifically has not been identified as a factor hampering innovation at firm and country level in South Africa in previous research. When this understanding is combined with a deeper understanding of specific factors hampering innovation activities within FMCG manufacturing firms, it can be used to take explicit action in removing such hampering factors. The longer term competitiveness at firm and country level could therefore ultimately be increased.

## **1.5 Outline of Research Report**

The chapters in the research proposal adhere to the following themes:

Chapter 1: Introduction to the Research Problem

Chapter 2: Theory and Literature Review

Chapter 3: Research Proposition

Chapter 4: Research Methodology

Chapter 5: Research Results

Chapter 6: Discussion of Results

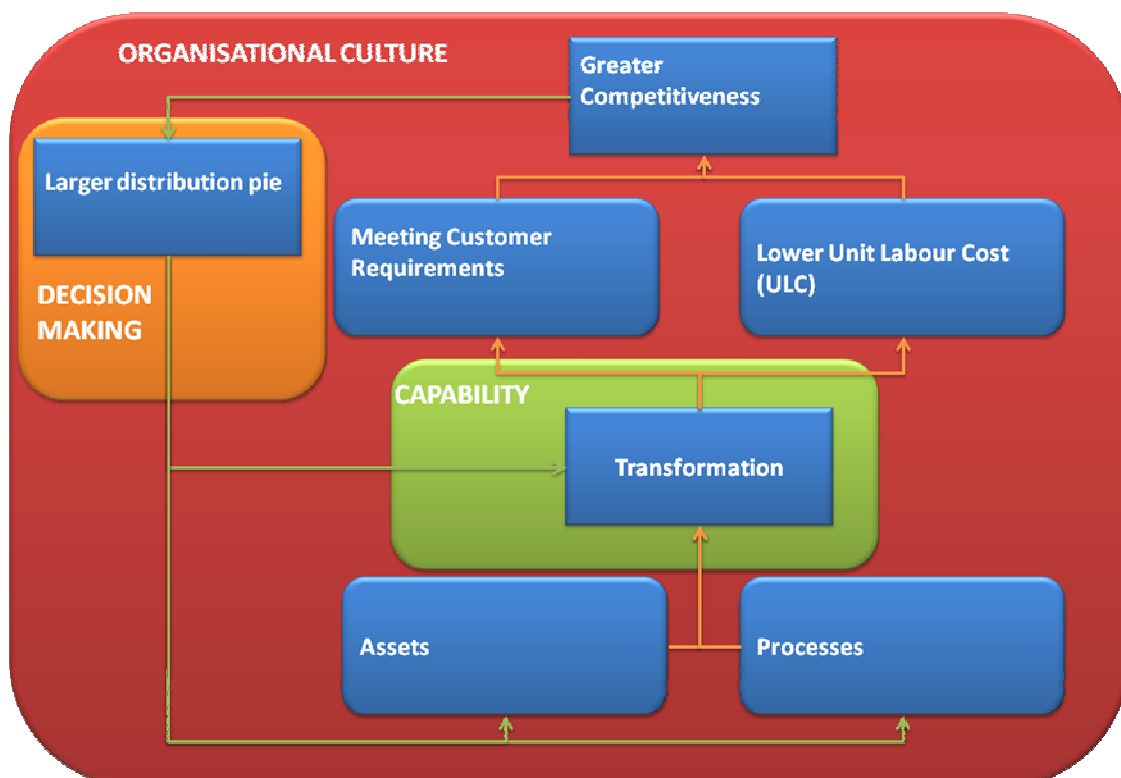
Chapter 7: Conclusion

## 1.6 Concluding Remarks

Blankley's (2008) finding, '62% of manufacturing firms within South African cite cost as a hampering factor to innovation' is not supported by the theory review covered in the following chapter. This contradiction raises the question: "Why in Blankley's survey of manufacturing firms in South Africa (2008) is cost cited as such a major hampering factor to innovation?", and further sparks the need to evaluate the relevance of these specific factors.

The combination of Shurchuluu's model (2002) and the identified determinants of innovation in the theory review set the base and structure for this research report. The model presented below has been developed using the theory base suggesting that organisational culture has a fundamental impact on organisational decision making around innovation, and its capability to innovate within the assets and processes framework of the organisation.

**Figure 2 - Primary drivers/enablers for successful innovation outcomes**





Answering the question on whether cost is, or is not, a hampering factor in South African firms will significantly contribute to how innovation should be fostered and cultivated in South African Manufacturing firms.

In Chapter 2 a clear understanding of innovation will be given with a deeper analysis using existing theory that could influence innovation in organisations such as:

- Organisational Culture
- Decision Making Processes
- Firm Resources
- Knowledge

This elaboration will further develop an understanding of the determinants of innovation outcomes.

## Chapter 2: Theory and Literature Review

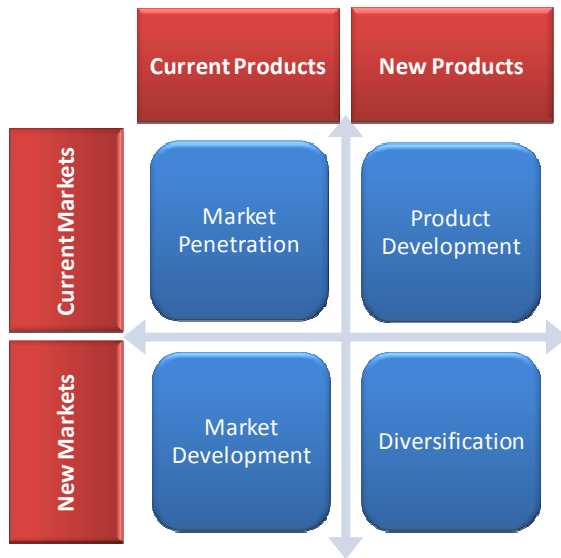
### 2.1 Introduction

The literature review will focus on innovation and on the elements that can influence innovation such as organisational culture, decision making processes, knowledge and firm resources. This base theory review will be done to understand the interrelatedness of these themes and the impact on innovation. This will facilitate a better understanding of innovation in context and further postulate how these elements might drive some of the findings highlighted by Blankley's survey (2008).

#### *2.1.1 Describing innovation*

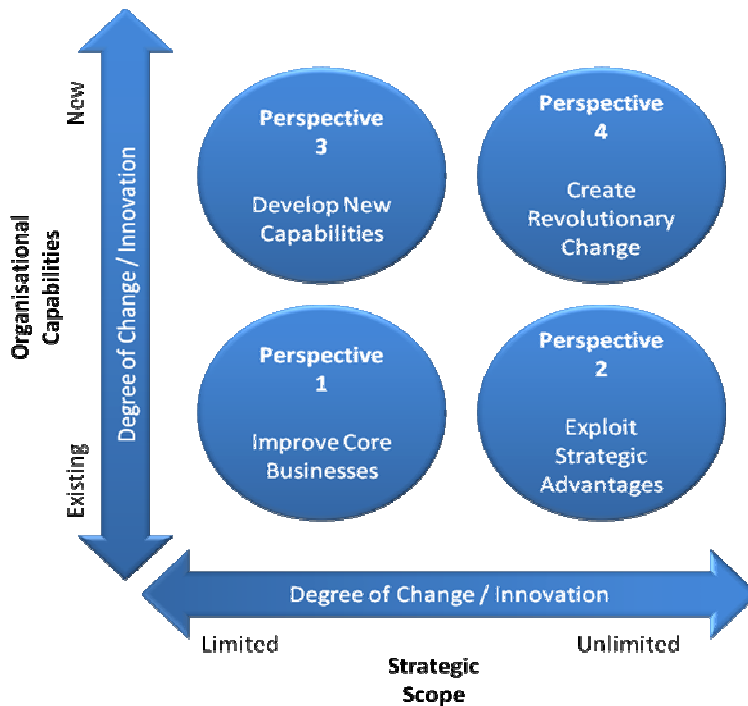
Innovation and what it encompasses or implies to the firm has been described from a multitude of perspectives. In general it can be stated that any activity that leads to improvement of the current outcome/situation can be deemed an innovation (Van de Ven, 1986), or as defined by Corso and Pavesi (2000) 'a continuous process of learning, improvement and evolvment.' Product and service level innovation is best described by Ansoff's matrix (*Figure 3*) (Watts *et al.*, 1998) and depicts innovation as the range between implementing new products into fresh markets, to expanding existing products in established markets.

Figure 3 - Ansoff's mat...



Hickman and Raia (2002) reaffirm that innovation is not just confined to the delivery of a spectacular new product to a new market and propose four perspectives of innovation (Figure 4), thus linking improvement with creation.

Figure 4 - Four perspectives of innovation



Hardaker (1998) and Schurich and Gibson (1999) further elaborate and include process changes that increase efficiencies and/or reduce costs as process innovation. Martins and Terblanche (2003) broaden the definition stating that innovation is the implementation of a new idea, practice or material artefact which is regarded as new by the unit of adoption and through which change is brought about.

In conclusion the model presented by Schurich (2002) best describes innovation as the process of transforming competitive assets and/or processes to deliver increased competitive advantage. This model allows for both product and process innovation at the incremental and radical levels.

### *2.1.2 Why do companies innovate?*

“Innovate or Die”, (Terriff, 2006: 475) is an appropriate statement describing why companies innovate and his case of the US Marine Corps is suitable as an analogy to modern businesses. External factors like economic growth/decline, increased local/global competition and more demanding consumers, force organisations to review current offerings. Companies have to measure their sustainable position in the market continuously. Competitive advantage is an ongoing challenge and companies strive to deliver unique products to the customer (Hardaker, 1998). Therefore product innovation is linked to company growth strategies (Watts, *et al.*, 1998) and is an important key to a firm’s survival, growth and long term performance (Akhigbe, 2002). The proliferation of brands is a widespread phenomenon, and multinationals have effectively

used innovation in brand, product and process to deter new entrants (Alfranca, Rama and Tunzelmann, 2002).

### *2.1.3 Key determinants associated with successful innovation*

Key determinants, enablers and pre-conditions are some adverbs used in defining the “Holy Grail” of innovation enabling. A summary of various articles on the topic is presented in the table below (*table 3*) and will be briefly discussed further.

**Table 3 - Summary of literature on 'Key determinants for successful innovation outcomes' – Author's own**

Source / References	Assets	Processes	Capability	Organisational Culture
(Van de Ven, 1986)		* Require end-to-end process to ensure management of idea into good currency	* Need ability to focus on complex environments * Need the capability to ensure the management of cross-functional relationships	
(Lippman, Steven and McCardle, 1987)				* Historic outcomes determine the attitude towards innovation
(Dougherty, 1992)			* Need ability to align different thought-worlds towards collaboration and collective action towards common understanding	
(Cooper, O'Mara, Ronchi and Corso, 1995)	* Require adequate resources	* Require high quality NPD process	* Require highly educated resources	* Need entrepreneurial environment * Require a specific NPD strategy * Require dedicated cross-functional teams * Need involved leadership
(Hardaker, 1998)				* Need early involvement and cultural integration of cross-functional teams



(Cooper, 1999)		* Require well defined and managed process with clear gate reviews		* Accountable dedicated cross-functional teams and strong leadership
(Chapman, <i>et al.</i> , 2001)		* Integrated NPD process	<ul style="list-style-type: none"> <li>* Knowledge management               <ul style="list-style-type: none"> <li>o Sourcing and acquisition of knowledge</li> <li>o Transfer and consolidation of knowledge</li> </ul> </li> </ul>	* Autonomous teams
(Paulson Gjerde, Slotnick and Soble, 2002)			* Market understanding driving innovation	
(Oerlemans, <i>et al.</i> , 2006)	<ul style="list-style-type: none"> <li>* Access to finance</li> <li>* Access to adequate resources</li> </ul>		* Highly educated resources	* Understanding of risk

### ***Resources, process and capabilities***

Manufacturing companies are biased towards manufacturing technology and in general will assign the most and strongest resources towards what is seen as the heart of the organisation (Sheth, Ram and Rodgers, 1989). This allocation and development of what is known, rather than what is needed refines already mastered skills, rather than building on what is needed for future delivery (Oerlemans *et al.*, 2006; Sheth *et al.*, 1989).

A limitation to effective innovation in organisations is the allocation and/or availability of resource skills and knowledge (Cooper, 1999). In complex consumer goods environments, it is important to have well rounded, experienced and knowledgeable resources as these resources are not just implementers but also definers of product innovations. Oerlemans *et al.*, (2006) clearly argue that the stronger the organisation's internal knowledge base the higher the innovation outcomes.

The combination of highly skilled resources across multiple organisational functions will aid in the development of better and stronger innovation concepts (Johne *et al.*, 1988). This implies that cross-functional stakeholders should be involved in all phases of innovations (Cooper *et al.*, 1995). Hardaker (1998) also cites that the lack of understanding and the divide across functions, force the need of early involvement of all stakeholders. Dougherty (1992) concludes in her findings that a collective action (shared understanding) is necessary to manage innovation.



This cross-functional approach to innovation enables the early alignment of business functions and promotes organisational learning and improvement relative to innovation (Corso *et al.*, 2000; Van de Ven, 1986).

### ***Organisational culture, leadership and climate***

In order to recognise the influence organisational culture has on innovation it is important to understand that change and uncertainty are inherent attributes of innovation. Terriff (2006: p478) defines organisational culture as the “symbols, rituals and practises that give meaning to the activities of the organisation”. She further says that culture creates the construct which influences the individual’s actions and understanding of what is acceptable behaviour within the organisation. If change through innovation or other means challenges the current organisational culture, it will be met with strong resistance. Changing this behaviour (driven by culture) is neither simple nor easy and needs to be approached incrementally by changing the narrative that reinforces organisational culture.

Obenchain, Johnson and Dion (2004) further expand research on organisational culture impact on innovation by adding organisational type as a dependant variable to innovation frequency and suggest that both culture and organisation type influence organisations’ ‘appetite’ and ability to innovate (*Figure 5*).

Figure 5 - Organisational innovation frequency



In terms of innovation, an organisation's culture can heavily influence the receptiveness and responses of its role-players towards innovation. The organisation's culture is a key determinant of how adaptable an organisation will be towards a changing environment (Obechain *et al.*, 2004, Johne *et al.*, 1988, Cooper *et al.*, 1995). Where a strong culture exists, it is natural that any direct threat, whether perceived or real, to the outcomes associated with the organisation's culture, will be avoided.

Leadership and management's role in organisations are firstly to set the strategic direction of an organisation and secondly to create, maintain and enable the structures/resources to deliver on the defined strategy. The strategic definition and enablement influence organisational behaviour and culture. If innovation is excluded from this formal 'destination map' how can leaders and managers align to create the enabling environment (Corso *et al.*, 2000)? They define an innovation strategy, the implementation of formalised delivery processes and measurement, the enablement of cross-functional engagement, and supportive policies as key levers to successful innovation implementation.

#### 2.1.4 Manufacturing firms

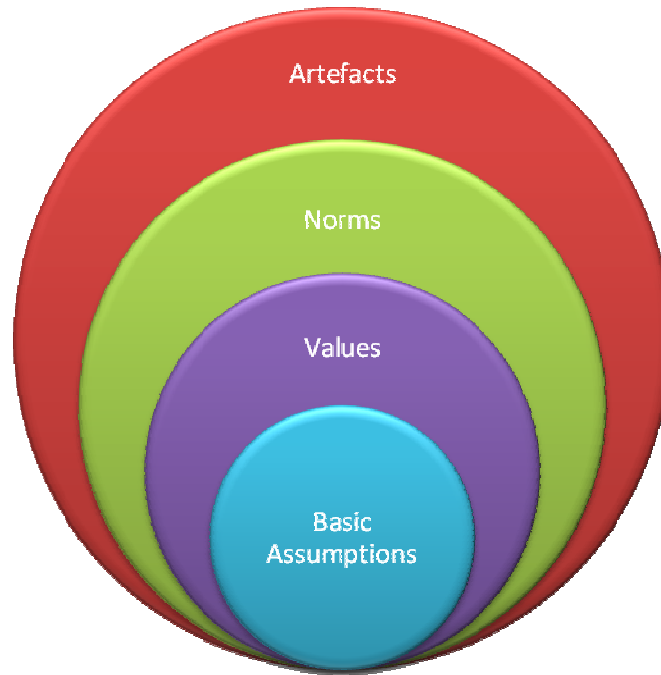
A manufacturing firm is defined for the purpose of this research paper as an organisation seeking profit by converting raw material or sub-assemblies into a final product using specific resources in order to fulfil a customer demand.

## 2.2 Organisational Culture

### 2.2.1 Definition of organisational culture

Many definitions exist for the 'Organisational Culture' with some agreement on elements that typically are reviewed to better understand organisational culture (Cummings & Worley, 2005). At the most basic level Van de Berg and Wilderom (2004) define culture as the glue that holds the organisation together and which stimulates employees to commit to the organisation. Martins and Terblanche (2003) defined organisational culture as a set of assumptions that worked well in the past and is therefore accepted as valid in the present. These assumptions manifest in each interaction within the organisation in the form of attitude and behaviour. Cummings *et al.* (2005) further present a framework of these basic elements and state that the culture of the organisation is defined by how individuals add meaning to these elements (*Figure 6*) and define culture as the pattern of artefacts, norms, values and basic assumptions about how to solve organisational problems.

Figure 6 - Levels of corporate culture



**Artefacts:**

Artefacts are the visible symbols of deeper levels of organisational culture. These are observable and include elements such as clothing, language, structures, systems, rules, etc (Cummings *et al.*, 2005).

**Norms:**

Norms represent the unwritten rules of how members of the organisation should behave in certain situations (Cummings *et al.*, 2005).

**Values:**

Values define what is important to the organisation and deserves the attention of its members (Cummings *et al.*, 2005).

Basic Assumptions:

Often taken for granted, the basic assumptions are the guidelines of how to perceive, think and feel about things. These assumptions are non-debatable and form the core of how organisational problems should be solved (Cummings *et al.*, 2005).

### *2.2.2 Organisational culture and its influence on organisational effectiveness*

With a basic definition of organisational culture presented, it is further important to understand how organisational culture influences organisational effectiveness and more specifically how it might influence creativity and innovation. Cummings *et al.* (2005) assert that organisational culture has a direct as well as indirect impact on organisational effectiveness. Suppose a particular pattern of values and assumptions has been the source of strength in the past for the organisation. This pattern could, in a changing environment, oppose a new strategic direction and thus indirectly negatively affect organisational effectiveness (Abrahamson *et al.*, 1994). More directly, a culture that emphasises employee participation in decision making, open communication, security and equality increases organisational performance relative to organisations where these factors are not explicit.

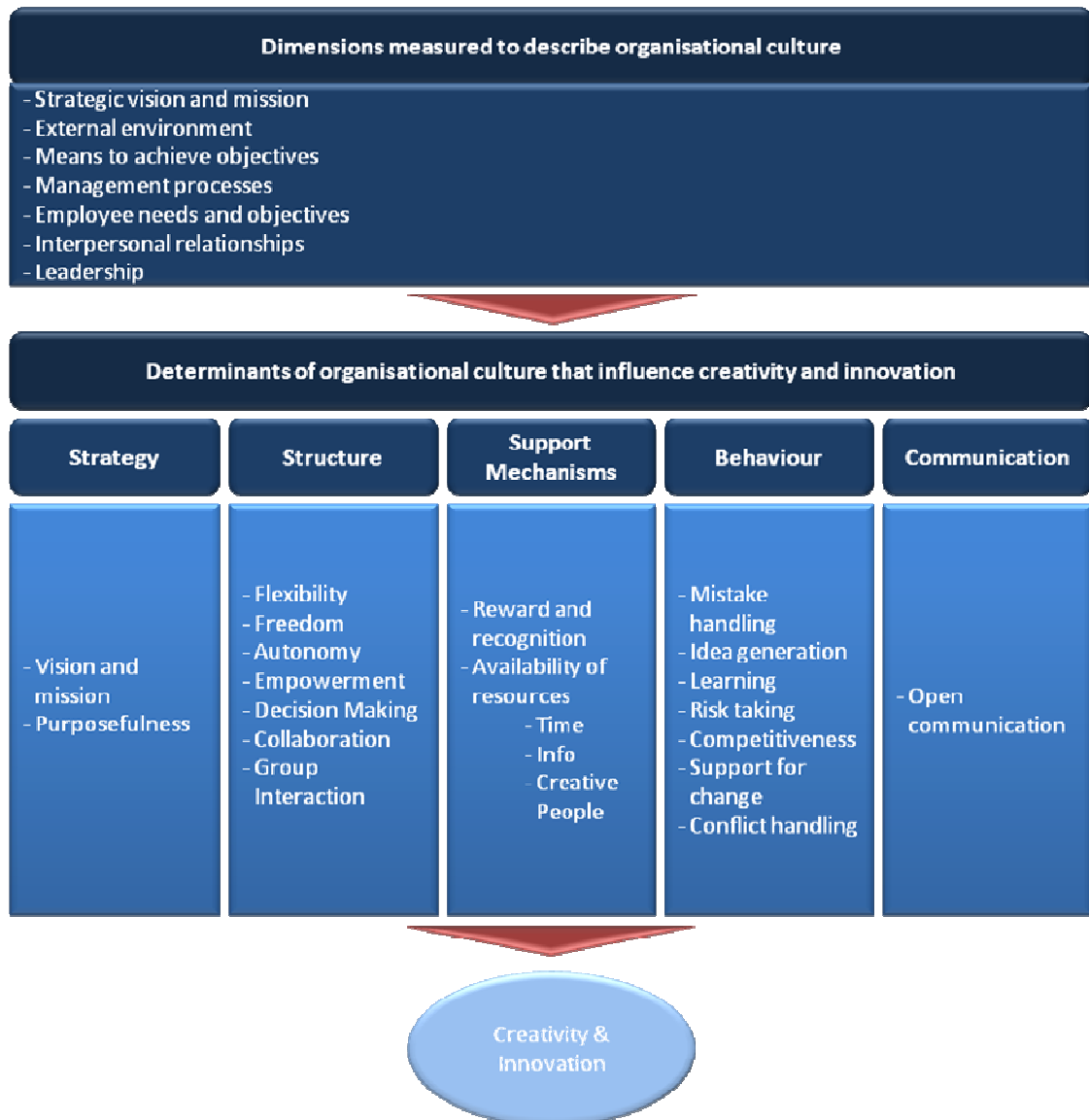
Andriopoulos (2001) researches determinants of organisational creativity and defines the key influences as, a) Organisational Culture, b) Organisational Climate, c) Leadership Style, d) Resources and Skills, and e) Structures and Systems. Within the organisational culture heading he elaborates and states

that open communication, risk taking, participation, trust and respect should be part of the core norms and values in an organisation's culture. Martins and Terblanche (2003) further research how organisational culture affects creativity and innovation and develops a framework showing which specific elements of organisational culture influences organisational creativity and innovation (*figure 7*).

The organisation's culture affects the process of idea creation, support and implementation. Through the normal socialisation processes within the organisation, the basic values, assumptions and beliefs of the employees, management and the leadership will react accordingly to new ideas which might affect change.

It is clear that organisational culture can affect how innovation is approached in an organisation. Martins and Terblanche (2003) give a valuable framework but researchers need to be cognisant that determinants are not mutually exclusive.

Figure 7 - Influence of organisational culture on creativity and innovation



## 2.3 Decision Making

### 2.3.1 Decision making at the individual level

Decision making can easily be discussed under the banners of organisational culture or behaviour. Given that innovation might not be an 'old' integrated process for manufacturing firms in South Africa, it could hold true that the decision making process around innovation is not entrenched in the

organisational culture. It is therefore important to review theory around the decision making process to understand how this might impact on innovation decisions in manufacturing firms within South Africa.

Schmidt (1958) develops a framework to explain executive decision making. In his framework he states that any decision will be based on the information at hand. These outcomes are termed hypothesis as there is uncertainty in the actual outcome manifesting post decision making. Given this construct, there are four possible decision directions a decision maker can take (*figure 8*):

- The hypothesis is true and positive action is taken.
- The hypothesis is true and non-positive action is taken.
- The hypothesis is false and non-positive action is taken.
- The hypothesis is false and positive action is taken.

This information never presents all the facts at hand to enable perfect decision making and thus always contains a degree of uncertainty. Within the information at hand the decision maker will develop various alternatives with associated outcomes. The rational decision-making theory (RDMT) proposes that the 'decision-maker' has all information needed to make a decision and is logical in deciding which option to pursue (Nichols, 2006). This theory further suggests that decision makers will pursue the optimum outcome in view of probability, irrespective of opinion.

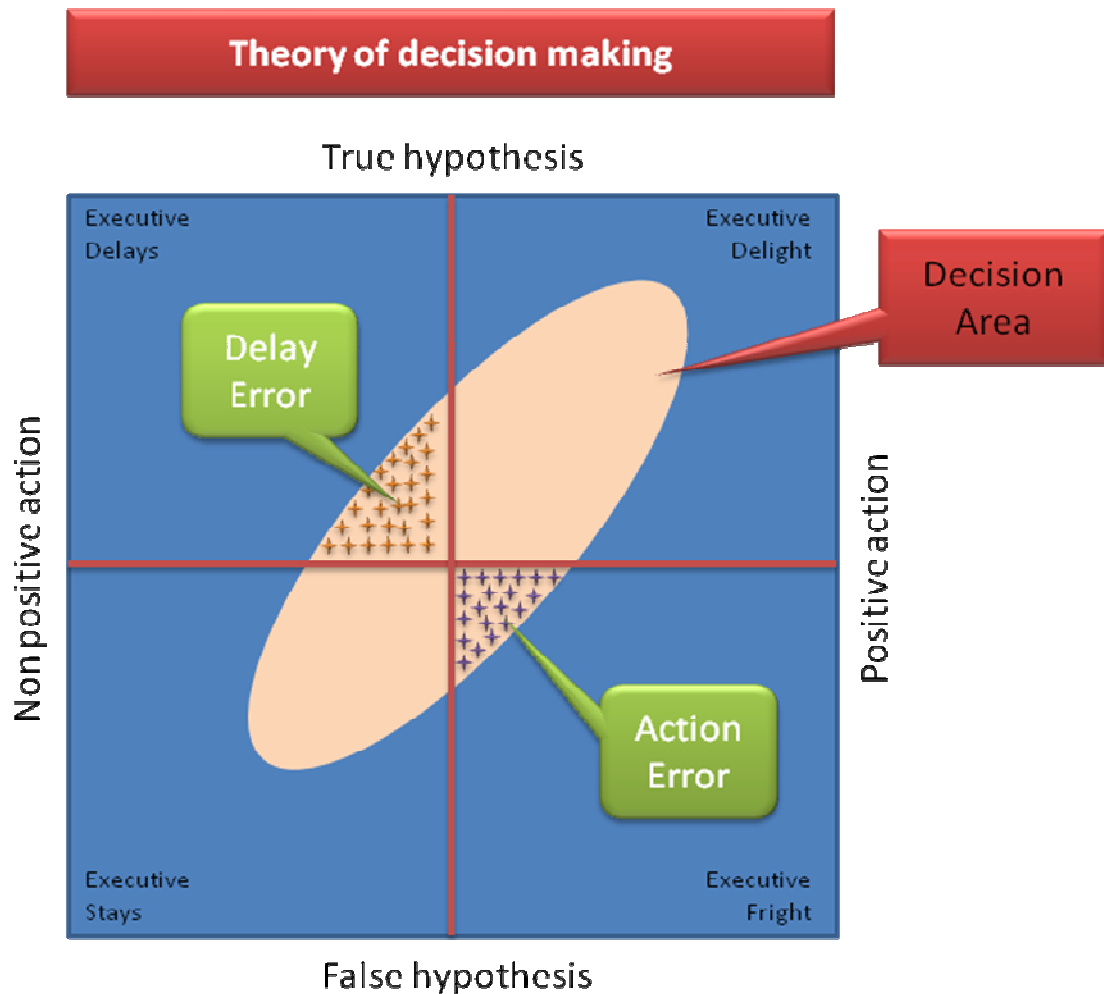
The ideal of having all information as described in the RDMT available prior to decision making is not realistic in every day life as the decision maker might not have the necessary data, skills or knowledge required to make an optimal



decision. Nichols (2006) and Cooper (1999) affirm the lack of perfect information and knowledge before the decision is made, and suggest that a form of 'intuition' fills this void. This collective term is expanded in the following ways:

- Decisions will be made based on what would be a satisfactory outcome (Nichols, 2006; Knighton, 2005)
- Social norms and culture influence decision making (Nichols, 2006).
- Decision making 'group' affecting the individual's decision making (Woodside *et al.*, 2005).
- General knowledge gained from experience influences decision making (Nichols, 2006; Corso *et al.*, 2000)

Figure 8 - Theory of decision making



It is within the executive delay and fright quadrant where the impact of corporate memory will most adversely affect future decisions. Cannon and Edmondson (2002) define failure as any deviation from the expected results, and further show that the common belief about failures in the organisation will impact on how the level decisions are made in the organisation and the actual way in which they are made. They further show that the actual beliefs around failure affect the performance of the firm.

### *2.3.2 Decision making by groups*

A firm's decisions are made by individuals or a collective of individuals (Woodside and Biemans, 2005). Torrance (1957) finds in his research that decision making by a group is only effective when inputs from the whole group is considered and a collective decision is made based on all inputs. What is interesting in his findings, are the specifics around group dynamics and social behaviour during the decision making process and its effects on the decision outcome. It is natural to assume that there is a formal hierarchy within an organisational decision making group. When opinions on a specific decision are asked from group members starting with the lowest level present in the room, the range of judgement tended to be greater than starting with the highest level in the group (Torrance, 1957). It is clear in his findings that the influence of an individual on the decision to be made is directly proportional to the status/power of that individual.

### *2.3.3 Understanding investment decisions*

A fundamental trade-off that decision makers will face is the substitution between business risk (what is inherent to the organisation) and the associated financial risk (Gabriel and Baker, 1980). Risk management in the context of the organisation is the management of an organisation's exposure to financial loss (Corbett, 2004).

Linking the constructs of 'decision-making to optimise outcomes in lieu of imperfect information', the inherent 'uncertainty of innovation outcomes', and

the 'risk-averse' nature of organisations, it becomes clear that decisions around uncertain outcomes will be made in a risk-adverse nature.

In the case of new product innovation Cooper (1999) in a study established how organisations measured innovation. This study showed that managers were unaware of the impact new products have on profitability, margin sales and sales impact. He further identifies that decision making on the pursuing of innovation is made relative to the reward (Johnes *et al.*, 1988), strategic fit and the probability of success. Chapman *et al.* (2001), surveying 70 manufacturing companies, show that key performance measures used in evaluation of innovations were linked predominantly to the areas of design performance (how much does the manufacturing cost; what is the manufacturing impact), and product performance (what are the input costs; what are the quality parameters of the product).

Chapman *et al.* (2001) further show that both local (regionally focused) and global (multi-national) manufacturers do measure innovation to some extent in terms of sales and profit and had low interest in viewing market share.

## 2.4 Resources and Knowledge

### 2.4.1 Resource Based View (RBV)

Wernerfelt (1984) defines firm resources as the tangible and intangible assets which are semi-permanently tied to a firm and can be thought of as a strength or a weakness of the firm. Wernerfelt (1984) takes a resource based view (RBV) and links resources with firm performance as opposed to taking a product/market based view. Barney (1991) expands on the RBV and develops a framework expanding on firm resources and sustained competitive advantage. Barney (1991) states that a resource and its impact on sustainable competitive advantage can be evaluated based on the resources':

- Value
- Rareness
- Imitability
- Substitutability.

Barney (1991) discusses the framework and its implications with the organisational based theory and affirms that organisational behaviour and culture can be included in the RBV and that this can be seen as a competitive advantage as can some of its values, norms, etc. and that these are valuable, rare and non-imitable.

#### *Valuable Resources*

Resources are deemed to be valuable when they enable the firm to improve on efficiency or effectiveness (Barney, 1991).

### *Rare Resources*

Resources are deemed to be rare if they are not commonly found in all organisations. It is possible for a resource to be valuable but not rare. An example of such a resource could be managerial talent (Barney, 1991).

### *Imperfectly Imitable Resources*

Valuable and rare resources will only contribute to sustained competitive advantage if these resources are not easily imitated or obtained by other firms (Barney, 1991).

### *Substitutability*

If a resource is not imitable a secondary action is substitution. If such substitutes exist and can deliver close or equal results when compared to the original, substituted resource, then such resources does not contribute to the sustained competitive advantage (Barney, 1991).

## *2.4.2 Knowledge Based View (KBV)*

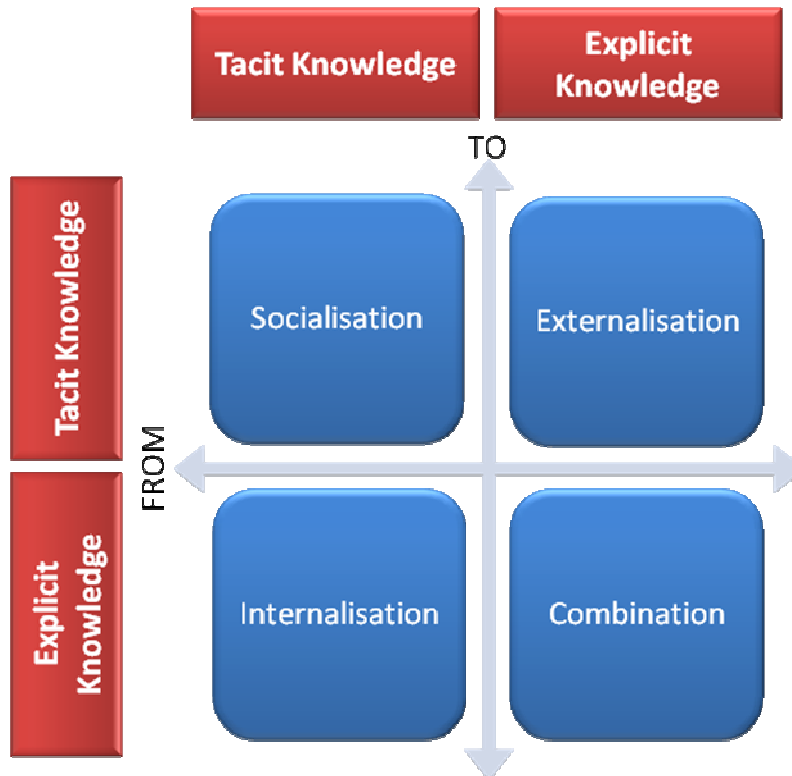
Overlapping the RBV is the knowledge based view (KBV). Knowledge is an important component of capabilities or resources and value creation is a direct result of knowledge creation and management (Coff, 2003).

*Knowledge Creation*

Nonaka (1994) presents a framework (*figure 9*) to explain the different methods of knowledge creation. It is necessary first to explain two distinct classifications of knowledge.

- Explicit knowledge - is knowledge which can be transferred through formal systematic processes (Nonaka, 1994).
- Tacit knowledge - is knowledge rooted in action, commitment and the specific context (Nonaka, 1994). It implies that tacit knowledge is not necessarily transmitted through formal structures but can be transmitted through observation.

Figure 9 - Modes of knowledge creation.



Socialisation – The creation of tacit knowledge is done through organisational social processes and is deeply rooted in the organisational culture and behaviour (Nonaka, 1994).

Combination – Using social processes in the organisation it is possible through the combination of different bodies of explicit knowledge to create new knowledge (Nonaka, 1994; Kogut and Zander, 1992).

Internalisation and Externalisation – Tacit and explicit knowledge interplay over time and can become an integral part of organisational culture (tacit) or be communicated to external sources (explicit) (Nonaka, 1994).



### *Knowledge Sharing*

Sharing of knowledge across business units is vital for organisations to enhance capabilities (Tsai, 2002; Hansen, 2002). They state that the more formalised and centralised the coordination of knowledge sharing across business units is, the lower the level of tacit knowledge sharing and that basic socialisation processes support knowledge sharing.

Hansen (2002) further explains that knowledge sharing networks within multiunit firms have an impact on knowledge sharing and that there is no specific design that can be applied to such networks to further enhance knowledge sharing.

(Majchrzak *et al.*, 2004), define knowledge transfer as the application of knowledge created in a previous situation to current context. They further find that the reuse of knowledge by others only occur when:

- a problem is unsolvable when using current knowledge possessed which is not sufficient to solve the problem
- a problem requires a totally new perspective
- it is thought that existing ideas can be found in the existing knowledge base of the firm. This demonstrates that it is important for knowledge networks to exist within the firm for this event to be possible.

## **2.5 Conclusion of Literature Review**

In this chapter a literature review on innovation and its existing theory base were presented to the reader. Understanding the basic building blocks of innovation and the impact of organisational culture and behaviour will assist in obtaining some rationale on why and how organisations behave in certain ways. A deeper review of literature on organisational culture and innovation elevates specific elements that will influence the organisation's creativity or innovations. Given the elements grounded in structural basis and the specific behavioural elements, the reader is exposed to theory on decision making.

In reviewing decision making theory, the study specifically focussed on how decisions are made and how these decisions are influenced by groups and by uncertainty.

The last section gives a very high-level review of RBV, and elements of KBV. Firstly RBV was touched on to ensure that a good understanding exists of which resources add to the firm's competitive advantage and therefore need to be protected/nurtured by the firm. It is clear that there is no reference in the literature to finance (money) being one of these. Secondly KBV is reviewed to understand theory particular to knowledge sharing and transfer within the organisation.

This literature review and the preceding discussion on innovation set a valuable foundation to investigate which factors are hampering innovation in the manufacturing firms and why manufacturing firms cite cost as the biggest

hampering factor to innovation in South Africa (Dankley, 2008). In the next chapter we will discuss the background of the research and formulate some propositions.

## Chapter 3: **Research Propositions**

### 3.1 Introduction

In the previous chapters we have discussed the following:

- a) Findings from innovation related surveys in South Africa (Blankley, 2008).
- b) The context of innovation. What it is, why organisations do it, and what are the determinants of successful innovation.
- c) Literature review to establish a theory base to explain some of the findings in Blankley's (2008) survey.

Through deductive reasoning these discussions are the groundwork for the development of the framework for the research propositions in this chapter. "To infer deductively means to begin with one (or more) statement(s) that are accepted as true and which may be used to conclude one logical true statement (form the broad and general to the specific)" (Welman and Kruger, 1999: 25).

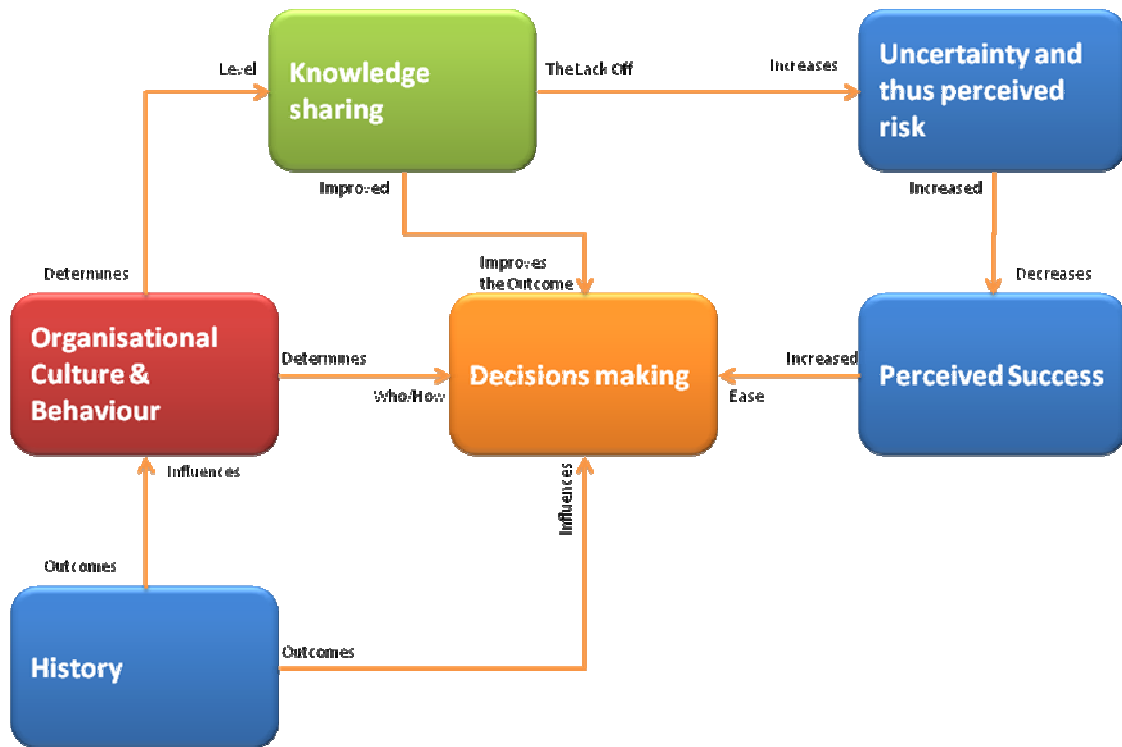
It is clear that there is no reference to cost as a determinant or hampering factor, directly or indirectly in the above theory base. This supports the fundamental question asked by this research study: "Determining the real hampering factors to innovation in South African manufacturing organisations?" It is plausible that the cost factors cited in Blankley's survey (2008) are secondary symptoms rather than real determinants or hampering factors to innovation.

Combining the above discussions, the researcher presents a framework as the basis of proposition construction. At the root of the question asked by the researcher is the 'decision' of a manufacturing firm: to innovate or not to. From research above it is clear that the decision making process is not linear and is influenced by a multitude of inputs and stimuli and by the absence of perfect information. Historic results are one of many influences on decision courses (Torrance, 1957; Corso, *et al.* 2000; Knighton, 2005; Nichols, 2006). This imperfect information also increases the perception of risk associated with the outcome of the decision (Torrance, 1957; Cannon *et al.*, 2002).

Martins and Terblanche (2003) give valuable insight as to how an organisation's cultural elements affect creativity and innovation within organisations and show that the decision making is an integral part of the organisational culture. Building on this we also find that organisational culture has a major influence on knowledge sharing within the organisation (Hansen, 2002; Nonaka, 1994). It is further highlighted by Chapman *et al.* (2001) that manufacturing firms specifically evaluate investment decisions around costs related to the manufacturing process.

Below is a framework (*figure 10*) connecting the findings above into a simplistic model showing influencing factors related to innovation decision making. This framework forms the foundation for constructing the research propositions.

Figure 10 - Factors influencing innovation related decision making – Author's own

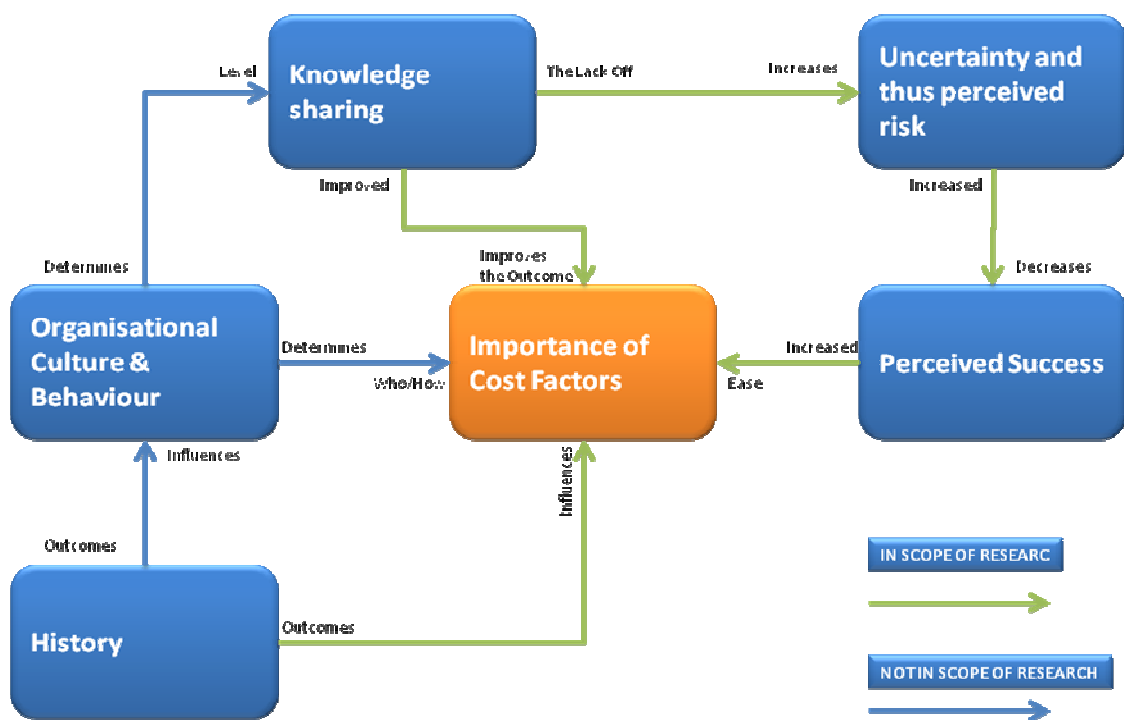


We should however, still link this framework to cost factors as displayed by the “South African Innovation Survey”, conducted by Blankley (2008). Blankley (2008) asked industries across South Africa whether they innovate or not, and irrespective of the innovation present in the organisations, what are the common factors hampering innovation within these organisations. He also grouped these industries across services and manufacturing. Blankley (2008) grouped his findings into 4 categories:

- Cost Factors
- Knowledge Factors
- Market Factors
- Reasons not to innovate

It is thus appropriate to perceive these factors as elements within the decision making process. Replacing decision making in the framework presented above (figure 10) with one of these elements enables the researcher to investigate the relationships within the framework specific to a single element within the decision making process.

**Figure 11 - Factors influencing the importance associated to cost factors within innovation related decision making – Author’s own**



The above framework (figure 11) will be used to formulate research propositions in aid to answering the research question: “What are the real factors hampering innovation in South African manufacturing organisations?”

## 3.2 Research Propositions

Zigmund (2003: 44) describes a hypothesis as “a proposition that is empirically testable” and that a proposition is, “a statement concerned with the relationship between concepts”. He further states that statistical hypotheses should be stated in the null form to ensure conservatism in testing.

Using the framework discussed above the following propositions have been formulated.

1. Negative innovation outcomes increase the importance of cost factors within the decision making process related to innovation.
2. The level of knowledge sharing related to an innovation is indirectly proportional to the level of uncertainty and thus to the perceived risk of an innovation outcome.
3. The level of knowledge sharing around an innovation is indirectly proportional to the importance of cost factors within the decision making process related to innovation.
4. The level of uncertainty associated with an innovation is indirectly proportional to the level of perceived success of that innovation.



5. The level of perceived success associated with an innovation is indirectly proportional to the importance of cost factors within the decision making process related to innovation.

### **3.3 Concluding Remarks**

Chapter 3 linked the reviewed theory base to the research question. A framework is presented and used as basis for formulation of the research propositions. Through inductive reasoning these propositions can be tested. “The inductive process means to begin with an individual case or cases and then proceed to a general theory (in order to generalise all cases based on the conclusions reached from observing a few cases)” (Welman & Kruger, 1999: 30). The next chapter will outline the research methodology and how the research will be conducted.

## Chapter 4: **research methodology**

### 4.1 Research Design

The research design is the principal plan of how the researcher will collect and analyse data in order to answer the research question (Zikmund, 2003). The research at hand is quantitative of nature and is appropriate for testing interrelatedness of concepts (Struwig, *et al.*, 2001). Primary and secondary data will be used to statistically test the propositions presented.

One of the most commonly used methods to gather primary data is the use of surveys (Zikmund, 2003). Surveys can be conducted in person, by mail, telephonically, or using the internet. Survey methods are by nature logically structured and involve the construction of a specific questionnaire to gather primary data (Balnaves, *et al.*, 2001; Struwig, *et al.*, 2001; Zikmund, 2003).

#### 4.1.1 *Secondary data*

Secondary data is by nature historical data previously collected for research or projects (Zikmund, 2003). Firstly, data and information on the relevant topics will be gathered from previous publications to aid in developing a questionnaire, ensuring that data gathered is related to the hypotheses (Struwig, *et al.*, 2001). Secondly data from Blankley's survey (2008) will be analysed to test interdependence.

The above mentioned dataset consisted of aggregated observations of key factors hampering innovation for both innovating and non-innovating firms. The dataset contains aggregate level information for various industries but for the purpose of this study only manufacturing firm level data was extracted for analysis.

Chi-square tests for independence were performed on the secondary dataset and therefore cross tabulation of the dataset was required to render in a usable format.

#### *4.1.2 Primary data*

Primary data is data collected by the researcher at hand (Zikmund, 2003) and will be used to test the stated propositions. Observation and asking questions are the basic methods of gathering data for quantitative research (Struwig, *et al.*, 2001). A survey questionnaire was designed with reference to hampering factors identified by Blankley (2008) and the literature review discussed in Chapter 3. This questionnaire (Annexure A) was used as the primary data collection tool through the media of internet, because of the convenience factor.

## **4.2 Unit of Analysis**

Zikmund (2003) describes the unit of analysis as the level at which the investigation should be done. This level can be a grouping of elements but should form the basis of the analytics to be performed. In the case of this research we are dealing with three distinct groupings:

- Manufacturing firms (organisation)
- Innovations/Innovation activity
- Decision makers

Although the research question is centred on the organisation, the decision makers within the firm collectively determine the outcome of the firm's propensity to innovate. The unit of analysis will thus be a decision maker within the organisation. Inductively we can test the propositions presented above within the context of the decision maker, and deductively make inferences on the firm's propensity to innovate through the grouping of decision makers' attributes within the specific firms.

### **4.3 Population of relevance**

Zikmund (2003: 369) defines a population or universe as “any complete group of people, companies... or the like that share similar characteristics.”

A total of 13 939 manufacturing industries were surveyed in the last national innovation survey (Blankley, 2008) and covered all typologies of manufacturing firms.

The proposed population for this research includes:

#### **A) Primary Population**

- Testing for independence between hampering factors and innovation propensity in manufacturing firms will utilise the total population

termed 'Manufacturing industries' and is represented by the dataset utilised by Blankley (2008).

B) Secondary population definition (FIRM)

- Manufacturing firms producing fast moving consumer goods.
- Producing multiple goods.
- Having distinct marketing function within the organisation.
- Employing more than 100 people.
- Manufacturing within South Africa.

C) Secondary population definition (INNOVATION)

- Change to process, or structure to:
  - i. Produce a new product sold to the end consumer
  - ii. Change a new product sold to the end consumer
    1. Change is permanent
    2. Change increases functionality of the product or reduces cost of the product

D) Secondary population definition (DECISION MAKER)

- Full time employee of the firm as described above
- Makes decisions related to investment expenditure within the firm
- Manager within Marketing, Manufacturing, Sales, Finance, or Supply Chain functions

## 4.4 Sample Size and Sampling methods

### 4.4.1 Sample size

“Sampling involves any procedure using a small number of items or parts of the whole population to make conclusions regarding the whole population,” (Zikmund, 2003: 369). Sampling is often done for pragmatic reasons where the researcher is constrained by time, accessibility and/or cost.

The greater the sample’s size the higher the probability of precision and reliability (Struwig *et al.*, 2001; Balnaves *et al.*, 2001). To be statistically viable in making an inference the minimum sample size required is 30 (Balnaves *et al.*, 2001). An important consideration when computing the sample size is the inclusion of a non-response factor (Struwig *et al.*, 2001). This is to ensure that post data collection, the researchers has a minimum level of data available for statistically viable analysis.

A total of 42 responses were received during data collection across multiple FMCG organisations. Post data analysis, 3 responses were excluded from the data analysis as these responses did not conform to the population definition criteria as presented above.

### 4.4.2 Sampling method

Sampling took place in two phases: firstly identifying the primary sampling units (firms) and then the secondary sampling units (managers) (Zikmund, 2003).

#### Primary sampling units (PSU):

The sampling method used for primary sampling units (PSU) was a combination of judgemental and convenience sampling. Judgemental sampling can be used to ensure that primary sampling units have the appropriate characteristics (Zikmund, 2003) and within this sample convenience sampling can be applied to ensure accessibility (Zikmund, 2003).

FMCG firms where a primary contact was accessible were identified as possible respondents for the research.

#### Secondary Sampling Units (Managers):

Post identification of a primary contact (judgemental) snowball sampling was used. Snowball sampling is where initial respondents recommend additional respondents that are suitable within the firm (PSU), (Zikmund, 2003).

The primary contact in identified firms was asked to distribute the questionnaire to as many possible decision makers within the firm who might be exposed to innovation type activities.

## **4.5 Validity**

“Validity is the ability of a measure to measure what it is supposed to measure,” (Zikmund, 2003: 302). Within this context it is important to ensure that the instrument used to do measurements measures what it is supposed to.

In designing the survey questionnaire cognisance was taken of previous research conducted on the topic and it was endeavoured to set questions in an unambiguous manner to maintain the ability of research comparisons. In most cases similar semantics were used in the questionnaire as presented by previous research. What about piloting the questionnaire to check if it is understood and easy to complete?

#### **4.6 Reliability**

Reliability is the extent to which the measures are free from errors and consistent (Zikmund, 2003). Reliability can be assessed if similar observations can be made by different researchers on different occasions, (Saunders *et al.*, 2000).

In context of this research a specific section was included in the questionnaire design to repeat the study conducted by Blankley (2008). It is possible that due to the sampling methods employed by this research design, that the specific firms observed are in fact those not representative of Blankley's findings. It is thus important to remove any observer error (Saunders, *et al.*, 2000) before proceeding with inductive research.

A direct comparison between Blankley's (2008) findings and the findings of this study was used to conclude that the dataset is reliable and similar insights can be derived from this research.



## 4.7 Data Collection

For the purpose of this research a structured survey questionnaire was developed based on the theoretical review of elements to be included in order to answer the research questions (*Appendix A*).

An internet based survey tool, "[surveymonkey.co.za](https://www.surveymonkey.co.za)", was utilised to perform data collection. Post identification of primary contacts in various FMCG firms and internet link was forwarded to the contacts via mail. Contacts were asked to forward the survey link to respondents within the identified organisation. Anonymity was guaranteed and questions in the survey structured in such a manner that neither the firm nor the individual could be identified.

Based on the questionnaire structure the researcher had no means to relate any response to an individual or firm. As mentioned, 42 responses were collected, with only 39 meeting the criteria determining the population of relevance.

## 4.8 Data Analysis

Zikmund (2003: 504) shows that there are a number of methods that can be utilised to test propositions and that understanding the type of question that needs to be answered should indicate appropriate statistical analysis techniques. Univariate (single variable), bivariate (relationship between two variables), and multivariate (simultaneous multiple variables) analysis will be the primary consideration for selecting statistical techniques (Zikmund, 2003). When accumulated data is ratio or interval scaled parametric sampling procedures like the “t-distribution” technique should be used to draw inference on the population mean where the sample size is not large (Zikmund, 2003).

The propositions presented in the study aim to test the interrelatedness between two concepts//variables also commonly referred to as the measure of association.

Primarily this research aims at testing association between concepts and not causality. In order to do this the Chi-square test ( $\chi^2$ ) was used. The Chi-square tests are based on frequency distributions and aim to determine if a dataset is similar to an expected result (Riley, *et al.*, 2000).

Due to the smaller data sample collected, the Chi-square tests for independence were replaced on the primary dataset with frequency observations and cross tabulation methods to derive insights.

## 4.9 Potential research limitations

The research has the following limitations:

### 4.9.1 *Limitations due to the sample*

- The small sample size can not be used to generalise across all FMCG organisations in South Africa, and thus statements can only be seen as insights that need further statistical qualification.
- The research focussed on previously proposed factors hampering innovation and has not ventured to identify additional factors specific to FMCG firms. It is possible that additional hampering factors exist within FMCG organisations that might influence the organisation's propensity to innovate.

### 4.9.2 *Limitations due to questionnaire*

- Due to anonymity and the collection method employed, the research cannot with all certainty establish that respondents meet the population of relevance criteria and therefore totally relies on the assumption that the filtering questions have removed all non-relevant responses.
- Reference to innovation in FMCG organisations is predominantly associated to product and market related innovations with process and technology innovations branded as mere improvements. It is possible

that innovation frequencies due to a lack of understanding and questionnaire design could be understated in the responses collected.

#### *4.9.3 Timing*

At the time of data collection, massive economic pressures manifested in the South African market. It is possible that reference to economic pressures faced by firms at time of data collection can manifest in the responses collected.

### **4.10 Concluding Remarks**

This chapter presents the reader with the research methodology of this study. Reference to underlying data, methods of analysis and the limitations of this study, provide the reader with important context against which further findings in this research need to be evaluated.

The results of conducted research are presented in Chapter 5.

## Chapter 5: **research RESULTS**

### 5.1 Introduction

This chapter will summarise the results optimised from the quantitative study performed and will present the results of the statistical analysis performed on the data. The results are presented in two sections below.

### 5.2 Description of variables measured

**Table 4 - List of Variables**

<b>Variable</b>	<b>Description</b>
OrgPropToInov	What is your organisation's propensity to innovate
Fac_IntFunds	Internal funds
Fact_ExtFunds	External funds
Fact_CostofInov	Innovation cost
Fact_QualPers	Qualified personnel
Fact_InfoOnTech	Information on technology
Fact_LackInfoMark	Lack of information on markets
Fact_LackPartner	Finding cooperation partners
Fact_MarkDomComp	Market dominated by established enterprise
Fact_DemNPD	Demand for new products
Fact_NoNeed	No need for further innovation
Fact_NoDemandNPD	No demand for new products
Org_InovFreq	What is your organisation's innovation frequency
Inf_PastExpOnDec	What is the influence past experiences on your investment decision making process
Inf_PastNegExpOnDec	What influence do negative outcomes on previous decisions have on investment decisions in similar situations.
LevlUnderst_OtherFunct	What is your level of knowledge and understanding of other functions in your organisation
Levl_OtherFunctOfYourFunct	What is the level of knowledge and understanding other functions in your organisation have of your function
Levl_FormalkKnowSh	What is the level of formal knowledge sharing across functions in your organisation
Levl_InFormalkKnowSh	What is the level of informal knowledge sharing across functions in your organisation
Import_KnowShare	What is the importance of knowledge/information in removing uncertainty
Inf_Uncert_SucclnoOutcome	What is the influence uncertainty has on successful investment decision outcome
Inf_Percep_SucclnoOutcome	What influence does your perception of a successful outcome of investment decisions have on your decision making process
Org_SetWays	In my organisation we are very set in our ways of doing things
Org_Adapt_Change	How flexible is your organisation in adapting to change

## 5.3 Descriptive Statistics

### 5.3.1 Median, Mode, Range

The median represents the central observation when observations are ranked from smallest to largest and forms the midpoint of the distribution. The mode identifies the most frequent selected option across all observations related to a specific variable. The range measures the distance between the minimum and maximum selected values across all observations related to a specific variable. Descriptive statistics are presented in the table hereunder.

**Table 5 - Descriptive Statistics (1)**

Variable	Descriptive Statistics									
	Valid N	Median	Mode	Freq of Mode	Min	Max	25 <sup>th</sup> Perc	75 <sup>th</sup> Perc	Range	Quart Range
OrgPropToInov	39	3	3.0000	13	1	5	2	4	4	2
Fac_IntFunds	39	3	3.0000	16	1	5	3	4	4	1
Fact_ExtFunds	39	4	Multiple		1	5	3	4	4	1
Fact_CostofInov	39	3	2.0000	12	1	5	1	3	4	2
Fact_QualPers	39	4	3.0000	15	2	5	3	4	3	1
Fact_InfoOnTech	39	4	4.0000	17	1	5	3	4	4	1
Fact_LackInfoMark	39	3	4.0000	12	1	5	2	4	4	2
Fact_LackPartner	39	3	4.0000	15	1	5	2	4	4	2
Fact_MarkDomComp	39	3	2.0000	12	1	5	2	4	4	2
Fact_DemNPD	39	3	2.0000	13	1	5	2	4	4	2
Fact_NoNeed	39	3	Multiple		1	5	3	4	4	1
Fact_NoDemandNPD	39	2	2.0000	14	1	5	1	3	4	2
Org_InovFreq	39	2	Multiple		1	5	1	3	4	2
Inf_PastExpOnDec	39	3	3.0000	15	2	5	2	4	3	2
Inf_PastNegExpOnDec	39	4	4.0000	24	3	5	4	4	2	0
LevlUnderst_OtherFunct	39	4	4.0000	20	2	5	3	4	3	1
Levl_OtherFunctOfYourFunct	39	4	4.0000	21	2	5	3	4	3	1
Levl_FormalKnowSh	39	3	3.0000	16	1	4	2	4	3	2
Levl_InFormalKnowSh	39	3	3.0000	17	1	4	2	3	3	1
Import_KnowShare	39	3	3.0000	19	1	4	3	4	3	1
Inf_Uncert_SuccInoOutcome	39	4	5.0000	19	3	5	4	5	2	1
Inf_Percep_SuccInoOutcome	39	4	4.0000	17	2	5	4	5	3	1

Org_SetWays	39	4	4.0000	19	2	5	4	5	2	1
Org_Adapt_Change	39	4	4.0000	19	2	5	3	4	3	1

### 5.3.2 Frequency Tables – Testing hampering factors

Observations have been grouped into frequency tables for variables in the questionnaire. Firstly tabulation has been performed across all selection possibilities within a variable:

- 1 = Very Low
- 2 = Low
- 3 = Moderate
- 4 = High
- 5 = Very High

Secondly variables have been condensed to achieve a high / low frequency distribution view calculated as:

- 1(Low) = Very Low (1) + Low (2)
- 2(High) = Moderate (3) + High (4) + Very High (5)

Frequency tables are presented in the tables below.

**Table 6 - Freq Table Organisation's Propensity to Innovate**

Organisations Propensity to Innovate						
OrgPropToInov	Code	Freq of Observ	% of Observ	Code	Freq of Observ	% of Observ
Very Low	1	1	3%	(1+2)	4	10%
Low	2	3	8%	(3+4+5)	35	90%
Moderate	3	16	41%			
High	4	14	36%			
Very High	5	5	13%			
<b>Total</b>		<b>39</b>	<b>100%</b>		<b>39</b>	<b>100%</b>

**Table 7 - Freq Table Organisation's Innovation Frequency**

Organisations Innovation Frequency						
Org_InovFreq	Code	Freq of Observ	% of Observ	Code	Freq of Observ	% of Observ
Very Low	1	0	0%	(1+2)	10	26%
Low	2	10	26%	(3+4+5)	29	74%
Moderate	3	15	38%			
High	4	12	31%			
Very High	5	2	5%			
<b>Total</b>		<b>39</b>	<b>100%</b>		<b>39</b>	<b>100%</b>





**Table 8 - Freq Table: Lack of Internal Funds**

Cost Factor - Lack of Internal Funds						
Fac_IntFunds	Code	Freq of Observ	% of Observ	Code	Freq of Observ	% of Observ
Very Low	1	1	3%	(1+2)	8	21%
Low	2	7	18%	(3+4+5)	31	79%
Moderate	3	11	28%			
High	4	11	28%			
Very High	5	9	23%			
Total		39	100%		39	100%

**Table 9 - Freq Table: Lack of External Funds**

Cost Factor - Lack of External Funding						
Fact_ExtFunds	Code	Freq of Observ	% of Observ	Code	Freq of Observ	% of Observ
Very Low	1	11	28%	(1+2)	23	59%
Low	2	12	31%	(3+4+5)	16	41%
Moderate	3	7	18%			
High	4	6	15%			
Very High	5	3	8%			
Total		39	100%		39	100%

**Table 10 - Freq Table: Innovation Cost too High**

Cost Factor - Innovation Cost too High						
Fact_CostofInov	Code	Freq of Observ	% of Observ	Code	Freq of Observ	% of Observ
Very Low	1	0	0%	(1+2)	3	8%
Low	2	3	8%	(3+4+5)	36	92%
Moderate	3	15	38%			
High	4	12	31%			
Very High	5	9	23%			
Total		39	100%		39	100%

**Table 11 - Freq Table: Lack of Qualified Personnel**

Knowledge Factor - Lack of Qualified Personnel						
Fact_QualPers	Code	Freq of Observ	% of Observ	Code	Freq of Observ	% of Observ
Very Low	1	1	3%	(1+2)	8	21%
Low	2	7	18%	(3+4+5)	31	79%
Moderate	3	8	21%			
High	4	17	44%			
Very High	5	6	15%			
Total		39	100%		39	100%

**Table 12 - Freq Table: Lack of Information on Technology**

Knowledge Factor - Lack of Information on Technology						
Fact_InfoOnTech	Code	Freq of Observ	% of Observ	Code	Freq of Observ	% of Observ
Very Low	1	1	3%	(1+2)	10	26%
Low	2	9	23%	(3+4+5)	29	74%
Moderate	3	11	28%			
High	4	12	31%			
Very High	5	6	15%			
Total		39	100%		39	100%

**Table 13 - Freq Table: Lack of Information on Markets**

Knowledge Factor - Lack of Information on Markets						
Fact_LackInfoMark	Code	Freq of Observ	% of Observ	Code	Freq of Observ	% of Observ
Very Low	1	2	5%	(1+2)	12	31%
Low	2	10	26%	(3+4+5)	27	69%
Moderate	3	8	21%			
High	4	15	38%			
Very High	5	4	10%			
Total		39	100%		39	100%

**Table 14 - Freq Table: Lack of Partners**

Knowledge Factor - Lack of Partners						
Fact_LackPartner	Code	Freq of Observ	% of Observ	Code	Freq of Observ	% of Observ
Very Low	1	6	15%	(1+2)	18	46%
Low	2	12	31%	(3+4+5)	21	54%
Moderate	3	10	26%			
High	4	6	15%			
Very High	5	5	13%			
Total		39	100%		39	100%

**Table 15 - Freq Table: Market Dominated by Others**

Market Factor - Dominated by Competitor						
Fact_MarkDomComp	Code	Freq of Observ	% of Observ	Code	Freq of Observ	% of Observ
Very Low	1	4	10%	(1+2)	17	44%
Low	2	13	33%	(3+4+5)	22	56%
Moderate	3	8	21%			
High	4	10	26%			
Very High	5	4	10%			
Total		39	100%		39	100%

**Table 16 - Freq Table: Uncertain Demand**

Market Factor - Uncertain Demand						
Fact_DemNPD	Code	Freq of Observ	% of Observ	Code	Freq of Observ	% of Observ
Very Low	1	1	3%	(1+2)	8	21%
Low	2	7	18%	(3+4+5)	31	79%
Moderate	3	12	31%			
High	4	12	31%			
Very High	5	7	18%			
Total		39	100%		39	100%

**Table 17 - Freq Table: No Need due to Previous Innovation**

No Need due to Previous Innovation						
Fact_NoNeed	Code	Freq of Observ	% of Observ	Code	Freq of Observ	% of Observ
Very Low	1	12	31%	(1+2)	26	67%
Low	2	14	36%	(3+4+5)	13	33%
Moderate	3	5	13%			
High	4	6	15%			
Very High	5	2	5%			
Total		39	100%		39	100%



**Table 18 - Freq Table: No Demand for Innovation**

No Demand for Innovation									
Fact_NoDemandNPD	Code	Freq of Observ	% of Observ	Fact_NoDemandNPD	Code	Freq of Observ	% of Observ		
Very Low	1	13	33%	Very Low - Low	(1+2)	26	67%		
Low	2	13	33%	Moderate - Very High	(3+4+5)	13	33%		
Moderate	3	5	13%						
High	4	6	15%						
Very High	5	2	5%						
<b>Total</b>		<b>39</b>	<b>100%</b>	<b>Total</b>		<b>39</b>	<b>100%</b>		

## 5.4 Chi-Square test for independence

### 5.4.1 Testing independence for independence between a firm's propensity to innovate and identified hampering factors to innovation

Chi-Square tests were performed to test the independence of hampering factors as identified by Blankley (2008) and manufacturing organisations' propensity to innovate. The Chi-Square statistics ( $\chi^2$ ) for all tests are presented in the table below:

**Table 19 - Chi-Square Statistics Analysis (Testing independence to Manufacturing Organisation's Innovation Propensity)**

Variable	Chi-Square tests related to Non Innovators and Innovators					
	$\chi^2$	Degrees of Freedom d.f.	Critical Value at $\alpha = .05$ probability	$\chi^2 > \alpha$ ( $\alpha = .05$ )	Critical Value at $\alpha = .1$ probability	$\chi^2 > \alpha$ ( $\alpha = .1$ )
Fac_IntFunds	318	1	3.841	Yes	2.706	Yes
Fact_ExtFunds	2	1	3.841	No	2.706	No
Fact_CostofInov	85	1	3.841	Yes	2.706	Yes
Fact_QualPers	38	1	3.841	Yes	2.706	Yes
Fact_InfoOnTech	139	1	3.841	Yes	2.706	Yes
Fact_LackInfoMark	595	1	3.841	Yes	2.706	Yes
Fact_LackPartner	631	1	3.841	Yes	2.706	Yes
Fact_MarkDomComp	783	1	3.841	Yes	2.706	Yes
Fact_DemNPD	175	1	3.841	Yes	2.706	Yes
Fact_NoNeed	621	1	3.841	Yes	2.706	Yes
Fact_NoDemandNPD	500	1	3.841	Yes	2.706	Yes

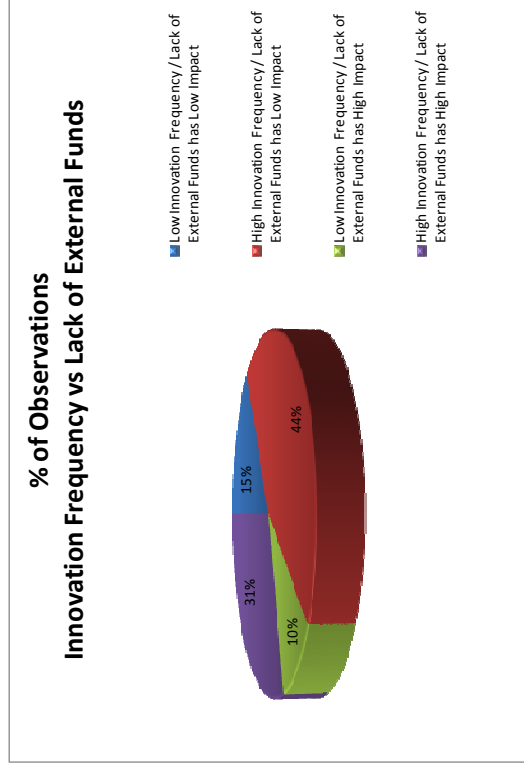
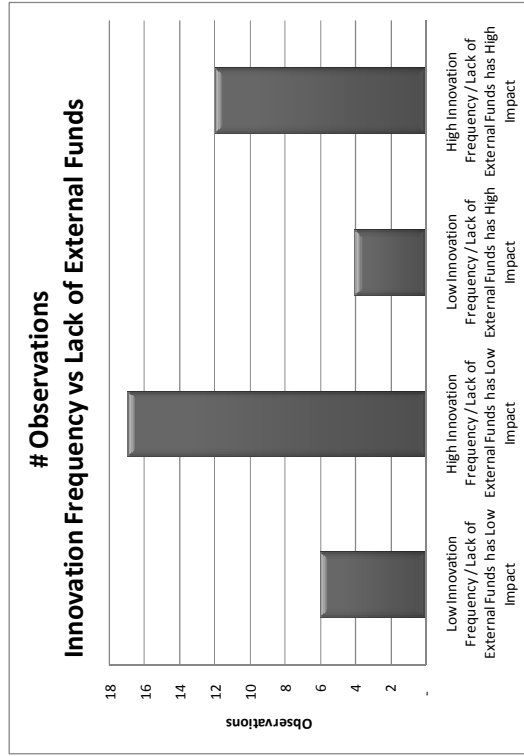
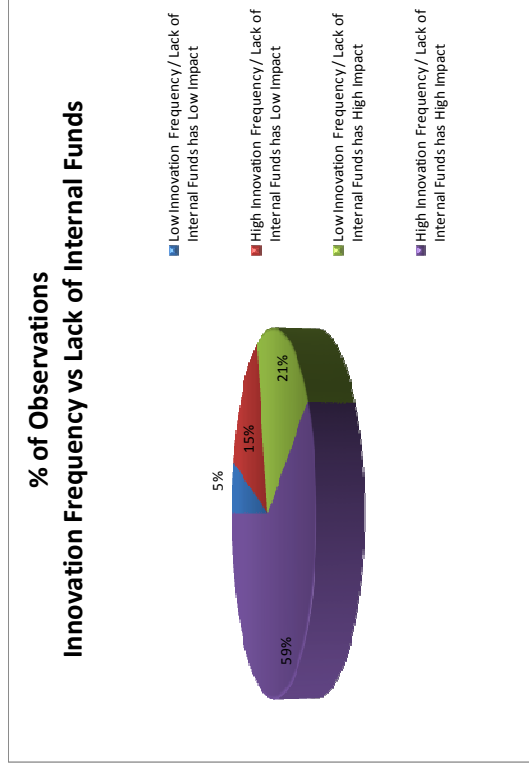
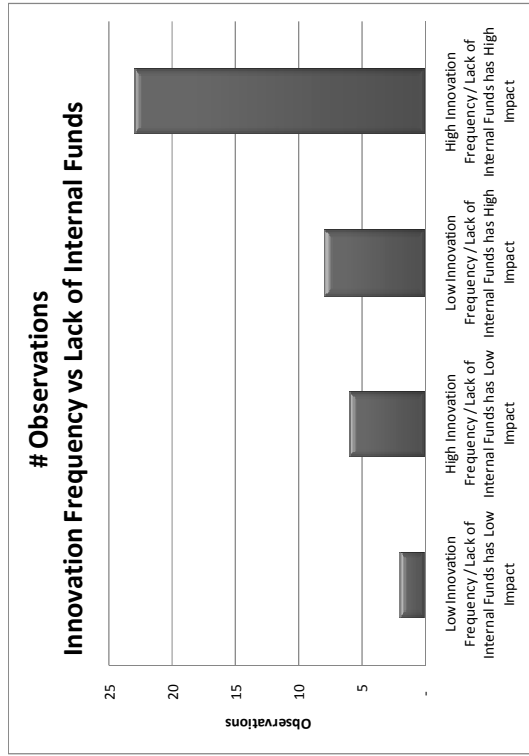
**Base Data Source: The South African Innovation Survey 2005 (Blankley, 2008)**

#### *5.4.2 Testing independence between innovation frequency in FMCG firms and identified hampering factors*

Due to the small sample size of 39, Chi-Square tests cannot be formed. Cross tabulation with frequency analysis is completed below and gives some insights on dependence between FMCG organisations' innovation frequencies relative to the identified hampering factors. This, however, serves as an indication of possible relation but cannot be proven in a probabilistic manner.

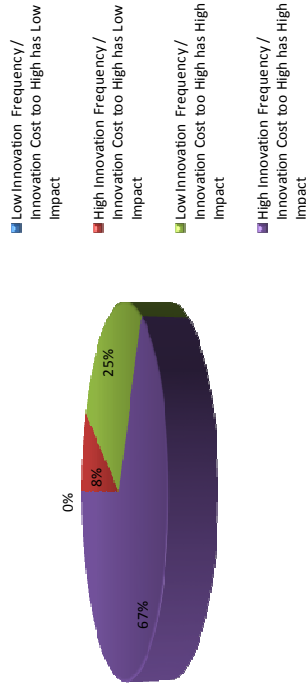


Figure 12 – Cost factors’ influence on innovation in FMCG





### % of Observations Innovation Frequency vs Innovation Cost too High



### # Observations Innovation Frequency vs Innovation Cost too High

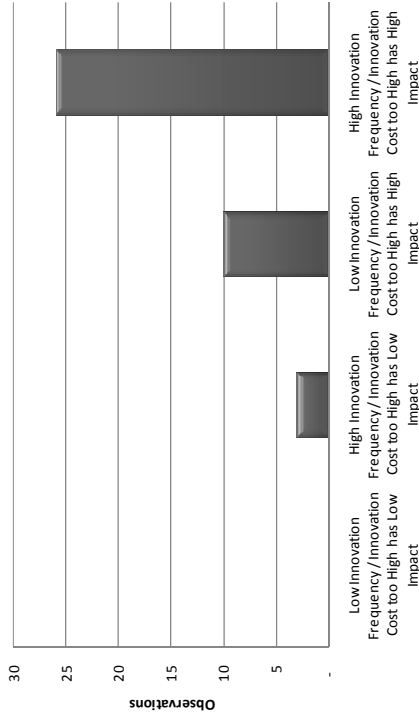


Figure 12 represents cross tabulated frequency observations to draw insights between cost-related hampering factors and FMCG organisations' innovation frequencies. The observations related to cost factors are highlighted below:

- Lack of internal funds:
  - 80% of respondents, irrespective of innovation frequency, cite internal funds as a high hampering factor;
  - 59% of respondents with high innovation frequency and 21% of respondents with low innovation frequency cite internal funds as a high hampering factor; and
  - 15% of respondents with high innovation frequency and 5% of respondents with low innovation frequency cite internal funds as a low hampering factor.
- Lack of external funds:
  - 41% of respondents, irrespective of innovation frequency, cite internal funds as a high hampering factor;
  - 31% of respondents with high innovation frequency and 10% of respondents with low innovation frequency cite internal funds as a high hampering factor; and
  - 44% of respondents with high innovation frequency and 15% of respondents with low innovation frequency cite internal funds as a low hampering factor.
- Innovation cost too high:
  - 92% of respondents, irrespective of innovation frequency, cite internal funds as a high hampering factor;

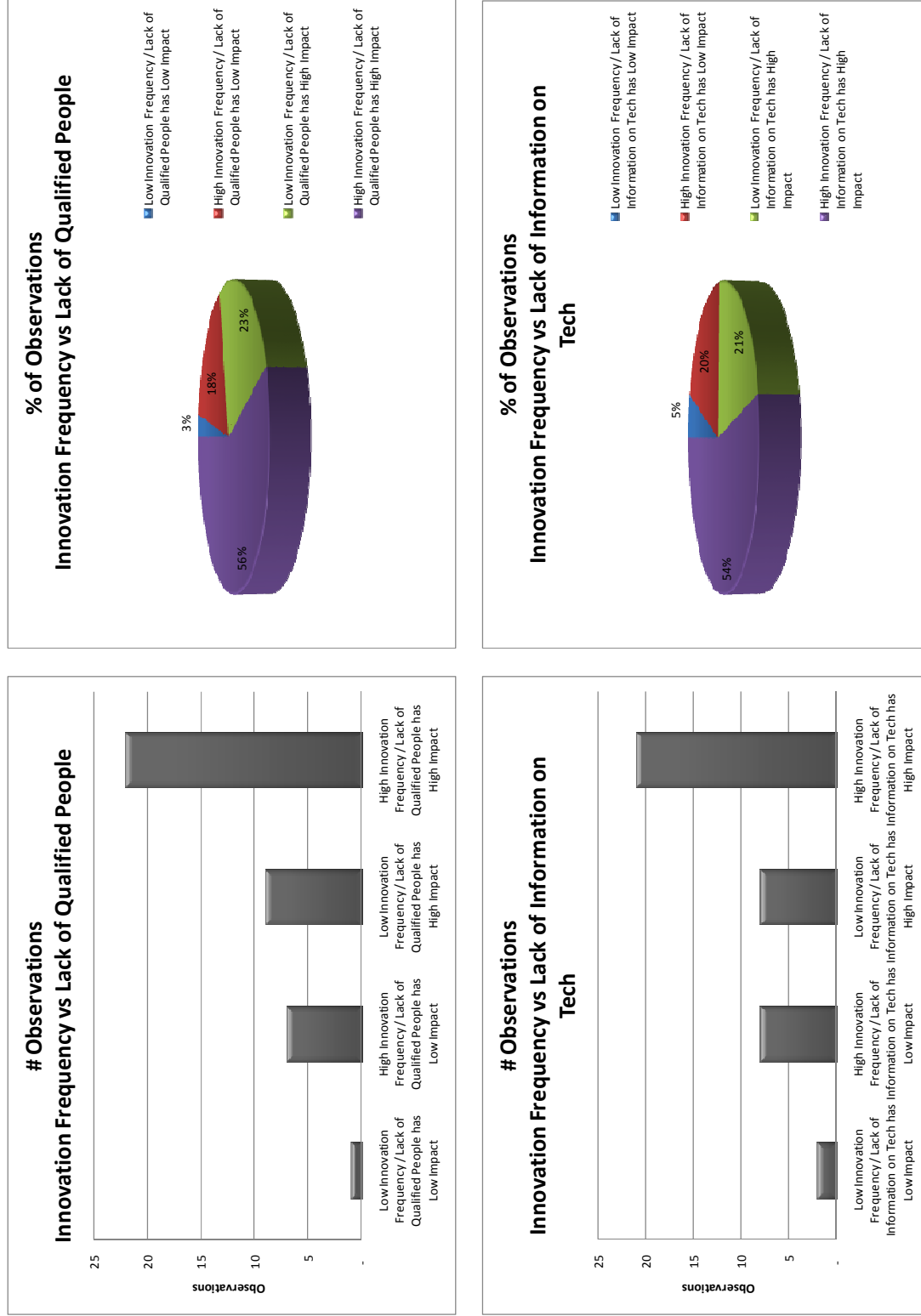
- 67% of respondents with high innovation frequency and 26% of respondents with low innovation frequency cite internal funds as a high hampering factor; and
- 8% of respondents with high innovation frequency and 0% of respondents with low innovation frequency cite internal funds as a low hampering factor.

It is clear that, irrespective of innovation frequency, both hampering factors 'lack of internal funds' and 'the cost of innovation too high' are experienced equally high. This gives an indication that these factors are regarded as problems but questions are asked when the expected values of influence are higher within high-innovative firms than low-innovative firms.

Lack of external funding seems to be more prevalent in low-innovative firms than high-innovative firms, although it is worth noting further that, as expected, the rating of influence is perceived as a low hampering factor by 60% of respondents.

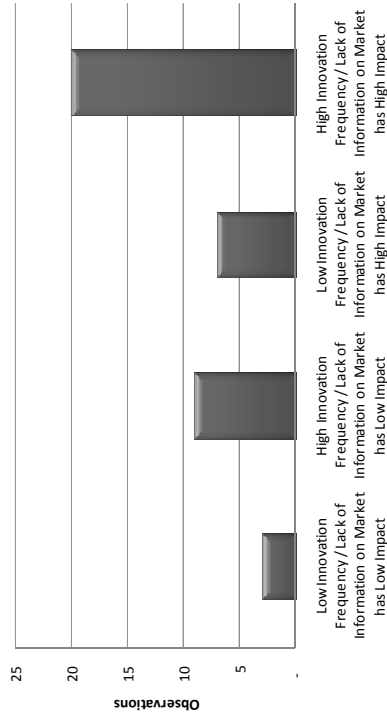
It can be concluded that all firms cite the identified factors as constraints to their ability to innovate. The expectation that these factors will be more often cited within lower innovating firms is found to be not true.

Figure 13 – Knowledge factors' influence on innovation in FMCG

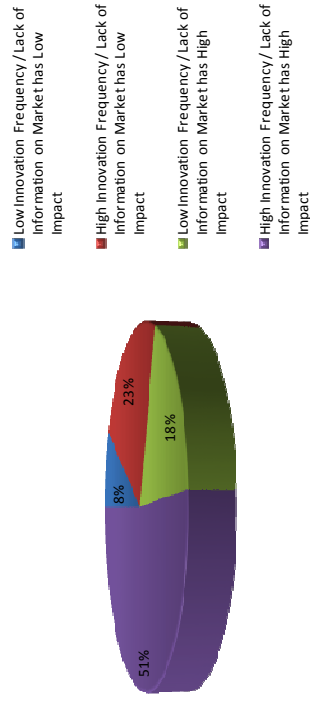




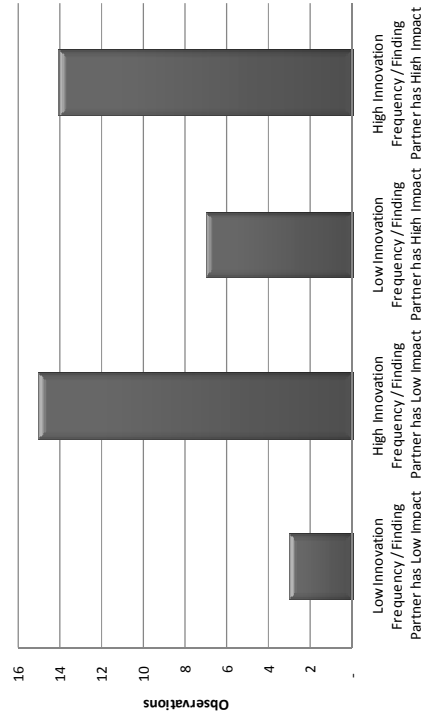
# Observations  
Innovation Frequency vs Lack of Information on Market



% of Observations  
Innovation Frequency vs Lack of Information on Market



# Observations  
Innovation Frequency vs Finding Partner



% of Observations  
Innovation Frequency vs Finding Partner

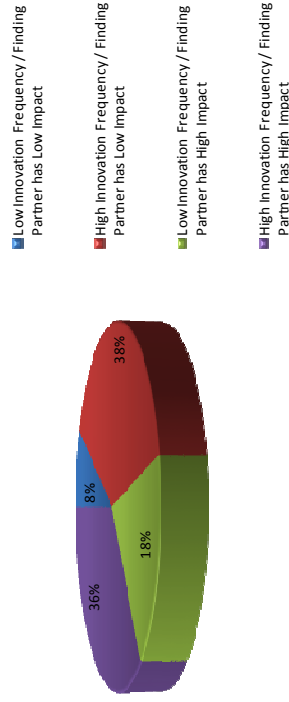


Figure 13 represents cross tabulated frequency observations to draw insights between knowledge-related hampering factors and FMCG organisations' innovation frequencies.

The observations related to cost factors are highlighted below:

- Lack of qualified people:
  - 80% of respondents, irrespective of innovation frequency, cite lack of qualified people as a high hampering factor;
  - 56% of respondents with high innovation frequency and 23% of respondents with low innovation frequency cite lack of qualified people as a high hampering factor; and
  - 18% of respondents with high innovation frequency and 3% of respondents with low innovation frequency cite lack of qualified people as a low hampering factor.
- Lack of information on technology:
  - 74% of respondents, irrespective of innovation frequency, cite lack of information on technology as a high hampering factor;
  - 54% of respondents with high innovation frequency and 21% of respondents with low innovation frequency cite lack of information on technology as a high hampering factor; and
  - 21% of respondents with high innovation frequency and 5% of respondents with low innovation frequency cite lack of information on technology as a low hampering factor.
- Lack of information on markets:
  - 69% of respondents, irrespective of innovation frequency, cite lack of information on markets as a high hampering factor;

- 51% of respondents with high innovation frequency and 18% of respondents with low innovation frequency cite lack of markets on technology as a high hampering factor; and
- 23% of respondents with high innovation frequency and 8% of respondents with low innovation frequency cite lack of information on markets as a low hampering factor.
- Difficulty in finding partners:
  - 54% of respondents, irrespective of innovation frequency, cite lack of finding partner as a high hampering factor;
  - 36% of respondents with high innovation frequency and 18% of respondents with low innovation frequency cite lack of finding partner as a high hampering factor; and
  - 38% of respondents with high innovation frequency and 8% of respondents with low innovation frequency cite lack of finding partner as a low hampering factor.

Similar observations as in cost factors can be made when reviewing knowledge factors. Citing of high hampering factors in general is more prevalent by high-innovators than low-innovators. The lack of qualified people is highlighted as the knowledge based factor with the highest influence on innovation frequency followed by the lack of information about technology and markets. Although cited by 54% of respondents as a hampering factor, the lack of partners do not seem to have a major influence on innovation frequencies.



It can be concluded that all firms cite the identified factors as constraints to their ability to innovate. The expectation that these factors will be more often cited within lower innovating firms is found to be not true.

Figure 14 – Market factors’ influence on innovation in FMCG

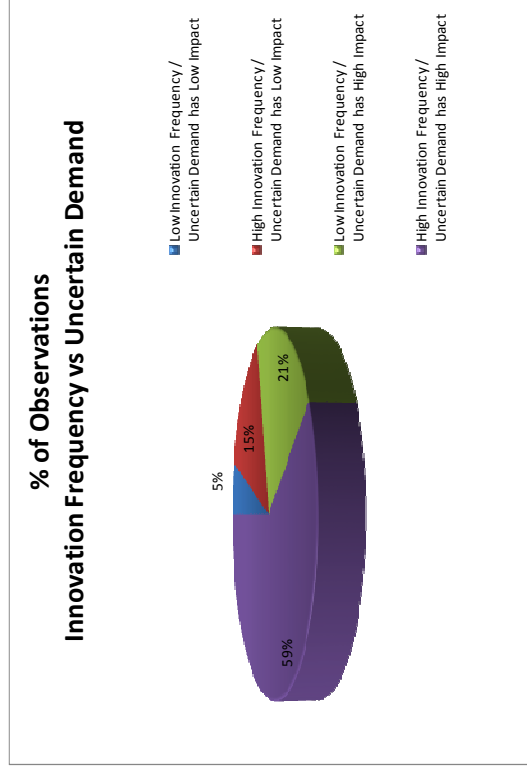
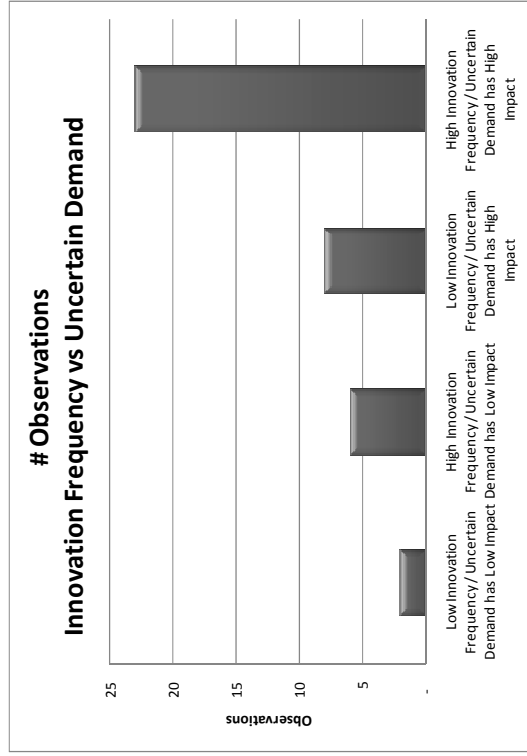
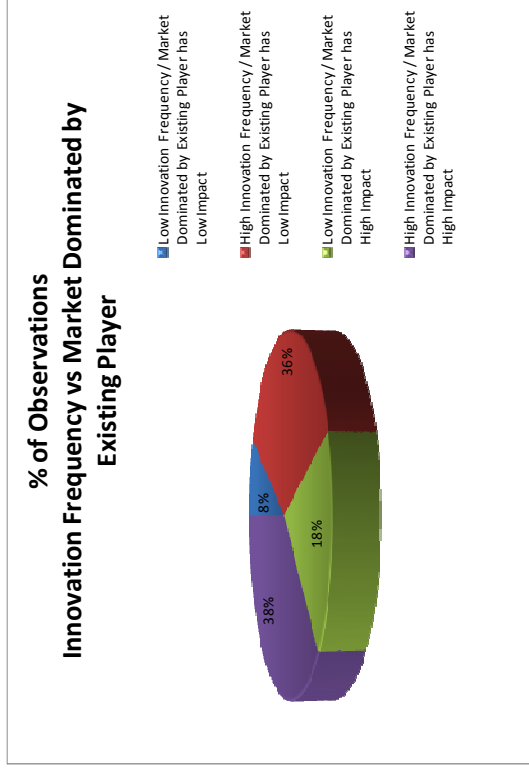
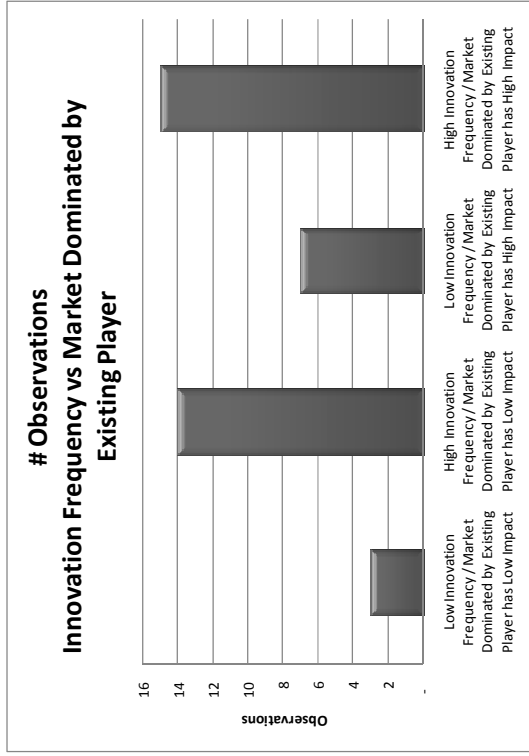


Figure 14 represents cross tabulated frequency observations to draw insights between market-related hampering factors and FMCG organisations' innovation frequencies. The observations related to cost factors are highlighted below:

- Market dominated by existing player:
  - 56% of respondents, irrespective of innovation frequency, cite market dominated by existing player as a high hampering factor;
  - 38% of respondents with high innovation frequency and 18% of respondents with low innovation frequency cite market dominated by existing player as a high hampering factor; and
  - 36% of respondents with high innovation frequency and 8% of respondents with low innovation frequency cite market dominated by existing player as a low hampering factor.
  
- Uncertainty of demand:
  - 79% of respondents, irrespective of innovation frequency, cite uncertainty of demand as a high hampering factor;
  - 38% of respondents with high innovation frequency and 18% of respondents with low innovation frequency cite uncertainty of demand as a high hampering factor;
  - 36% of respondents with high innovation frequency and 8% of respondents with low innovation frequency cite uncertainty of demand as a low hampering factor.

Market related factors seem to be mostly vested in uncertainty of demand which can be linked to lack of or limited information.

Figure 15 – Reasons not to innovate influence on innovation in FMCG

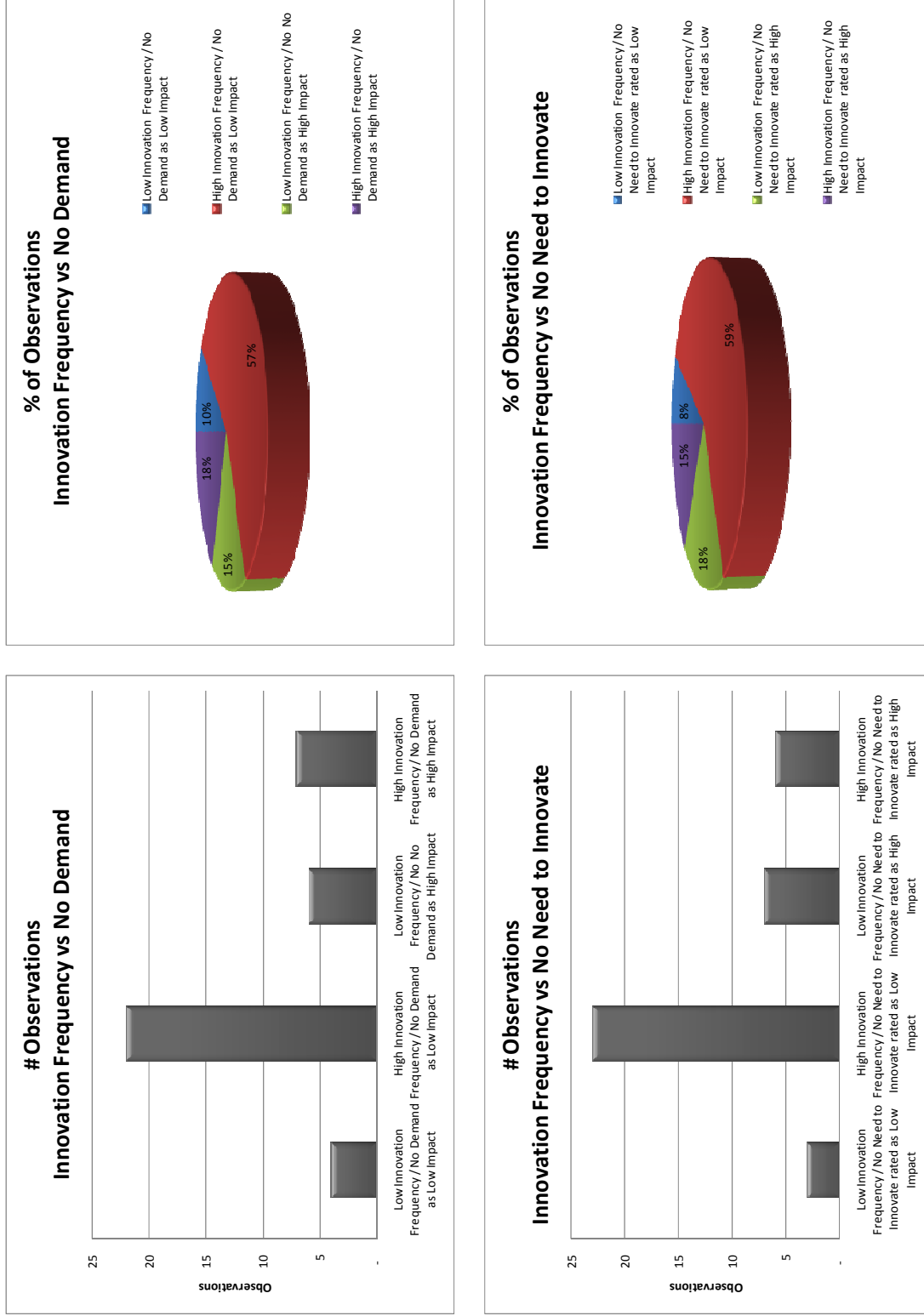


Figure 15 represents cross tabulated frequency observations to draw insights between reasons not to innovate factors and FMCG organisations' innovation frequencies. The observations related to cost factors are highlighted below:

- No demand:
  - 33% of respondents, irrespective of innovation frequency, cite uncertainty of demand as a high hampering factor;
  - 18% of respondents with high innovation frequency and 15% of respondents with low innovation frequency cite uncertainty of demand as a high hampering factor; and
  - 56% of respondents with high innovation frequency and 10% of respondents with low innovation frequency cite uncertainty of demand as a low hampering factor.
  
- No need:
  - 33% of respondents, irrespective of innovation frequency, cite uncertainty of demand as a high hampering factor;
  - 15% of respondents with high innovation frequency and 18% of respondents with low innovation frequency cite uncertainty of demand as a high hampering factor; and
  - 56% of respondents with high innovation frequency and 8% of respondents with low innovation frequency cite uncertainty of demand as a low hampering factor.

As expected the reasons not to innovate hampering factors indicate that a realisation of importance of innovation exists within FMCG firms.

### 5.4.3 Analysing interferences between factors

After analysing the relationship between hampering factors and a firm's innovation frequency, further analysis is conducted to understand the relationship that might exist between hampering factors. Cross tabulation and frequency analysis attempt to analyse these relationships.

Proposition 1: Negative innovation outcomes increase the importance of cost factors within the decision making process related to innovations.

Figure 16 & 17 show that 90% of respondents cited both the influence of past negative outcomes and the cost of innovation high, indicating that in most cases observations on these factors are similar.

Figure 16 - Relationship histogram (Negative Outcomes and cost of Innovation)

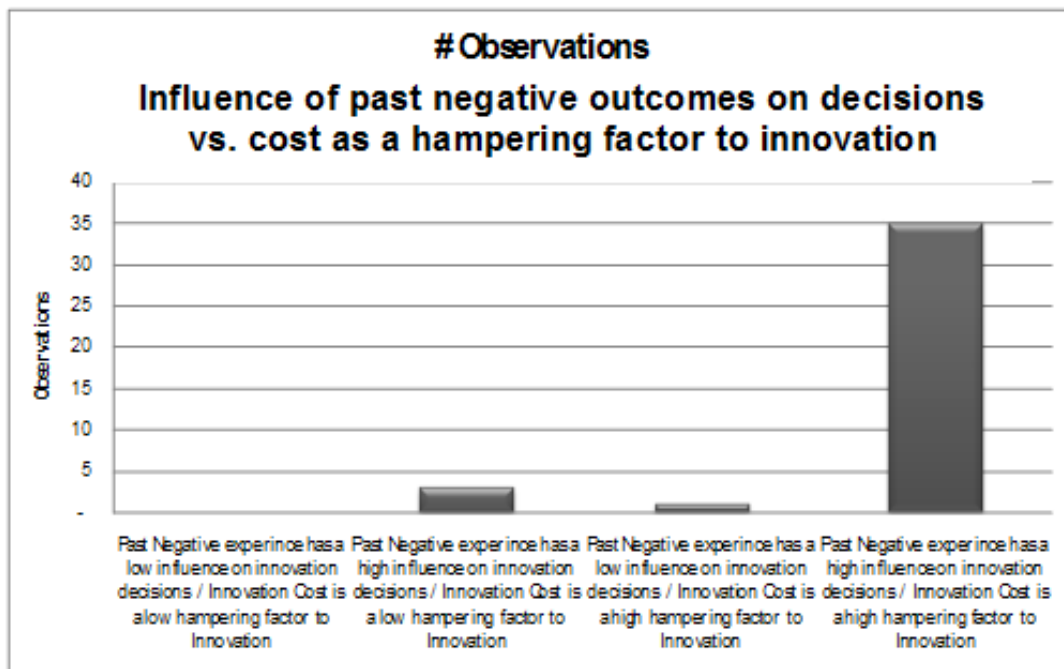
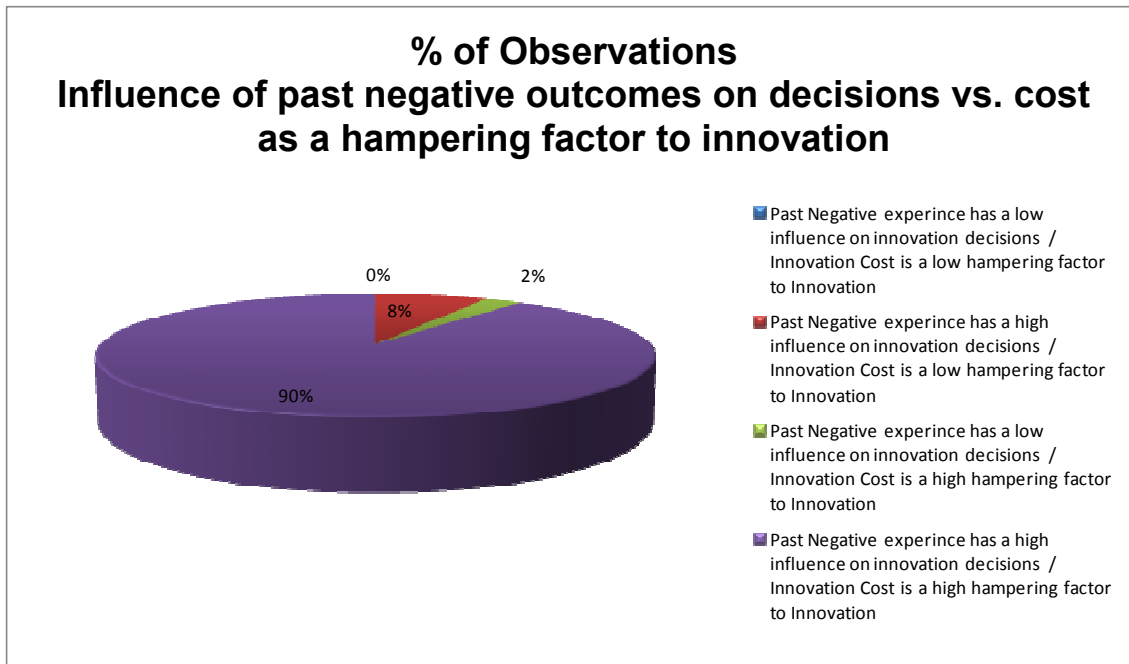


Figure 17 – Percentage Combination (negative outcomes and cost of Innovation)

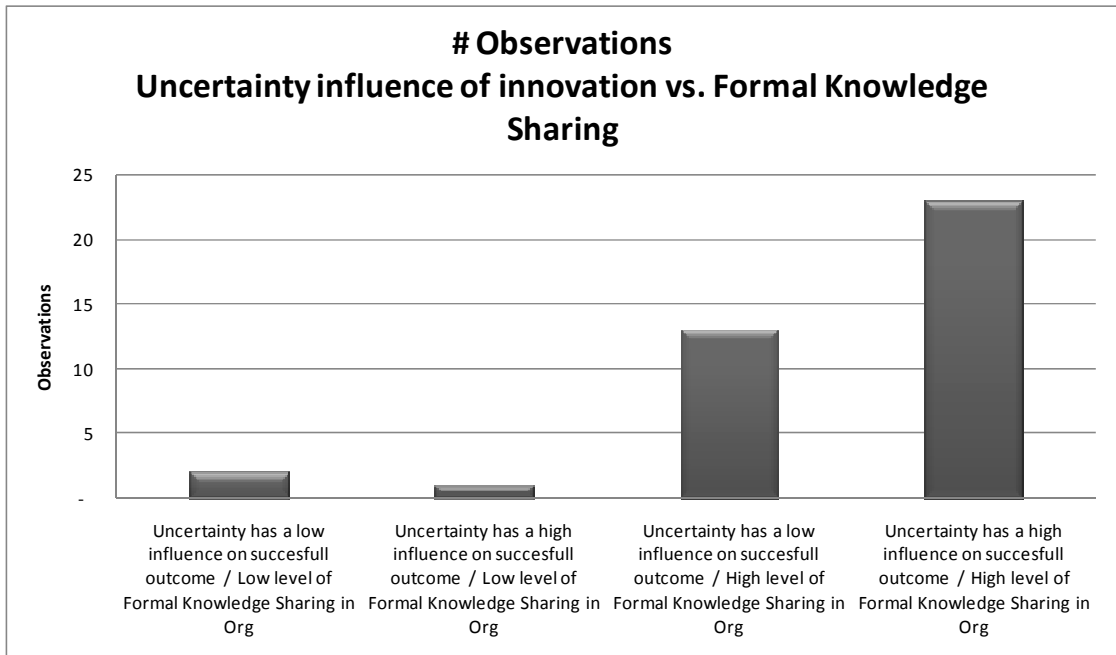


Proposition 2: The level of knowledge sharing related to an innovation is indirectly proportional to the level of uncertainty and thus perceived risk of an innovation outcome.

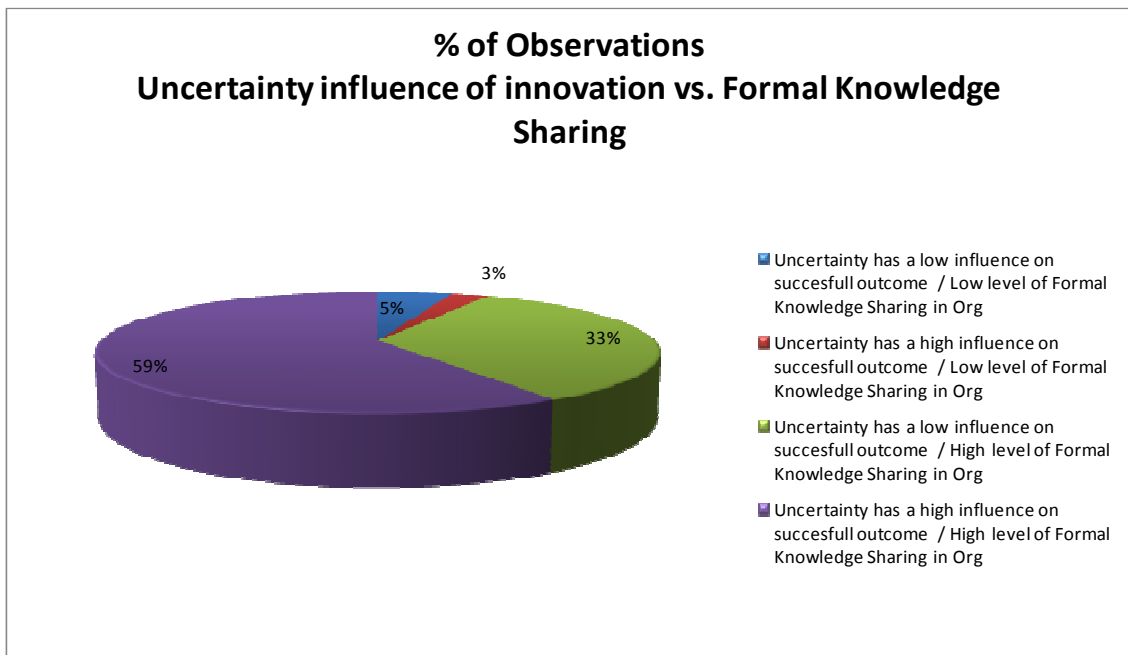
Figures 18 & 19 show that 92% of respondents cited that formal knowledge sharing is an important factor to successful innovation. Interestingly though, 60% of these respondents equally cited that uncertainty has a high impact on innovation propensity.

This indicates that there is some degree of connectedness between the level of knowledge sharing and the removal of uncertainty.

**Figure 18 - Relationship histogram (Uncertainty and formal knowledge sharing)**



**Figure 19 – Percentage Contribution (Uncertainty and formal knowledge sharing)**





Proposition 3: The level of knowledge sharing around an innovation is indirectly proportional to the importance of cost factors within the decision making process related to innovation.

Figures 20 & 21 show that 56% of respondents cited that formal knowledge sharing is an important factor to successful innovation and that innovation cost is a high hampering factor. 36% of respondents who also cited innovation cost as a high hampering factor cited the level of knowledge sharing as a low impacting factor.

Although not overwhelming, it is more prevalent to see that firms with high impact knowledge factor equally cite a high impact cost factor. This is, however, not strong enough to make a defensible suggestion that these factors might be related.

**Figure 20 - Relationship histogram (Formal knowledge Sharing and cost of Innovation)**

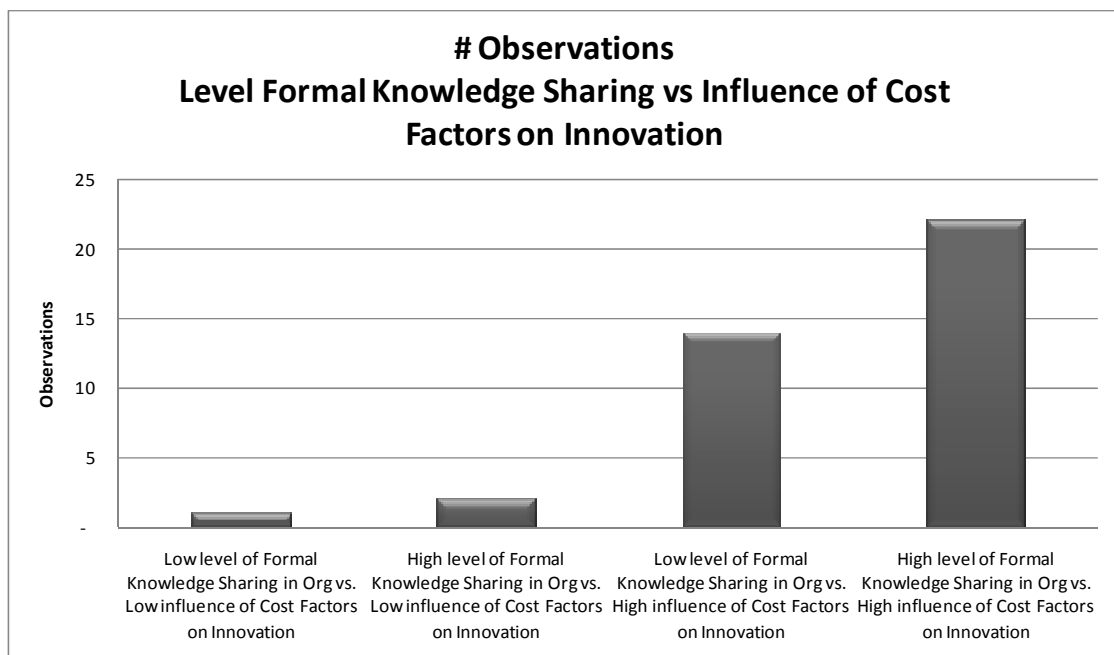
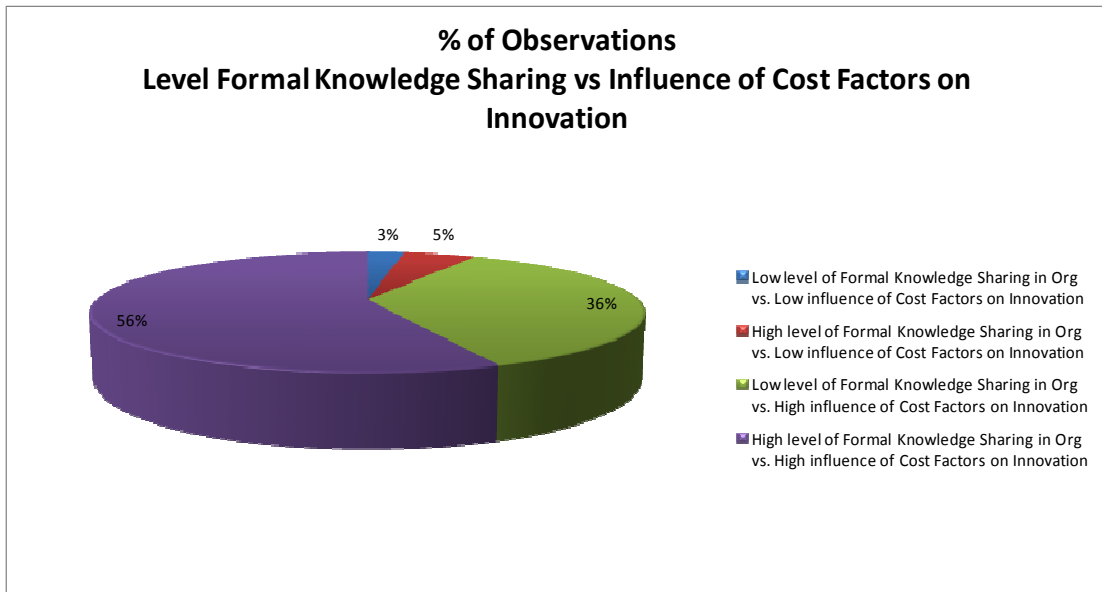


Figure 21 – Percentage Combination (Uncertainty and Formal Knowledge Sharing)



Proposition 5: The level of uncertainty associated with an innovation is indirectly proportional to the level of perceived success of that innovation.

Figures 22 & 23 show that 92% of respondents cited both uncertainty and the perception of successful outcomes as high impacting factors showing overwhelming evidence that these factors are perceived in similar fashion.

Figure 22 - Relationship Histogram (Uncertainty and Perception)

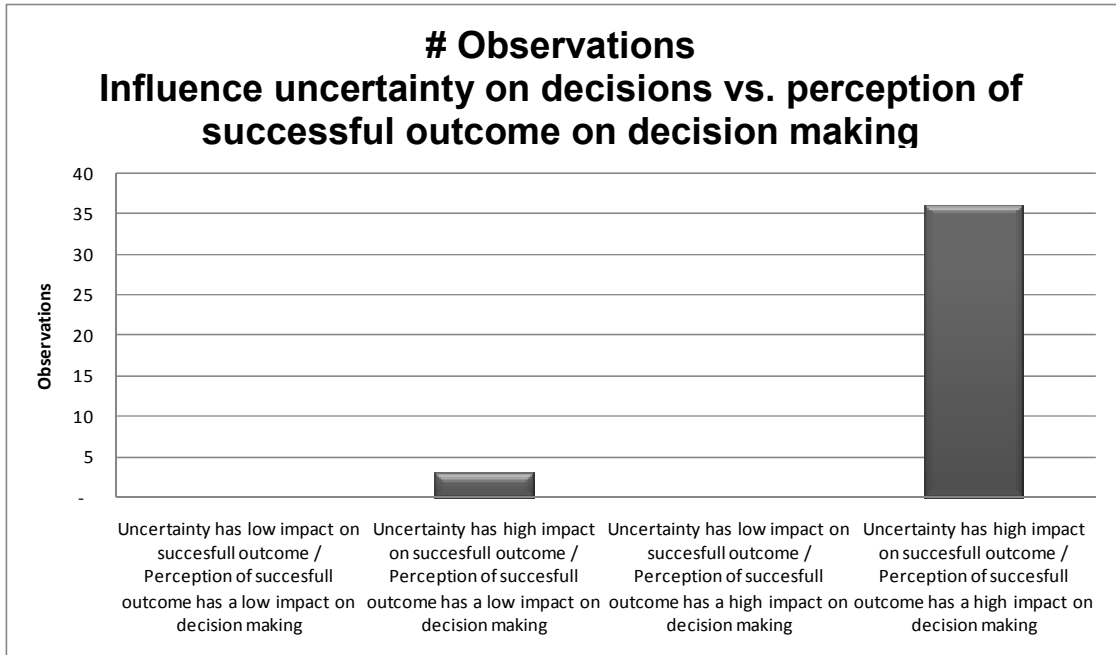
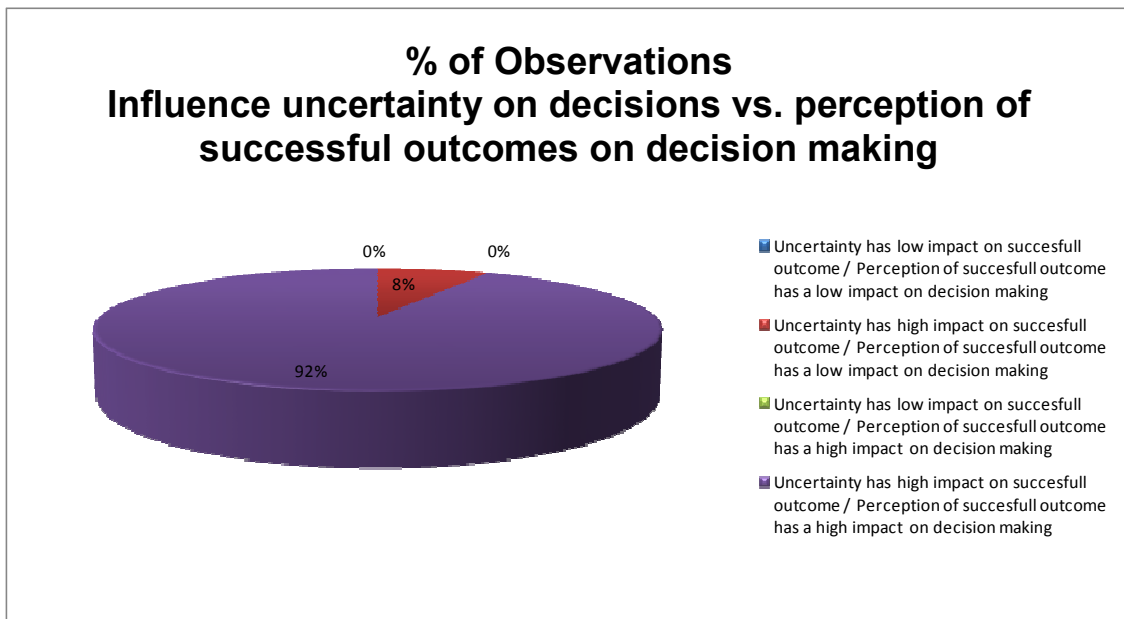


Figure 23 – Percentage Contribution (Uncertainty and Perception)



Proposition 6: The level of perceived success associated with an innovation is indirectly proportional to the importance of cost factors within the decision making process related to innovation.

Figures 24 & 25 show similar to above that 92% of respondents cited both perception of successful outcomes and the cost of innovation as high impacting factors showing overwhelming evidence that these factors are perceived in similar fashion.

**Figure 24 - Relationship histogram (Perception and Cost of Innovation)**

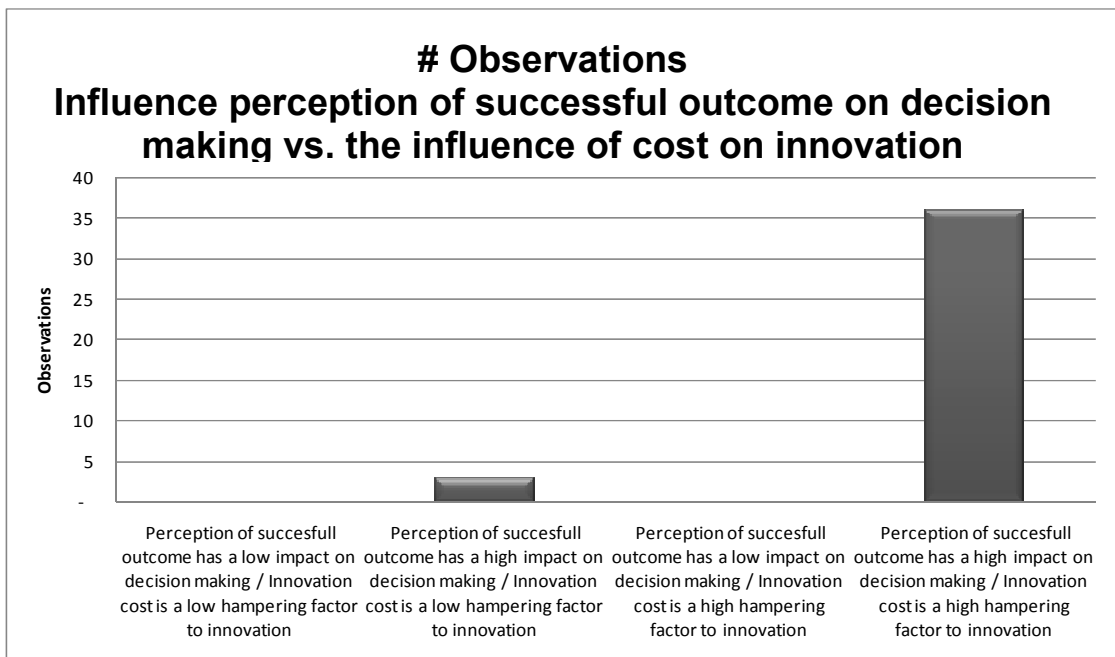
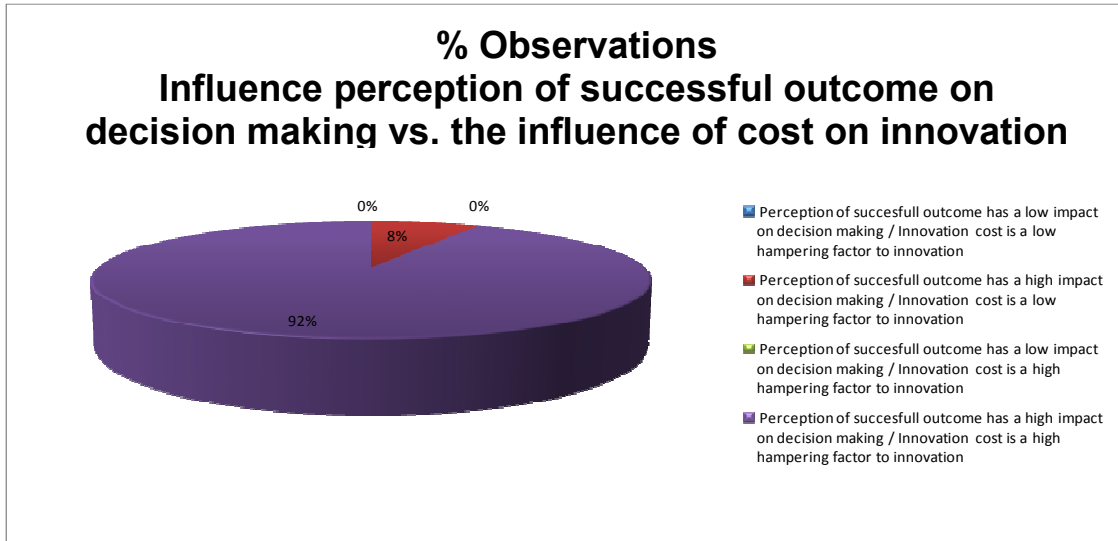


Figure 25 – Percentage Contribution of Perception and Cost of Innovation)



## 5.5 Concluding Remarks

This chapter comprises the results of the statistical analysis performed on the collected dataset retrieved from the structures questionnaire. Analysis includes descriptive statistics, frequency observations and Chi-square tests. Chi-square tests are performed to test firstly the interdependence between the variables and an organisation's innovation frequency, and secondly to test interdependence between specific variables. Analysis and discussion of these results will follow in Chapter 6.

## Chapter 6: **DISCUSSION OF RESULTS**

### 6.1 Introduction

In Chapter 4 the research methodology followed is described and in Chapter 5 the results of the analysis are presented. Firstly, frequency tables were constructed on the dataset to assess whether the observations in this study validate previous findings related to factors hampering innovation. More specifically we determine whether the identified factors hampering the manufacturing industry in the research conducted by Blankley (2008) on South African firms apply to FMCG organisations in South Africa.

Secondly, Chi-Square tests for independence were performed on the findings of Blankley (2008) to test for independence between identified hampering factors and manufacturing firms' propensity to innovate. This supports the research of Blankley (2008) and qualifies whether the identified hampering factors do determine the innovation propensity of manufacturing organisations. We further attempt to confirm whether similar relationships exist in FMCG organisations.

Finally the interdependence between the factors hampering innovation were analysed to determine whether there are possible underlying causes in their manifestation. The results of these analyses are presented in Chapter 5 and Chapter 6 will interpret the results to broaden the collective understanding of factors hampering innovation in South African manufacturing firms and answer the research questions and comply with the purpose of the research.

## 6.2 Analysis and interpretation of results

### 6.2.1 Identifying factors hampering innovation in South African FMCG organisations

In the questionnaire respondents were asked to rank the influence that hampering factors have on their organisations' innovation frequency. Answers are collected using a Likert scale where 1 = very low impact on firms' innovation attempts through to 5 = very high impact on firms' innovation attempts. Analysing the median, mode and range of observations for each response variable identifies the most common characteristics across all observations related to a specific response variable (Zikmund, 2003).

Mode analysis identifies the central tendency of observations and represents the most frequently occurring value across all observations related to a specific response variable (Albright, *et al.*, 2006). Frequency analysis identifies the frequency of specific observations or groupings of observations relative to the total number of observations related to a specific response variable and highlights 'preference' for certain outcomes.

To confirm whether FMCG organisations support findings of factors hampering innovation for manufacturing firms (Blankley, 2008), a frequency and mode analysis was conducted. Firstly, it is expected that a higher percentage of observations will fall within the range 3 – 5 (moderate to very high impact) than 1 – 2 (low to very low impact), and secondly that modes of response variables range from 3 – 5. This will present substantial proof indicating that the

measured factor is perceived a high hampering factor to innovation in FMCG organisations, and that this is true across most FMCG organisations. Detailed results can be found in tables 5 – 18.

Frequency analyses show that for most variables the frequency of observations between 3 to 5 (moderate to very high) is greater than (>) 50% and their related observed modes either 3 or 4. These findings suggest that FMCG organisations experience similar hampering factors to innovation as identified by Blankley's (2008) findings. The frequency and mode analysis further develops insight into 'how much' of a hampering factor each response variable constitutes within the FMCG environment. The 'level' of influence of these factors on an organisation's propensity to innovate has not been previously identified by Blankley (2008).

Observations confirm cost a major hampering factor with 92% of organisations citing that the cost of innovation is a moderate to very high hampering factor. In the same sense 79% of organisations cite the lack of internal funds as a moderate to very high hampering factor to innovation. Combining high frequency observations with modes = 3 suggests that most firms do experience cost as a hampering factor to innovation but that this factor only moderately hampers the organisation's propensity to innovate. In contrast, it is clear that FMCG organisations do not perceive the availability of external funding as an equally major hampering factor to innovation as was identified by Blankley's (2008) research where only 41% of respondents responded with a value of moderate to very high. Multiple modes related to this response variable eliminate the ability to suggest a 'preference'.



It is possible that external funding is not a major hampering factor to FMCG organisations due to the higher demand posted on FMCG firms to innovate at the product and process level (Terriff, 2006). FMCG organisations need to develop internal capability and funding strategies, in order to require less external funding to finance as opposed requiring funding for major technology type innovations (Obechain, *et al.*, 2004).

This does not disprove Blankley's (2008) suggestion that the lack of external funding is a major hampering factor to innovation in South African firms. It merely supports Obechain's (2004) proposition that organisation type, and therefore organisational strategy, plays a major role in the organisation's innovation frequency.

Ranking (table 20 below) importance of hampering factors (based on percentage observations) and comparing Blankley's to current research, interestingly suggest that not only is cost in FMCG organisations a major hampering factor, but equally important is the impact of knowledge factors. In the third place, to a lesser extent, but more important than Blankley's findings, are market factors.

**Table 20 – Rank of observations Blankley vs. Research**

	<b>Blankley (2008)</b>	<b>Research</b>
<b>Cost Factors</b>		
Lack of funds within your enterprise or group	1	2
Lack of finance from sources outside your enterprise	2	7
Innovation costs too high	3	1
<b>Knowledge Factors</b>		
Lack of qualified personnel	4	2
Lack of information on technology	6	3
Lack of information of markets	9	4
Difficulty in finding cooperation partners	7	6
<b>Market Factors</b>		
Market dominated by established enterprises	5	5
Uncertain demand for innovative goods or services	8	2
<b>Reasons not to innovate</b>		
No need due to prior innovations	10	8
No need because of no demand for innovations	11	8

FMCG firms do, to a greater extent, experience knowledge and market factors as inhibitors to innovation than the general manufacturing population as evaluated in Blankley's research.

Under knowledge factors the lack of qualified personnel is cited by 79% of respondents as a moderate to high factor hampering innovation. The respective mode = 4 indicates that most of these observations suggest that the impact is rated as high. Oerlemans *et al.*, (2006) cite the importance of knowledgeable resources in complex consumer goods environments to ensure quality definition and implementation of innovation. Johnes *et al.*, (1988), Hardaker (1998) and Dougherty (1992) further elaborate and suggest that a cross-functional approach and a shared understanding are necessary to manage successful innovations.

To understand the drivers of qualified personnel, further analysis is conducted on specific knowledge based factors. Firstly testing the perceived levels of understanding across functions, secondly testing the organisation's views on knowledge sharing and finally the impact uncertainty has on organisational innovation decisions.

Table 21 below shows that all organisations (100%) recognise the importance knowledge sharing has in eliminating uncertainty. What is interesting is that in similar fashion most firms (92%) cite that uncertainty of outcomes and thus perceptions of outcomes are strong drivers (mode = 4) of innovation decisions.

When testing these views with the level of understanding across functions, it becomes clear that respondents cite their understanding of other functions 23% higher than other functions understanding theirs. The respective mode = 4 suggests that intrinsic understanding across functions is rated as high. It is further observed that the level of formal knowledge sharing (62%) and informal knowledge sharing (87%) both modes = 3, suggest that this perceived understanding is generated more through informal than formal networks in the organisations. Dougherty (1992) previously identified the importance of a 'shared understanding' in managing innovation.

Combining this observation with the importance "perception of outcome" has on decisions (Freq = 100%, Mode = 4) one can suggest that cross-functional decisions are heavily influenced by perception of outcome due to uncertainty. This is supported by the finding that the level of actual knowledge sharing on a

formal basis (Freq = 02/10, Mode = 3) is well below the indicated level of importance (Freq = 100%, Mode = 3).

**Table 21 - Expansion on hampering factors to innovation**

	<i>Freq % (1-2) in Observ</i>	<i>Freq % (3-5) in Observ</i>	<i>Mode</i>
<b>Knowledge Factors Expanded</b>			
What is your level of knowledge and understanding of other functions in your organisation?	5%	95%	4
What is the level of knowledge and understanding other functions in your organisation have of your function?	28%	72%	4
What is the level of formal knowledge sharing across functions in your organisation?	38%	62%	3
What is the level of informal knowledge sharing across functions in your organisation?	13%	87%	3
What is the importance of knowledge/information in removing uncertainty?	0%	100%	3
What is the influence uncertainty has on successful investment decision outcome?	8%	92%	4
What influence does your perception of a successful outcome of investment decisions have on your decision making process?	0%	100%	4
<b>Experience Factors</b>			
What is the influence of past experiences on your investment decision making process?	0%	100%	3
What influence do negative outcomes on previous decisions have on investment decisions in similar situations?	3%	97%	4
<b>Organisational Culture</b>			
In my organisation we are very set in our ways of doing things	13%	87%	4
How flexible is your organisation in adapting to change?	36%	64%	4

Elaborating on experience factors indicate (Freq = >97%, Mode = >3) that decision makers evaluate current decisions against past experiences. This is both a function of limited knowledge and/or understanding as presented by Nichols's (2006) theory that a logical evaluation of past experience will follow in the event of limited information supporting the decision making process. This logical evaluation is further influenced by the organisational culture and the common beliefs about failure within the firm (Cannon and Edmondson, 2002).

Respondents indicated that their respective organisations have a strong culture (Freq = 87%, Mode = 4), and therefore it is plausible to suggest that past experience will be formed within the constructs of the organisation's culture.

Within the third grouping namely 'Market Factors', 79% of organisations cite uncertainty of demand as a moderate to high hampering factor to innovation, and 56% cite competitive landscape as a hampering factor to innovation. Both factors present a mode = 3 that suggests that these have moderate impact on the firm's innovation propensity.

The final grouping 'Reasons not to innovate' is, as expected, cited as a very low hampering factor to innovation with only 33% of respondents stating that this impact is moderate to high, mode = 2.

### *6.2.2 Testing for independence between innovation propensity (all Manufacturing Firms) and identified hampering factors*

It is possible that multiple hampering factors will be cited as hampering factors to innovation due to the specific dynamics (internal and external) influencing an organisation at the specific time of observation. It is therefore important to test the factors presented by Blankley (2008) and current research for dependence on an organisation's propensity to innovate. Proving dependence between cited hampering factors and a firm's propensity to innovate will support the suggestion that the identified hampering factors do determine whether a firm innovates or not and is thus a hampering factor to innovation within manufacturing firms.

The Chi-square test ( $\chi^2$ ) for independence tests whether attributes are independent in a probabilistic sense (Albright, *et al.*, 2006). The null hypotheses ( $H_0$ ) is that two attributes are independent and therefore one cannot predict the outcomes (behaviour) of a variable based on the observations of another.

Proving the alternative hypotheses ( $H_A$ ) is done through comparison of the Chi-square statistic ( $\chi^2$ ) in equation 1 below, with the critical value. The critical value is a function of degrees of freedom at the appropriate alpha level ( $\alpha$ ).

**Equation 1 - Chi-square statistic**

$$\chi^2 = \sum \frac{(O_i - E_i)^2}{E_i}$$

The number of degrees of freedom is determined through:

**Equation 2 - Degrees of freedom calculation**

$$d.f. = (R - 1)(C - 1)$$

Comparison of the critical value ( $R$ ) (at 1 degree of freedom and alpha set at 0.05) and the Chi-square statistic ( $\chi^2$ ) proves or disproves the hypotheses.

**Equation 3 - Chi-square test for independence**

Where  $\chi^2 > R$  then rejects  $H_0$  and independence between variables are disproved one can then suggest that observations in a specific attribute can predict the outcomes of another attribute.

**Table 22 - Critical values of Chi-square at Alpha = 0.05 and 0.1 and 1 d.f.**

(d.f.)	( $\alpha$ )	(R)
1	0.05	3.841
1	0.1	2.706

Table 19 in Chapter 5 presents the relevant Chi-square statistics ( $\chi^2$ ) and suggests that the lack of external funding is independent from a manufacturing firm's propensity to innovate. Chi-square ( $\chi^2$ ) = 1.793 vs. critical value (R) = 3.841 at alpha ( $\alpha$ ) = 0.05.

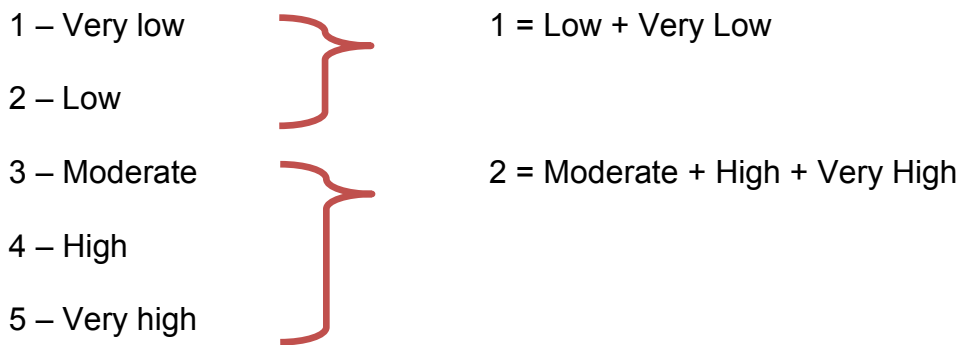
All other factors cited as hampering factors to innovation are proved to be linked to a firm's propensity to innovate. Observed ( $\chi^2$ ) values are well above the critical value (R) = 3.841 at alpha = 0.05.

It is therefore confirmed that the cost factors, with the exception of 'lack of external funding', knowledge factors, market factors and reasons not to innovate as presented by Blankley (2008) and the literature review in Chapter 3, do determine whether manufacturing firms in South Africa innovate.

### *6.2.3 Testing for independence between innovation frequency in FMCG organisations and the identified hampering factors*

By using a similar method of analysis as in the previous section, we attempt to establish whether a similar dependency exists between FMCG organisations' innovation frequencies and the identified hampering factors. Unlike Blankley's survey, respondents were not classified as innovators and non-innovators but rather as high innovators and low innovators.

In the analysis the five (5) response categories are broken down into two (2) categories due to the small sample size to ensure large enough frequency observations (Zikmund, 2003).



Due to the small sample size, the Chi-square test for independence cannot be conducted on the research population and we rely on the frequency tabulation presented in figures 12 -15 to suggest some relational effect between the identified hampering factors and FMCG organisations’ innovation frequency.

We find that within the population 75% rate themselves as high frequency innovators and 25% as low. Responses are collated in the table below:

**Table 23 - High innovators’ rating of hampering factors as % of innovation groups**

	Low Freq Innovation Low Impact of Factor	High Freq Innovation Low Impact of Factor	Low Freq Innovation High Impact of Factor	High Freq Innovation High Impact of Factor
<b>Cost Factors</b>				
Lack of funds within your enterprise or group	20%	21%	80%	79%
Lack of finance from sources outside your enterprise	60%	59%	40%	41%
Innovation costs too high	-	10%	100%	90%
<b>Knowledge Factors</b>				
Lack of qualified personnel	10%	24%	90%	76%
Lack of information on technology	20%	28%	80%	72%
Lack of information of markets	30%	31%	70%	69%
Difficulty in finding cooperation partners	30%	52%	70%	48%



<b>Market Factors</b>				
Market dominated by established enterprises	30%	48%	70%	52%
Uncertain demand for innovative goods or services	20%	21%	80%	79%
<b>Reasons not to innovate</b>				
No need due to prior innovations	30%	79%	70%	21%
No need because of no demand for innovations	40%	76%	60%	24%

Half of the factors are experienced equally strong by high and low frequency innovating organisations as hampering factors to innovation with nearly no difference within the cost factor grouping. Significant are the inverse responses seen for:

E) Knowledge Factors

- a. Lack of Qualified Personnel
- b. Difficulty finding Partners

F) Market Factors

- a. Market Dominated by established enterprise

G) Reasons not to Innovate

- a. No need due to previous innovation
- b. No demand for innovation

This suggests that a possible relationship exists between these factors and their influence on FMCG organisations' innovation frequency. Where these factors were rated as high, firms generally have a low innovation frequency with the opposite also being true. We can thus propose that for 50% of the factors there might be a dependency between these specific factors and an FMCG organisation's propensity to innovate.

#### 6.2.4 *Dependence between variables and their affect on innovation frequencies*

It is established so far that:

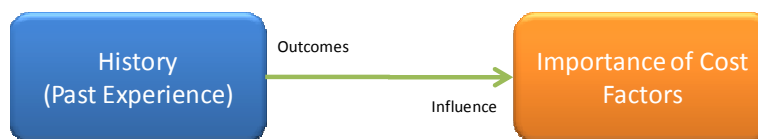
- 1) FMCG firms in South Africa as a subpopulation of all manufacturing firms in South Africa cite similar hampering factors to innovation as in the findings on the total population of manufacturing firms presented by Blankley (2008).
- 2) There exists a dependency between Manufacturing firms' innovation propensity and the identified hampering factors.
- 3) Similar dependencies might exist in FMCG organisations.

Figures 10 and 11 in Chapter 3 suggest that a further possible relationship exists between identified hampering factors, and that some factors could merely be symptomatic identification of underlying factors rather than a root cause/determinant to innovation frequency.

To test the relationship between these identified factors specifically within the subpopulation (FMCG Organisations in South Africa), cross tabulations and frequency observations are presented in figures 16 - 25 in Chapter 5.

**Proposition 1: Negative innovation outcomes increase the importance of cost factors within the decision making process related to innovations**

Ninety (90) percent of respondents who indicated that previous negative outcomes heavily influence innovation decisions similarly rated the cost of innovation as a high hampering factor to innovation. The same group responded with 100% citing that past experiences (positive and negative) have high influences on decision making. As identified by Chapman *et al.* (2001) innovation evaluation is predominantly focused on the cost factors. This is further elaborated by Gabriel and Baker (1980) who suggest that risk management in organisations is grounded in the principle of minimising loss.



It is therefore reasonable to suggest that previous experience (positive or negative) related to innovation is measured predominantly in terms of cost to the firm. Secondly it is logical to expect that previous negative outcomes will increase the decision maker's evaluation of total cost, and that this cost will be perceived as too high due to the perceived risk manifesting from previous negative innovation outcomes.

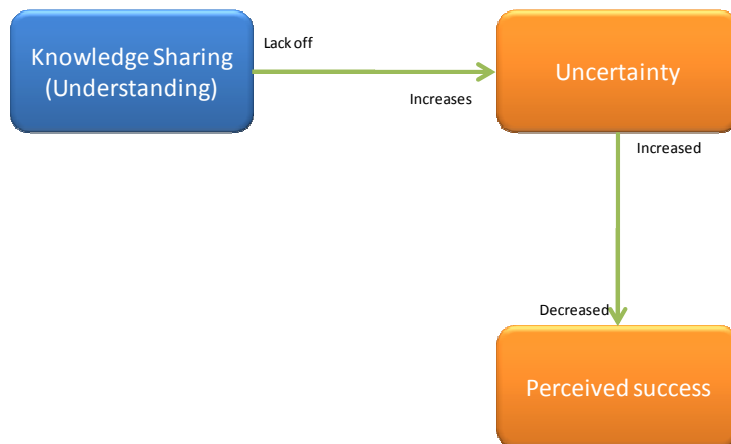
**Proposition 2 and 3. The level of knowledge sharing related to an innovation is indirectly proportional to the level of uncertainty and thus perceived risk/uncertainty of an innovation outcome. Uncertainty is indirectly influencing the perception of success.**

Ninety-two (92) percent of respondents who indicated that knowledge sharing in an organisation is very important, also indicated that uncertainty of outcomes is a high hampering factor to innovation. Interestingly, only 59% of organisations rate the level of formal knowledge sharing as high with 79% indicating informal knowledge sharing as high. Ninety-two (92) percent of respondents who indicated that uncertainty plays a very high role in innovation decision outcomes also cited that the perception of a successful outcome heavily influences innovation decisions.

Further analysis shows that only 54% of respondents rate their understanding of other functions as high and in similar fashion only 31% rate other functions' understanding of their function as high. All respondents rated uncertainty as a moderate to very high influence on decision making related to innovation. It is clear that an understanding exists within firms that knowledge sharing is an important determinant in innovation. What is, however, a contradicting expectation, is the level of understanding across firms in view of the level of knowledge sharing as suggested by the respondents.

Schmidt (1958) clearly links decision making with perception of risk due to uncertainty and limited information at hand. Nichols (2006) presents that in the absence of perfect information, decision makers will pursue the optimum

outcome in view of probability. Nichols (2000) and Corso *et al.* (2000) further state that decisions will be made through knowledge gained from previous experience.

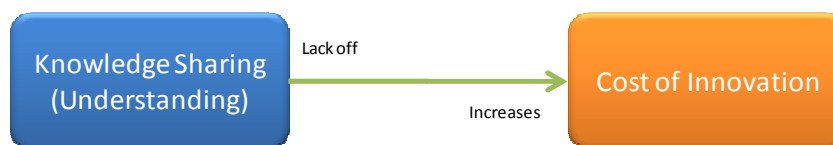


It is rational to suggest that through knowledge sharing uncertainty is eliminated within and across organisational functions. The findings here suggest that a low level of cross-functional understanding is cited in combination with high impact of uncertainty on innovation outcomes. It can thus be deduced that low levels of knowledge sharing lead to low levels of understanding across functions and increases the uncertainty and therefore the perception of risk related to innovation decisions.

**Proposition 3: The level of knowledge sharing around an innovation is indirectly proportional to the importance of cost factors within the decision making process related to innovation.**

Ninety-two (92) percent of respondents who indicated that knowledge sharing in an organisation is very important, also indicated that the cost of innovation is a high hampering factor to innovation. Interestingly though, only 56% of organisations rate the level of formal knowledge sharing as high with 79% indicating informal knowledge sharing as high.

Firms indicated their understanding of the importance of knowledge sharing as high (100%). Equally 92% of respondents cited cost as a moderate to high impacting factor on innovation. As shown in the previous discussion, however, further analysis of understanding across functions highlights the fact that the level of understanding is much lower, 54% internally rated it as moderate to high and 31% externally rated it as moderate to high.



Comparing level of understanding to the rating of innovation cost as hampering factors does suggest that a low level of understanding and thus low level of knowledge sharing are linked to a high rating of innovation cost as a hampering factor.

**Proposition 6: The level of perceived success associated with an innovation is indirectly proportional to the importance of cost factors within the decision making process related to innovation.**

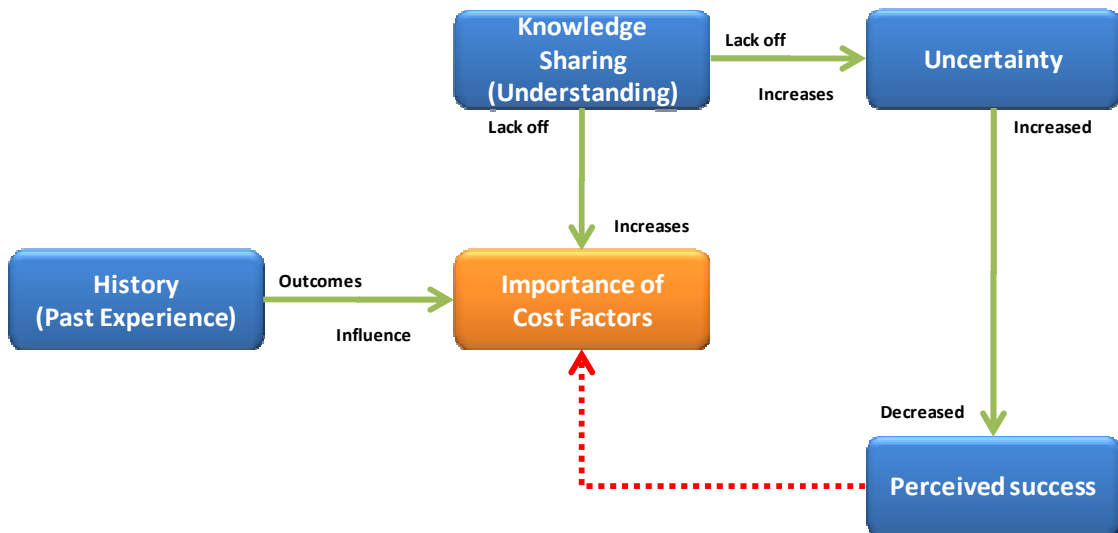
Ninety-two (92) percent of respondents who indicated that the perception of a successful outcome heavily influences innovation decisions also cited the cost of innovation as a high impacting factor to innovation. There is no evidence found in the analysis that supports the notion of high perception of success translates into a low indication of cost as a hampering factor to innovation.

### **6.3 In Reference to the objective of the study**

To remind the reader, the purpose of this study is to better understand factors hampering innovation within South African manufacturing firms. Firstly, analysis was conducted on previous research done by Blankley (2008) which determined that a probabilistic relationship exists between his identified factors and an organisation's propensity to innovate. The research then builds on his study to determine whether the same hampering factors are prevalent in a subpopulation, namely FMCG organisations. Finally, the research attempts to broaden the understanding of the specific hampering factors as previous research presented in Chapter 3 presents various factors hampering innovation which could be seen as root causes to the hampering factors presented by Blankley (2008).

After confirming that similar hampering factors exist in FMCG firms and the dependence of such factors to innovation frequency in the general population (manufacturing firms), a model is built based on exploratory findings suggesting that various underlying factors can be determinants to cost being cited as a major hampering factor in FMCG organisations.

The model below represents such possible relationships as shown above and gives a valuable framework for further research in deeper rooted causes to limited innovation in South African manufacturing firms.



## 6.4 Concluding Remarks

The purpose of this chapter was to analyse and interpret data obtained from Blankley's previous research (2008) and collected data through means of a questionnaire completed by innovation decision makers in FMCG organisations in South Africa.

The results were presented in such a manner as to support previous research findings on factors hampering innovation in South African manufacturing firms and broaden the understanding of the interrelatedness of these factors by means of exploratory analysis.



Although not probabilistic in nature, some evidence is presented that suggests that hampering factors might be symptomatic in nature and a framework is presented for future research to statistically prove relational tendency between factors and underlying drivers.

Chapter 7 presents a conclusion and further recommendations to this study, based on literature research and the findings presented above.

## **Chapter 7: Conclusion and Recommendations**

### **7.1 Introduction**

The intention of this final chapter is to echo findings highlighted in the literature review, findings from the results of this research and finally use the increased knowledge base to inform stakeholders of key learnings and researchers of possible further research that should be conducted.

### **7.2 Main findings of the study**

The main objectives of this study were to verify whether previous identified hampering factors to innovation apply to FMCG organisations in South Africa; to prove that there exists a relationship between these factors and an organisation's innovation frequency; and finally to prove that, in some cases, these factors are symptoms of underlying drivers (root causes). The results and interpretation of these objectives are presented in Chapter 6.

The motive for undertaking this study is grounded in the realisation that a growing global arena brings about increased competition at the business and ultimately the country level. To move South Africa into the next domain where economic freedom is granted to all, we need to remain competitive and should therefore understand what influences our ability to compete (Binnedel, 2008).

Competitive nature is the ability to change and reinvent what we offer to the market to ensure the continuous maintenance/growth of the market share and thus sustained profitable earnings. This can be achieved through focused and successful innovations (Terrif, 2006).

Blankley (2008) presents a disturbing picture showing that nearly half of our manufacturing firms in South Africa do not innovate. He also presents the factors that hamper these organisations' ability/inclination to innovate. Blankley's (2008) findings taken in combination with South Africa's declining global competitive index (GCI) as published by the World Economic Forum (World Economic Forum, 2009), must advocate to all stakeholders the need to understand these factors across the entire industry. Understanding the causes and therefore developing practical plans to eliminate all possible constraints to innovation in South Africa should be a priority.

***The main findings of this study are therefore that:***

- 1) FMCG organisations as a subpopulation to manufacturing firms in South Africa experience similar hampering factors to innovation as identified in Blankley's research (2008).
- 2) The identified hampering factors with the exception of 'limited external funding' show a probabilistic relationship with a manufacturing firm's propensity to innovate.

- 3) FMCG organisations show to some extent that similar a relationship exists between the identified hampering factors presented by Blankley (2008) and their propensity to innovate. These factors are summarised in the categories of:
- a. Cost Factors
    - i. The lack of internal funds
    - ii. The lack of external funds
    - iii. The cost of innovation is too high
  - b. Knowledge Factors
    - i. The lack of qualified personnel
    - ii. The lack of information on technology
    - iii. The lack of information on markets
    - iv. The inability to find partners
  - c. Market Factors
    - i. Market dominated by existing player
    - ii. Uncertainty of demand
  - d. Reasons not to Innovate
    - i. No demand
    - ii. No need
- 4) The cost of innovation might be a symptomatic hampering factor with some evidence suggesting the knowledge factors in combination with how organisations manage risk, moved decision makers in organisation to cite innovation cost as a hampering factor.

The research therefore suggests that 'information sharing' across all functions as well as 'organisational culture' pressures should become more focussed within the realm of innovation decision making in order to ensure a higher propensity to innovate.

### **7.3 Limitations of the study**

Although no major problems were experienced with the study or collection of data, it is important to mention the following issues:

- 1) Due to the small sample size representing FMCG organisations within the global population of manufacturing firms obtained, no generalisations can be applied to FMCG organisations. Important insights, however, have been obtained which can support further research.
  
- 2) Similar constraints apply to independence testing between hampering factors and as a result, drivers of these factors are mere suggestions of underlying causes.

It would have been ideal to apply the Chi-square test for independence to the population to obtain relational insights between perceived hampering factors and FMCG organisations' propensity to innovate but time and resources did not allow for a broader audience analysis.

## 7.4 Recommendation to stakeholders

Recognition and understanding of the factors hampering innovation is important for all senior management. This insight gives management the ability to anticipate hurdles and address them in a proactive way to ensure that firms not only increase their innovation capability but also increase the success rate of implementations.

Specific attention needs to be given to knowledge factors. Most firms recognise the importance of knowledge sharing as a tool to increase understanding and thus remove uncertainty. However, the desired level of cross-functional understanding as shown by this research is still lacking. It would seem that informal networks are still the major lane through which important information is shared and thus inhibits: (1) the ability to crystallise learnings and knowledge in a manner that is accessible to all employees in a timely manner and (2) the ability to build constructively across functions on information at hand.

Leadership should also recognise the impact organisational culture has on the perception of risk and the perception of failure. The study highlights that a major driver in innovation decisions is past experience of negative outcomes. 'Failing forward' is as important to organisational growth and success as sporadic successes. It is the responsibility of leadership in these organisations to create a culture where failure is accepted as part of the total learning curve in an organisation's innovation cycle.

## 7.5 Recommendation for further research

This research makes room for further research:

- 1) Probabilistic determination of relationships between hampering factors and FMCG organisations to further understand if root determinants to innovation propensity are identified within this manufacturing segment as indicated in table 23.
- 2) Probabilistic determination of relationships between hampering factors in FMCG firms to further understand root causes of hampering factors as shown in figure 26.
- 3) Similar analysis across other manufacturing industry segments to ascertain whether the identified hampering factors apply to the micro segments of manufacturing.
- 4) It is further recommended that particular attention should be given to understanding the impacts organisational culture and knowledge sharing have on an organisation's innovation propensity.

## 7.6 Concluding Remarks

The researcher believes that the objectives of this study have been adequately met. A deeper insight into constraints to innovation in manufacturing firms is presented through this research. A supporting argument to Blankley's (2008) findings is presented, with some suggestion as to the relative impact and interplay of these factors. Thus building on previous research, more valuable insights are brought to light which will assist South African manufacturing firms to improve on their innovation capability and therefore compete successfully in the global arena.

It is believed that the research should not only spark ideas on how to improve innovation frequencies in already innovating firms, but should also raise some thorny questions in non-innovating firms as to why they are not innovating.

*We as business leaders and academia need to decide whether we want to compete or exit. This study is concluded with a quote from William Shakespeare's 1623 play, "As you like it", act II, scene VII, lines 139-143.*

*"All the world is a stage, and all men and women merely players: they have their exits and their entrances: and one man in his time plays many parts ..."*

*(Shakespeare, 1623).*



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## Appendix A - Research Questionnaire

<b>1 Questions About the Firm</b> <i>(Please tick the appropriate box)</i>			
1.1	My Organisation manufactures Fast Moving Consumer Goods	<input type="checkbox"/> YES <input type="checkbox"/> NO	<input type="checkbox"/> YES <input type="checkbox"/> NO
1.2	My Organisation manufactures multiple Fast Moving Consumer Goods	<input type="checkbox"/> YES <input type="checkbox"/> NO	<input type="checkbox"/> YES <input type="checkbox"/> NO
1.3	There is a marketing function within my Organisation	<input type="checkbox"/> YES <input type="checkbox"/> NO	<input type="checkbox"/> YES <input type="checkbox"/> NO
1.4	We manufacture (some) products in South Africa	<input type="checkbox"/> YES <input type="checkbox"/> NO	<input type="checkbox"/> YES <input type="checkbox"/> NO
	My Organisation employ more than 100 people	<input type="checkbox"/> YES <input type="checkbox"/> NO	<input type="checkbox"/> YES <input type="checkbox"/> NO
<b>2 Questions About Respondent</b> <i>(Please tick the appropriate box)</i>			
2.1	I am a full time employee of the organisation described above	<input type="checkbox"/> YES <input type="checkbox"/> NO	<input type="checkbox"/> YES <input type="checkbox"/> NO
2.2	I am part of decision making in my organisation related to investment	<input type="checkbox"/> YES <input type="checkbox"/> NO	<input type="checkbox"/> YES <input type="checkbox"/> NO
2.3	I am a manager in my organisation	<input type="checkbox"/> YES <input type="checkbox"/> NO	<input type="checkbox"/> YES <input type="checkbox"/> NO
2.4	I work in the following function	<input type="checkbox"/> Marketing <input type="checkbox"/> Manufacturing <input type="checkbox"/> Sales <input type="checkbox"/> Finance <input type="checkbox"/> Supply Chain	<input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/> <input type="checkbox"/>



**3 Questions About Innovation**

*(Please tick the appropriate box where 1 = Very Low, 2 = Low, 3 = Moderate, 4 = high and 5 = Very High )*

3.1	Rate your organisations propensity to innovate	1	2	3	4	5
3.2	Rate the impact the following factors have on your organisations innovation frequency					
3.2.1	<b>Cost Factors</b>					
3.2.1.1	Lack of funds internal	1	2	3	4	5
3.2.1.2	Lack of funds external	1	2	3	4	5
3.2.1.3	Innovation cost to high	1	2	3	4	5
3.2.2	<b>Knowledge Factors</b>					
3.2.2.1	Lack of qualified personnel	1	2	3	4	5
3.2.2.2	Lack of information on technology	1	2	3	4	5
3.2.2.3	Lack of information on markets	1	2	3	4	5
3.2.2.4	Difficulty in finding cooperation partners	1	2	3	4	5
3.2.3	<b>Market Factors</b>					
3.2.3.1	Market dominated by established enterprise	1	2	3	4	5
3.2.3.2	Uncertain demand for innovative good / service	1	2	3	4	5
3.2.4	<b>Reasons not to innovate</b>					
3.2.4.1	No need due to previous innovations	1	2	3	4	5
3.2.4.2	No need because of no demand for innovation	1	2	3	4	5
3.1	Rate your organisations innovation frequency	1	2	3	4	5

**4 Questions About Historic events**

*(Please tick the appropriate box where 1 = Very Low, 2 = Low, 3 = Moderate, 4 = high and 5 = Very High )*

4.1	Rate the influence past experiences has on your decision making process	1	2	3	4	5
4.2	Rate the influence of past negative outcomes for specific decisions influences your decision making process in a similar situation	1	2	3	4	5



**5 Questions About Knowledge Sharing**

*(Please tick the appropriate box where 1 = Very Low, 2 = Low, 3 = Moderate, 4 = high and 5 = Very High )*

5.1	Rate your level of knowledge and understanding of other functions in your organisation	1	<input type="checkbox"/>	2	<input type="checkbox"/>	3	<input type="checkbox"/>	4	<input type="checkbox"/>	5	<input type="checkbox"/>
5.2	Rate the level of knowledge and understanding other functions in your organisation has of your function	1	<input type="checkbox"/>	2	<input type="checkbox"/>	3	<input type="checkbox"/>	4	<input type="checkbox"/>	5	<input type="checkbox"/>
5.3	Rate the level of formal knowledge sharing across functions in your organisation	1	<input type="checkbox"/>	2	<input type="checkbox"/>	3	<input type="checkbox"/>	4	<input type="checkbox"/>	5	<input type="checkbox"/>
5.4	Rate the level of informal knowledge sharing across functions in your organisation	1	<input type="checkbox"/>	2	<input type="checkbox"/>	3	<input type="checkbox"/>	4	<input type="checkbox"/>	5	<input type="checkbox"/>

**6 Questions About Uncertainty**

*(Please tick the appropriate box where 1 = Very Low, 2 = Low, 3 = Moderate, 4 = high and 5 = Very High )*

	Rate the importance of knowledge/information in removing uncertainty	1	<input type="checkbox"/>	2	<input type="checkbox"/>	3	<input type="checkbox"/>	4	<input type="checkbox"/>	5	<input type="checkbox"/>
	Rate the influence uncertainty has on successful outcome	1	<input type="checkbox"/>	2	<input type="checkbox"/>	3	<input type="checkbox"/>	4	<input type="checkbox"/>	5	<input type="checkbox"/>
	Rate the influence the perception of an successful outcome has on your decision making process	1	<input type="checkbox"/>	2	<input type="checkbox"/>	3	<input type="checkbox"/>	4	<input type="checkbox"/>	5	<input type="checkbox"/>

**7 Questions About Uncertainty**

*(Please tick the appropriate box where 1 = Very Low, 2 = Low, 3 = Moderate, 4 = high and 5 = Very High )*

	My organisation has a very strong culture	1	<input type="checkbox"/>	2	<input type="checkbox"/>	3	<input type="checkbox"/>	4	<input type="checkbox"/>	5	<input type="checkbox"/>
	Rate your organisations propensity to react different to what is expected	1	<input type="checkbox"/>	2	<input type="checkbox"/>	3	<input type="checkbox"/>	4	<input type="checkbox"/>	5	<input type="checkbox"/>

**8 Open question identifying other hampering factors to innovation**

*(Please tick the appropriate box where 1 = Very Low, 2 = Low, 3 = Moderate, 4 = high and 5 = Very High )*

Is there other factors influencing your firms willingness to innovate?