A conceptual framework for the relationship between the implementation of innovation and knowledge management and its link to organisational capabilities

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A conceptual framework for the relationship between the implementation of innovation and knowledge management and its link to organisational capabilities

I declare that the above thesis is my own work and that all the sources that I have used or quoted have been indicated and acknowledged by means of complete references.

_____ ____2019/06/03___

SIGNATURE DATE

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Abstract

In our knowledge-intensive economy, charismatic managers of organisations are increasingly adopting innovation and knowledge management strategic imperatives to improve products and services for service delivery and competitive edge. However, organisations implementing homogeneous and intellectual resource organisational capabilities such as Innovation Capability (INNO) and Knowledge Management Capability (KMC) suffer inertia, lack of understanding and organisational capability inefficiencies caused by multiple influences, complex building blocks and depleted organisational capability. Therefore, the main purpose of this study was to examine if Organisational Capability Efficiency (OCE) is improved by aligning/synthesising organisational capabilities when implementing Innovation Capability and Knowledge Management Capability in organisations.

The main objective of the study was to develop a conceptual framework for the alignment of Innovation Capability (INNO) and Knowledge Management Capability (KMC) that would assist managers in organisations during implementation to improve Organisational Capability Efficiency (OCE).

This study adopted a positivist research philosophy. The variables derived from the theory for this study were Innovation Capability (INNO), Knowledge Management Capability (KMC) and Organisational Capability Efficiency (OCE). An in-depth literature review was undertaken to develop the constructs for the conceptual research model. The hypothesis and research questions were developed from the theory. The variables were operationalised into definable measurable indicators and a research survey instrument was used to measure the variables and operationalise the indicators to test the hypothesis.

Quantitative research was used in this exploratory study and data were collected from a representative sample. No sampling was done in this study because the researcher conducted a census survey. A semi-structured questionnaire, mainly utilising the five-point Likert scale, was used to collect data. The target population consisted of all organisations, including national government departments, state-owned enterprises and listed SA

companies engaged in innovation and knowledge management in South Africa. The data were analysed statistically, primarily by means of factor analysis, to determine the significant factors that contributed to the validation of the conceptual framework.

The Structured Equation Model in chapter 4 (figure 4.7), which shows the interrelationships between Innovation Capability, Knowledge Management Capability and Organisational Capability Efficiency, and the conceptual framework described in chapter 5 (section 5.3.1), which offers insight into the aligned/synthesised implementation of Innovation Capability and Knowledge Management Capability are considered to be contributions to the body of knowledge.

In terms of the research result, it is recommended that organisations implementing Innovation Capability consider Knowledge Management Capability concepts and, where applicable, align/synthesise them with the appropriate Innovation Capability, using their order of importance to prioritise implementation for the organisation and attain Organisational Capability Efficiency.

It was found that implementing Innovation Capability and Knowledge Management Capability separately did not produce Organisational Capability Efficiency. However, aligning/synthesising Innovation Capability and Knowledge Management Capability coherently allowed managers and practitioners to achieve cohesive implementation strategies, optimised utilisation of resources, reduced redundancy of effort, improved investments and accessibility to scarce and skilled resources.

Key terms: innovation, knowledge management, Organisational Capability Efficiency, organisational capability, Innovation Capability, Knowledge Management Capability, alignment, conceptual framework, capability, organisation.

Opsomming

In die hedendaagse kennisekonomie gee charismatiese maatskappybestuurders voorkeur aan innovering en kennisbestuur om hulle organisasies se produkte en dienste te verbeter en ʼn mededingende voordeel te behaal. Organisasies wat homogene en intellektuele hulpbronvermoëns, soos Innoveringsvermoë (INNO) en Kennisbestuursvermoë (KBV), implementeer, openbaar egter mettertyd ʼn traagheid, ʼn gebrekkige begrip en ondoeltreffendheid as gevolg van verskeie invloede, waaronder ingewikkelde boustene en verminderde organisasievermoëns. Daarom probeer hierdie studie vasstel of Organisasievermoëdoeltreffendheid (OVD) verbeter indien organisasievermoëns gekorreleer of gesintetiseer kan word deur Innoveringsvermoë en Kennisbestuursvermoë in organisasies te implementeer.

Die doel van hierdie studie was om ʼn konseptuele raamwerk vir die korrelering van Innoveringsvermoë (INNO) en Kennisbestuurvermoë (KBV) te ontwikkel wat tydens die implementering van Organisasievermoëdoeltreffendheid (OVD) vir maatskappybestuurders van nut kan wees.

Hierdie studie het ʼn positiwistiese navorsingsbenadering gevolg. Die veranderlikes wat uit die teorie afgelei is, is Innoveringsvermoë (INNO), Kennisbestuursvermoë (KBV) en Organisasievermoëdoeltreffendheid (OVD). Die literatuur is grondig bestudeer om die konstrukte van die konseptuele navorsingsmodel te ontwikkel. Die hipotese en navorsingsvrae het uit die teorie voortgespruit. ʼn Navorsingsopname-instrument is gebruik om die veranderlikes te meet en in omskryfbare en meetbare aanwysers te operasionaliseer ten einde die hipotese te toets.

Kwantitatiewe navorsing is in hierdie verkennende studie onderneem, en data is uit ʼn verteenwoordigende steekproef versamel. Geen steekproef is vir hierdie studie geneem nie, aangesien die navorser ʼn sensusopame gedoen het. Data is met behulp van ʼn halfgestruktureerde vraelys volgens die vyfpunt-Likert-skaal ingesamel. Allerlei organisasies, van staatsdepartemente en ondernemings in staatsbesit tot genoteerde plaaslike maatskappye wat by innovering en kennisbestuur in Suid-Afrika betrokke is, het

die teikenpopulasie gevorm. Die data is grotendeels aan die hand van ʼn faktoranalise statisties ontleed om die faktore te bepaal wat die geldigheid van die konseptuele raamwerk bevestig.

Die Gestruktureerde Vergelykingsmodel in hoofstuk 4 (figuur 4.7) en die konseptuele raamwerk wat in hoofstuk 5 (afdeling 5.3.1) beskryf word, lewer ʼn bydrae tot die geheel van kennis. Eersgenoemde toon die onderlinge verbande tussen Innoveringsvermoë, Kennisbestuursvermoë en Organisasievermoëdoeltreffendheid, en laasgenoemde bied insig in die gekorreleerde of gesintetiseerde implementering van Innoveringsvermoë en Kennisbestuursvermoë.

Wat die navorsingsuitslag betref, word aanbeveel dat organisasies wat Innoveringsvermoë implementeer, die Kennisbestuursvermoëkonsepte in ag neem en, as dit nodig is, met die toepaslike Innoveringsvermoë korreleer of sintetiseer, en volgens hulle eie prioriteite in werking stel om Organisasievermoëdoeltreffendheid moontlik te maak.

Daar is bevind dat wanneer Innoveringsvermoë en Kennisbestuursvermoë afsonderlik geïmplementeer word, Organisasievermoëdoeltreffendheid nie verbeter nie. Indien Innoveringsvermoë en Kennisbestuursvermoë egter samehangend gekorreleer of gesintetiseer word, is bestuurders en praktisyns se implementeringstrategieë samehangend, word hulpbronne optimaal aangewend, verminder onnodige inspanning, verbeter beleggings, en is skaars en opgeleide hulpbronne meer toeganklik.

Okucatshangiwe

Olwazini wethu lomnotho obanzi, abaphathi abanobuntu bezinhlangano baya ngokuya bamukela izindlela ezintsha zokuphathwa kolwazi nokwenza ngcono imikhiqizo nezinsizakalo zokulethwa kwezinsiza kanye nokuncintisana. Kodwa-ke, izinhlangano ezisebenzisa amandla amakhulu wezinsizakusebenza ezinokuqonda okufana nAmandla Ezindlela Ezintsha (*Innovation Capability INNO*) kanye nAmandla okuPhatha uLwazi (*Knowledge Management capability KMC*) zihlupheka ngokweqile, ukuntuleka kokuqonda nokungakwazi ukwenza kahle kwenhlangano okubangelwa yimithelela eminingi, izakhi zokwakha ezibucayi namandla aphelile enhlangano. Ngakho-ke, inhloso esemqoka yalolu cwaningo bekuwukuhlola ukuthi ngabe Amandla okuSebenza Kahle kweNhlangano (*Organisational Capability Effeciency OCE*) athuthukisiwe ngokuvumelanisa / ukuhlanganisa amandla enhlangano lapho kufakwa Amandla Ezindlela Ezintsha kanye nAmandla Okuphatha uLwazi ezinhlanganweni.

Inhloso esemqoka yalolu cwaningo bekuwukuqamba uhlaka oluzwisisekayo lokuqondiswa kwAmandla Ezindlela Ezintsha *(Innovation Capability INNO*) nAmandla okuPhatha uLwazi (*Knowledge Management capability KMC*) oluzosiza abaphathi ezinhlanganweni ngesikhathi sokuqalisa ukwenza ngcono Amandla okuSebenza Kahle kweNhlangano (*Organisation capability Performance OCE*).

Lolu cwaningo lwamukele ucwaningo lolwazi olususelwa ezintweni zemvelo nobudlelwano bazo (*positivist philosophy).* Ukwehlukahluka okususelwa kumcabango walolu cwaningo bekungAmandla Ezindlela Ezintsha (*Innovation capability INNO*), Amandla okuPhatha uLwazi (*Management Capability KMC*) kanye nAmandla okuSebenza Kahle kweNhlangano (*Organisation capability OCE*). Ukubuyekezwa kwezincwadi okujulile kwenziwa ukuze kuthuthukiswe ukwakhiwa kwesifaniselo socwaningo olucatshangelwe. Imibuzo ehlongozwayo njengesisekelo sobufakazi bokuqala uphenyo locwaningo yathuthukiswa kusuka emcabangweni. Izinto eziguqukayo zazisetshenziselwa izinkomba ezikwazi ukuqondakala futhi ithuluzi lokuhlola lusetshenziselwe ukukala okuguqugukayo futhi kusebenze izinkomba ukuhlola umqondo.

Kusetshenziswe uhlobo locwaningo olufuna ukuhumusha ukuqonda emininingwaneni ezosiza ukuqonda impilo yenhlalakahle (*quantitative research*) kulolu cwaningo lokuhlola futhi imininingwane iqoqwe kusampuli emelwe. Akukho sampula eyenziwe kulolu cwaningo ngoba umcwaningi wenze inhlolovo yokubalwa kwabantu. Uhlu lwemibuzo olwakhiwe kancane, ikakhulukazi olusebenzisa isilinganiso samaphuzu amahlanu kaLikert, lwalusetshenziselwa ukuqoqa imininingwane. Abantu ababehlosiwe babehlanganisa zonke izinhlangano, kufaka phakathi iminyango kahulumeni kazwelonke, amabhizinisi aphethwe nguhulumeni kanye nezinkampani ezikleliswe ohlwini lweNingizimu Afrika ezisebenza ezindleleni ezintsha nokuphathwa kolwazi eNingizimu Afrika. Imininingwane yahlaziywa ngokwezibalo, ngokuyinhloko kusetshenziswa ukuhlaziywa kwezinto, ukuthola izinto ezibalulekile ezaba nomthelela ekuqinisekisweni kohlaka lomqondo.

ISakhiwo Esilungisiwe Sesifaniselo esahlukweni 4 (isithombe 4.7), esikhombisa ukuxhumana phakathi, kwAmandla Ezindlela Ezintsha, Amandla okuPhathwa koLwazi kanye nAmandla okuSebenza Kahle kweNhlangano, nohlaka lomqondo oluchazwe esahlukweni 5 (isigaba 5.3.1), olunikeza ukuqonda ngokuhambisana / ukuqaliswa okwenziwe kwaAmandla Ezindlela Ezintsha kanye nAmandla okuPhathwa koLwazi kubhekwa njengegalelo emzimbeni wolwazi.

Ngokomphumela wokucwaninga, kuphakanyiswe ukuthi izinhlangano ezisebenzisa Amandla Ezindlela Ezintsha zibheke imiqondo yAmandla okuPhathwa koLwazi futhi, lapho kusebenza khona, zikuqondanise / zikuhlanganise nAmandla Ezindlela Ezintsha ezifanelekile, zisebenzisa ukuhleleka kokubaluleka kokubeka phambili ukusebenza kwenhlangano futhi zithole Amandla okuSebenza Kahle kweNhlangano.

Kwatholakala ukuthi ukusebenzisa Amandla Ezindlela Ezintsha kanye nAmandla okuPhathwa koLwazi ngokwehlukanisa akuzange kukhiqize Amandla okuSebenza Kahle kweNhlangano. Kodwa-ke, ukuvumelanisa / ukuhlanganisa Amandla Ezindlela Ezintsha kanye nAmandla okuPhathwa koLwazi kuvumele ngokuqinile abaphathi nabasebenza ngempumelelo ukufezekisa amasu wokusebenzisa okuvumelanayo, ukusetshenziswa kahle

kwezinsiza, ukunciphisa kwemizamo engadingekile, ukuthuthukiswa kokutshalwa kwemali kanye nokufinyeleleka kwezinsizakusebenza ezinamakhono.

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Acronyms, Abbreviations and Definitions

CEO: Chief Executive Officer

COE: Centre of Excellence

CPSI: Centre for Public Service Innovation

DBL: Doctorate in Business Leadership

ICT: Information and Communication Technologies

INNO: Innovation Capability

IT: Information Technology

KM: Knowledge Management

KMC: Knowledge Management Capability

KMS: Knowledge Management Systems

OCE: Organisational Capability Efficiency

Competencies: It is the combination and coordination of resources and capabilities (Malhotra, 2000: 21).

Data: Vastly explicit knowledge resulting from the data in the databases and data warehouses, utilised for strategic decision-making after summarising, analysis, mining, etc. (Kulkarni and Freeze, 2002: 1-21).

Expertise: Vastly tacit knowledge, domain-specific, increased through practice, formal education and collaboration (Kulkarni and Freeze, 2002: 1-21).

Innovation: Innovation is the creation, advancement and enactment of something novel in the organisation (Kör and Maden, 2013: 293).

Innovation Capability: Are those capabilities that are required to conceptualise, implement and commercialize products and services; required to manage the innovation funnel, to understand the business environment and to plan, and design innovation programs; generate ideas in-house or through collaborative efforts or external sources; prioritise ideas and convert them into products or processes that create value to the customer (Kumar, Thampi, Jyotishi & Bishu, 2013: 37-50).

Knowledge: Knowledge is a community benefit because it can be used by any person or organisation to a definite problem without rescinding the ability to relate the knowledge to an alternative practice" (Rugman, 1980:26).

Knowledge Assets: Intangible assets that incorporate knowledge and the capability of an organisation to utilise that knowledge (Kulkarni and Freeze, 2002: 1-21).

Knowledge Capability Area: A subcategory of knowledge resources identified as the organisations expertise, lessons Learned, knowledge documents, information and data (Kulkarni and Freeze, 2002: 1-21).

Knowledge Creation: Requires multi-directional collaboration between people with dissimilar knowledge sets, empowering people to develop into both sources and beneficiaries of knowledge (Cohen, 2003: 1-112).

Knowledge Development: Is the gathering, creation, implementation, spreading, assessment and review of information and research in a certain subject (Cohen, 2003: 1-112).

Knowledge Documents: Documented knowledge with conventional prolonged shelf life exists in an unambiguous form and may be created from within or outside the organisation (Kulkarni and Freeze, 2002: 1-21).

Knowledge Economy: Is described as the production and services established on knowledge-intensive events that add to an augmented pace of technical and scientific development, as well as quick uselessness (Powell and Snellman, 2004: 199).

Knowledge Life Cycle: The events surrounding usage of knowledge as it flows through the phases of creation or capturing, store, retrieve or disseminate and application. (Kulkarni and Freeze, 2002: 1-21).

Knowledge Management: Knowledge Management can be described as the generation, illustration, storage, dissemination, conversion, application, embedding, and security of organisational knowledge (Alavi, Kayworth & Leidner, 2006: 191-224).

Knowledge Management Tools: Knowledge Management Systems (KMS) include several technologies (e.g., knowledge repositories, data warehouses, intranets, search engines, data mining tools, collaboration tools, intelligent agents) to enable the creation, storing, transferal, and distribution of knowledge both internally and externally to the organisation precincts (Alavi et al., 2006: 191-224).

Knowledge Management Capability: Is derived from the theory that a resource-based capability comprising of technology, structure and organisational culture, and a knowledge-based capability comprising of expertise, learning and information are required by organisations implementing knowledge management (Aujirapongpan, Vadhanasindhu, Chandrachai & Cooparat, 2010: 183-203).

Knowledge Transfer: Indicates passing knowledge for usage in certain background or situation (Ravn, 2004: 161).

Knowledge Worker: Knowledge worker tasks include those tasks similar to traditional production where on-the-job performance includes task repetition and those tasks where

scanning for new information or knowledge inside or outside the organisation leads to knowledge creation (Chen and Edgington 2005: 279-309).

Lessons Learned: Knowledge added to the organisation when undertaking tasks or projects, also known as Best Known Methods, Best Practices and Benchmarking (Kulkarni and Freeze, 2002: 1-21).

Organisational Capability: An organisational capability is recognised as an organisations capacity to organise resources for anticipated organisational goals (Helfat and M. Lieberman, 2002: 725).

Organisational Capability Efficiency: Is when organisations benefit in economising on capability, mobilising existing resources appropriately, determining resource gaps and redundancies across domains and building an optimal capability by sharing, integrating and co-ordinating capability (Itami and Noto, 2007: 132; Hamel and Prahalad, 1992: 79-91).

Organisational Culture: Organisational culture determines values, beliefs, and work systems (Alavi et al., 2006: 191).

Organisational Knowledge: Valuable knowledge that needs to be known, which gives the organisation a competitive advantage (Desouza and Awazu, 2004: 46).

Organisation: Organisation in this study refers to organisations including national government departments; state-owned enterprises and SA listed companies that are engaged in innovation and knowledge management in South Africa.

Resources: Resources are the tangible and intangible assets which an organisation utilises to determine and implement its plans and strategies (Barney, 2001: 41).

Chapter 1: Contextualising the Study

1.1 Introduction

Organisations are becoming more knowledge-intensive, giving augmentation to a brand new economy labelled knowledge economy (Ponis, Vagenas and Koronis, 2012). These contemporary organisations have prioritised innovation (Kör and Maden, 2013) and knowledge management (Switzer, 2006) strategic imperatives to achieve competiveness.

Knowledge management is the creation, sharing and learning from information, experience and insight (Gold, Malhotra & Segars, 2001), whilst innovation is strategically seen as the generation, development and implementation of something new in the organisation (Kör and Maden, 2013: 293). Since very diminutive consideration has been paid to the analogous nature of Innovation Capability and Knowledge Management Capability in both theory and practice, organisations have most often implemented these strategic initiatives in isolation or using a departmental approach, adding to the problem of a spiralling increase in deficient and costly resources and organisational capability. As suggested by Tello-Gamarra and Zawislak (2013: 3) capabilities are the knowledge, experience and skills that firms develop in order to find the best arrangement of their resources to surpass their competitors.

The study has provided a greater understanding of the relationship between Innovation Capability (INNO), Knowledge Management Capability (KMC) and Organisational Capability Efficiency (OCE) and will inform business managers, knowledge managers, innovators and project managers on the appropriate investment for an aligned implementation of Innovation Capability and Knowledge Management Capability for the organisation. In addition, it provides a theoretical conceptual framework which both practitioners and researchers can use to advance the body of knowledge in innovation, knowledge management, organisational capability, Innovation Capability, Knowledge Management Capability and Organisational Capability Efficiency research areas.

The chapter outlines the rationale for the study, objectives and research design.

1.2 Statement of the Problem

Organisations implementing homogeneous and intellectual resource intensive strategic imperatives, such as Innovation Capability (INNO) and Knowledge Management Capability (KMC), suffer inertia, lack of understanding and organisational inefficiencies caused by the grappling of multiple influences, complex building blocks and depleted organisational capability. As illustrated in a survey of 1127 Fortune 1000 business executives found out that there is a gap between creating knowledge for innovation and the ability to disseminate it organisation wide which leads to missed opportunities (Dobni and Nelson, 2013). Even more so with developing economies such as South Africa, organisational capability introspection is extremely necessary to focus analysis on the ability and capacity (Camio, Romero, Alvarez & Rébori, 2018: 2). Organisations need to be able to adapt, optimise and mobilise its organisational capability to survive and grow competitively. Although there are research interests in the alignment of innovation and knowledge management, and studies pertaining to Innovation Capability and Knowledge Management Capability, the researcher has not come across a conceptual framework or model that aligns Innovation Capability, Knowledge Management Capability and Organisational Capability Efficiency (Jay, 2013; Teece, 2000).

1.3 Importance

The main purpose of this study was to examine if Organisational Capability Efficiency (OCE) is improved by aligning Innovation Capability (INNO) and Knowledge Management Capability (KMC).

1.4 Research Objectives

Main objective

To develop a conceptual framework for the alignment of Innovation Capability (INNO) and Knowledge Management Capability (KMC) that would assist managers in organisations to improve OCE.

Specific objectives

Literature objectives

1. To examine the factors that affect INNO.
2. To examine the factors that affect KMC.
3. To examine the factors that affect OCE.

Empirical objectives

4. To investigate the relationships between INNO, KMC and OCE.
5. To evaluate the important factors of KMC that affect INNO.

1.5 Research Questions

1. Is there an effective model of the link between each of the dimensions of INNO and KMC and the dimensions of OCE?

2. What will the conceptual framework be to align organisational capabilities when implementing INNO and KMC to improve OCE?

1.6 Hypotheses

The relevant hypotheses are presented below:

Hypothesis 1

H_0^1 INNO does not affect OCE.

H_1: INNO positively affects OCE.

Hypothesis 2

H_0^2 KMC does not affect OCE.

H_2: KMC positively affects OCE.

Hypothesis 3

H_0^3 The combination of INNO and KMC does not have a larger positive effect on OCE than their effects on OCE individually.

H_3 The combination of INNO and KMC has a larger positive effect on OCE than their effects on OCE individually.

1.7 Limitations of the Study

The data were collected from South African organisations; however, the characteristics of the organisations surveyed may be quite dissimilar from organisations in other countries. Hence, its generalisability is limited to other similar contexts. Future research can also

explore the relevance of the findings to other global and cultural settings, to bring about a wider theoretical generalisation.

1.8 Applicable Theoretical and Conceptual Frameworks

This section reviews the relevant models and frameworks of the relationship between innovation, knowledge management, Innovation Capability, Knowledge Management Capability and Organisational Capability Efficiency to determine their applicability, strength and weaknesses. There have been several studies that have been undertaken to evaluate and map the Knowledge Management domain and its progress as well as to identify gaps and propose future research. Research themes such as: knowledge management process, technology enablers, knowledge economy, knowledge strategy, human and social factors, organisational learning, knowledge types, intellectual capital and as well as Knowledge Management Capability has been the interest of both practice and academic interest (Alavi and Leidner, 2001; Heisig, 2014). Moreover, there has been both academic and business interest in innovation as a means to competitive advantage with research inclusive of knowledge creation, creative industry, Innovation Capability and open innovation (Godin, 2012; Heisig, 2014).

There has also been research undertaken to investigate the alignment of innovation and knowledge management. According to current literature, there are studies that show the positive impact of knowledge management on innovation (Kör and Maden, 2013; Wuryaningrat, 2013). However, from an extensive literature review, the researcher did not come across any systemic approach or theory that examines the alignment between Innovation Capability and Knowledge Management Capability and its effect on Organisational Capability Efficiency.

The few studies found in the literature review that investigated the relationship between knowledge management and innovation mainly address specific processes of knowledge management and determine the influence on innovative performance. The studies lack the understanding of the interrelatedness of Innovation Capability and Knowledge Management Capability in its entirety. For example, the study undertaken by Kör and Maden (2013: 293) examines the relationship between effective knowledge management processes and innovation types in organisations. The study concludes that knowledge

management processes relate positively to innovativeness (Kör and Maden, 2013: 293). Nevertheless, the study only addresses the knowledge management process impact on innovation and does not deal with the infrastructure and knowledge capabilities. Similarly, the study by Wuryaningrat (2013) is limited to examining how knowledge sharing, a knowledge management process can be transformed into Innovation Capability. The study provides a better understanding of the importance of organisational knowledge sharing which leads to improving absorptive capacity and innovation capabilities, but does not observe the relationship between Innovation Capability and Knowledge Management Capability. Furthermore, Slavkovic and Babic (2013: 85) investigates the effect of knowledge management on innovativeness and concludes that knowledge management is positively related to the different dimensions of organisational innovation. Likewise, this study is limited to the organisational capabilities of knowledge management and do not examine how the overall knowledge management capabilities impact innovation capabilities. Equally, the research by Lin, McDonough III, Lin & Lin (2013) is limited to the learning capability of knowledge management and its impact on innovation and does not address the composite of capabilities found in innovation and knowledge management.

The increased researches on knowledge management and innovation, especially in the last two decades have derived a number of concepts, frameworks and models that knowledge management can be seen as strategy to foster innovation. Still, another viewpoint is that some experts may view organisational capability as important and some most important for the success of knowledge management or innovation in the organisation (Heisig, 2014). Therefore, the scope of this study is limited to Innovation Capability (INNO) and Knowledge Management Capability (KMC) and Organisational Capability Efficiency (OCE).

From the literature review, there is limited research on Innovation Capability, Knowledge Management Capability and Organisational Capability Efficiency. Such a model ought to provide a number of benefits, such as established cohesive strategies, optimised resources and avoidance of duplicated effort. To remedy the situation, we examined the correlation of these strategic imperatives in organisations. This research seeks to break new ground on the issue by providing a conceptual framework that aligns Innovation

Capability, Knowledge Management Capability. The overall contribution of this study aims to add to the understanding of how Innovation Capability and Knowledge Management Capability can be aligned/synthesised for implementation to attain Organisational Capability Efficiency.

1.8.1 Shortcomings in existing models

Firstly, there seems to be limited theory that addresses the alignment of INNO and KMC and its impact on OCE.

Secondly, there seems to be limited frameworks or models that align INNO, KMC and OCE.

The research design and methodology for examining this empirically are discussed next.

1.9 Research Design and Methods

1.9.1 Research strategy and approach

The main purpose of this study is exploratory research in the sense that it focused on examining organisational capability from a new perspective of a synergistic affect through alignment of Innovation Capability and Knowledge Management Capability. According to Saunders, Lewis & Thornhill (2012:140) quantitative methods are often used in exploratory research. As such, quantitative research was mainly used to examine and explore the topic by gathering data from a population or a sample that represents the population. A semi-structured questionnaire was utilised to collect data from the organisations. Considering the nature of the research questions and the derived hypotheses for this study, the research strategy was a survey methodology which is a positivist research design, in which a census survey (100% of the population) was conducted. The survey method was semi-structured self-administered emailed questionnaires. The questionnaire was made available online with the link emailed to the respondents for convenience. The data gathered from the surveys conducted with managers and practitioners involved in organisations were statistically analysed to determine the relationship of Innovation Capabilities, Knowledge Management Capabilities and

Organisational Capability Efficiency. This was achieved by using factor analysis and structural equation modelling (SEM).

1.9.2 Population

The target population consisted of all organisations including national government departments, state-owned enterprises and listed SA companies that are engaged in innovation and knowledge management in South Africa.

1.9.3 Sample and sample size

No sampling was done in this study because the researcher conducted a census survey. The researcher did not know how many employees who qualified were in each of the organisations. Two hundred and ninety one (291) respondents correctly completed the questionnaires used for the analysis. Suhr (2004: 200) recommends that for factor analysis (which is a statistical technique used in this study), "the minimum sample size for reliable results is at least 100 observations". The unit of analysis for this study was the innovation and knowledge management employee in an organisation.

1.9.4 Data collection methods

A survey method was used and a semi-structured questionnaire was emailed to and self-administered by the respondents. The questionnaire was also posted online and a link was sent to the participants requesting them to access and complete the questionnaires. The deadline was communicated to the respondents. Data was retrieved from the website on a daily basis.

Steps were followed to make sure that the questionnaire design complied with the guidelines for an effective and efficient questionnaire (such as avoiding vague, ambiguous, or leading questions; avoiding double barrelled questions and negatives; and ensuring that questions are in accordance with research objectives, etc.). The questionnaire was aligned to the topic, statement of the problem, the research questions and the research objectives. Mainly closed-ended questions were utilised to gather information from the respondents.

1.9.5 Reliability and Validity of data

According to Leedy and Ormrod (2015: 116) reliability is defined as the consistency with which a measurement instrument yields certain, consistent results when the unit being

measured hasn't changed. Internal reliability of quantitative data is a measure of stability and consistency in a measurement. This can be established by managing an instrument more than once and relating the results, or by utilising a statistical process that specifies the degree of consistency (Mertens, 2009: 234). Salkind (2009:50) defines validity as the degree to which the test instrument the researcher uses actually measures what he or she intended to measure. The five-point Likert scale was used; whereas Creswell (2014: 201) describes it as dependability, authenticity and credibility of the findings. The author goes on to say that one way to enhance the validity of the findings is to use rich, thick explanations to convey the findings (Creswell, 2014: 201).

The questionnaire instrument was pilot tested to review and confirm the relevance of the concepts and ideas, their clarity and suitability, and the overall completeness of content.

The gathered data were captured and stored in a database for analysis, together with the traceable sources to ensure dependability of the data gathered. Appropriate data-mining and statistical software was chosen to ensure integrity, reliability and accurate recording of the data and analytical results.

Statistical techniques were conducted with the survey results to provide a reliable criterion for accurate and conclusive findings. A statistician was consulted to ensure authoritative and reliable results were achieved. Acquiring an understanding from multiple organisations ensured that the results of the study provided insight into the problem under investigation, which may apply to a broader population of organisations practicing innovation and knowledge management.

Saunders, Lewis & Thornhill (2000) speaks about researcher and respondent bias as a major weakness when considering data quality issues. To ensure greater reliability and validity, questionnaires were used to gather information in the study. Cronbach Alpha was used to test the internal reliability of the constructs in the research instrument. The questionnaires were designed to avoid bias in the way the items and questions were presented. When the questions were drawn up the possibility of influencing the responses was considered.

The purpose and type of information requested were fully explained to the respondents through e-mail correspondence. Furthermore, the participant's right to not answer any questions was accentuated. All attempts were made to permit the questions being clearly phrased. Each questionnaire was clearly marked with the name of the respondent, the date and place, and any other relevant details for verification of the source of information.

In addition, to meet the validity and reliability requirements, the following steps were undertaken in this study:

- Practitioners in the field were requested to remark on the adequacy and applicability of the research instrument relative to the research objectives.
- The Likert Scale type questionnaire was used, which is considered to be an appropriate and relevant instrument in research.
- The researcher used only completed questionnaires, where all questions were answered.
- To encourage the respondents to participate, the importance of the research was explained to each respondent telephonically and also described in the cover letter. The main definitions of the study were also described on the questionnaire to exclude the possibility of ambiguity.
- The questions used in this research were adapted from existing related studies (Aujirapongpan et al., 2010; Kumar et al., 2013), which placed a prominence on ensuring the requirements of validity and reliability.

1.9.6 Data analysis techniques

Firstly, descriptive statistics were used to describe each variable in the questionnaire. According to Welman, Kruger & Mitchell (2005:89), descriptive statistics is related to the narrative and summary of data in the practice of frequency tables, graphs and measures of central tendency.

In addition to using the descriptive statistical methods termed as means, medians and standard deviations, the following statistical techniques were utilised in this research (Creswell, 2012; Hox and Bechger, 2001):

- Assumptions of the various statistical techniques were adhered to, which could include normally distributed variables.
- Pearson's correlation coefficient, which indicates the strength and the direction of the relationship between variables, was used.
- Exploratory Factor Analysis (EFA) was used to deduce the dimensions in the data and assess the construct validity of the research instrument.
- Confirmatory Factor Analysis (CFA) was used to verify the factor structure of the variables and to test the Hypotheses.
- Assessment of internal reliability of the constructs in the research instrument was done by using Cronbach Alpha.
- Structural Equation Model (SEM) was constructed and analysed using a statistical package for multivariate analyses.
- Regression Analysis was used to analyse the relationship between a single dependent variable and several independent variables.
- Path Diagrams was used to summarise SEMs.

Correlation matrix was used to statistically analyse the overall relationship of Innovation Capability, Knowledge Management Capability and Organisational Capability Efficiency (Creswell, 2012). This was important to show significant coordination and interrelatedness among Innovation Capability, Knowledge Management Capability and Organisational Capability Efficiency.

For inferential analysis, the quantitative data analysis was conducted using multivariate statistical analysis, more specifically factor analysis, which is suitable for this research due to its factorial and dimensional constructs. Kaizer-Meyer-Olkin measure of sampling adequacy (KMO-test) was used to check if the sample for the research was big enough. In general, factor analysis can be used to prove that an interaction occurs when the effect of one factor modify across levels of another factor, meaning, the simple main effects of one factor vary across levels of another (Palmquist, 2009). The purpose of factorial analysis discovers patterns in the relationships among the variables (Gorsuch, 1983). One of the main applications of factor analysis, which is to examine theoretical structure (Gorsuch, 1983), supported the objectives of this study, which was to examine the relationships

between Innovation Capability, Knowledge Management Capability and Organisational Capability Efficiency.

1.10 Ethical Issues

As the research advanced, it was important to preserve and build upon the relevant literature and models of existing theories, pragmatic applications and new insights.

The University of South Africa's (UNISA) ethics policy for research was adhered to. An ethics clearance number of 2017_SBL/DBL_014_FA was received from the UNISA SBL ethics committee before the research was conducted (Refer Annexure A).

The confidentiality of the information provided was secured and respected to ensure non-malfeasance. In addition, the following key ethical issues were adhered to across all stages of the research:

- The manner in which the research was used, analysed and reported on the data did not discredit, cause harm or create negativity towards the participants.
- All work was clearly referenced to preclude possible plagiarism.
- Research information was not falsified.
- This research did not condemn research undertaken by others, but attempted to offer valuable criticism.

1.11 Significance of the Study

Implementing Innovation Capability and Knowledge Management Capability in organisations is complex and highly corporate resource intensive (Walker and Christenson, 2005; Kühl and Cunha, 2013; Aujirapongpan et al., 2010). Conversely, if Innovation Capability and Knowledge Management Capability are coherently aligned/synthesised for implementation, it will allow managers and practitioners to optimise on organisational capability investments and prioritise implementation of organisational capability in order of importance and affordability. Additional derived benefits may include reduced redundant effort, common strategies, optimising highly scarce and skilled resources,

increased knowledge development and organisational learning, collaboration and developing capability gaps.

To the researcher's knowledge there is limited research of the relationship of Innovation Capability, Knowledge Management Capability and Organisational Capability Efficiency. Consequently, if the research study is published, it will contribute to the literature by examining the effect of alignment/synthesise of Innovation Capability and Knowledge Management Capability on Organisational Capability Efficiency. In addition, a conceptual framework was developed for the aligned/synthesised implementation of Innovation Capability and Knowledge Management Capability that would assist managers in organisations in leveraging these organisational capabilities through the understanding of its underlying constructs and to ultimately attain Organisational Capability Efficiency.

The following budget provisions were considered:
Audio-tape
Editor
Transport and accommodation
Stationary
Printing costs
Statistician service
Statistics Analyses Software (SPSS)

1.12 Research Plan (Chapter-by-Chapter Summary)

1.12.1 Contextualising the study

The objective of Chapter 1 was to contextualise the study by providing an appropriate introduction and defining the background to the study of INNO, KMC, Alignment and OCE. The research problem, aims and objectives of the study were also presented.

1.12.2 Literature review

Chapter 2 discusses the theoretical aspects of innovation, knowledge management, INNO, KMC, OCE, strategic alignment and organisational capability that is related to the study.

The dilemma for the charismatic organisation, such as costly resources and diversity of capability which is required when implementing homogenous initiatives such as innovation and knowledge management, was discussed. The alignment theory and its positive aspects in theoretical frameworks were reviewed. Factors that affect Innovation Capability, Knowledge Management Capability and Organisational Capability Efficiency were identified. A Structured Equation Model (SEM) aligning KMC, INNO and OCE was developed using the constructs that emanated from the literature.

1.12.3 Research design and methodology

Chapter 3 provides the opportunity to present the structure of the research methodology. It justifies the chosen research design and approach by referring to literature from prominent research methodology authors. Aspects such as research design, research methodology, and research target population and sample size, data collection method, research instrument, research data, statistical analysis methods, validity and reliability, data analysis and limitations of the research were considered.

1.12.4 Data analysis and discussion of research results

Chapter 4 presents the data analysis and a discussion of the research survey's results undertaken to gather data on Innovation Capability, Knowledge Management Capability and Organisational Capability Efficiency. The statistical approach was aligned to the research methodology in Chapter 3. An analysis and interpretation of the data were presented.

1.12.5 Discussion, conclusions and recommendations

Chapter 5 presents the findings, as well as the outcome of the main research objective and the specific literature and empirical objectives. The developed conceptual framework is presented. The original contribution to the body of knowledge, benefits and recommendations of the study are also presented.

1.13 Chapter Summary

The chapter has successfully introduced the topic and positioned the issues that the study intended to research. The problem statement was discussed and justified. The objectives have been developed. The research methodology was briefly outlined without any detail (detail is provided in chapter 3).

An examination into the relationship of Innovation Capability and Knowledge Management Capability and its link to Organisational Capability Efficiency will assist stakeholders, managers and strategists in the organisations to integrate and appropriately invest and prioritise in the implementation of Innovation Capability and Knowledge Management Capability. Therefore, it was essential to undertake an extensive literature review of innovation, knowledge management, organisational capability, Innovation Capability, Knowledge Management Capability, Organisational Capability Efficiency and alignment theory in Chapter 2.

Chapter 2: Literature Review

2.1 Introduction

In a competitive business environment, innovation (Kör and Maden, 2013; Kühl and Cunha, 2013) and knowledge management (Fan, Feng, Sun & Ou, 2008) are progressively becoming strategic imperatives, providing long-term benefits for the organisation. As such there is an increasing necessity for Innovation Capability and Knowledge Management Capability in organisations. However, the capabilities required for these strategic imperatives are gradually depleting and are becoming scarce and expensive. In spite of this, these strategic imperatives are often isolated or departmentalised in implementation, since there seems to be limited theory that has synthesised Innovation Capability and Knowledge Management Capability. As expounded in literature, the antecedents of Innovation Capability and Knowledge Management Capability, which are innovation and knowledge management respectively, are often intimately intertwined in theory (Kör and Maden, 2013; Souza and Bruno-Faria, 2013). Consequently, it was viable to see the impact on Organisational Capability Efficiency when aligning/synthesising Innovation Capability and Knowledge Management Capability, so that organisations could benefit by manoeuvring, leveraging and optimising on technology platforms, infrastructure, resources and capability.

Towards this goal, the chapter briefly reviewed the existing literature on the interests and definitions of innovation and knowledge management since they are the antecedents of Innovation Capability and Knowledge Management Capability respectively. A detailed literature review and construction of the relationship of Innovation Capability, Knowledge Management Capability and Organisational Capability Efficiency from existing theory was undertaken to formulate a proposed conceptual framework for investigation and analysis to draw conclusions on: What is the effect of alignment of Innovation Capability (INNO) and Knowledge Management Capability (KMC) on Organisational Capability Efficiency (OCE)?

2.2 The Interest of Innovation, Knowledge Management and Organisational Capabilities as a Business Practice

There has been increased observation in innovation and knowledge management in recent years, with many knowledge-driven organisations adopting both these practices as strategic imperatives (Kumar et al., 2013; Kör and Maden, 2013). Primarily the focus of the study is on Innovation Capability (INNO), Knowledge Management Capability (KMC) and Organisational Capability Efficiency (OCE); however it is essential to briefly discuss their antecedents of innovation, knowledge management and organisational capability respectively to form a sound basis of the fundamentals and to appropriately contextualise this study.

2.2.1 Innovation

There have been numerous studies on innovation and as such there has been many definitions given to innovation. In the 1990s Porter (1990) suggested that innovation is the centre of long-term viable competitive gain (Slavkovic and Babic, 2013: 91). Innovation is the knowledge practice that converts knowledge into new products and services (Wilson, 2007: 183). Innovation has been also characterised as a practice that encompasses organisational learning, with a certain degree of ambiguity and intrinsic probability for transformation, based on people expertise, technology advancements and organisational cultural elements, necessitating the elucidation of problems during its enactment (Souza and Bruno-Faria, 2013: 108-129). Innovation is sometimes described as the improvement and application of novel ideas by experts who engage in transactions over time with others within the organisation (Podrug, Filipović & Kovač; 2017: 632).). Applicably, this study will adopt the definition by Kör and Maden (2013: 293) whereby innovation is seen as the generation, improvement and implementation of something novel in the organisation as well as the development of original products, services, know-hows, methods, technologies, administrative systems or structures.

2.2.2 Knowledge Management

Ever since the 1990s, knowledge management has been the theme of concentrated studies conducted by academics and professional business individuals and what is important is that it provides competitive advantage, organisational performance, organisational survival,

profitability and long-term benefits for organisations (Slavkovic and Babic, 2013: 86; Omotayo, 2015). There are various definitions of knowledge management that have come forth from theoretical study. Strategically, knowledge management has been defined as a motivating process of categorising and leveraging individual and collective organisational knowledge for organisations to contend more successfully (Bosua and Venkitachalam, 2013: 331). Another meaning given to knowledge management is that it is a managing task that improves knowledge sharing and delivers accessible knowledge, know-how, experience, and proficiency (Kör and Maden, 2013: 294). According to Kör and Maden (2013: 294), knowledge management is a business process that shares the conception of new knowledge and warrants the use of knowledge within the organisation when it is required.

More relevant to this study, academics have theorised that knowledge management encompasses a diverse continuum of activities, intended to empower management for the exchange, creation and development of intellectual assets within an organisation (Halawi, Aronson & McCarthy, 2005: 75). Knowledge management can also be seen as a discipline and role in which knowledge is generated, developed, stored, collaborated, codified and utilised through an aiding environment to proliferation innovation and organisational performance. (Andreeva and Kianto, 2011: 1016–1034). According to Beijerse (1999:102) ‘knowledge management is realising the strategic organisational goals which are ultimately inspired by incentive and enablement of knowledge workers to cultivate and enhance their capability to interpret data and information by consuming accessible sources of information, knowledge, abilities, culture, character, personality feelings, etc. through an advancement of providing meaning to the data and information. Due to the plethora of definitions, according to Tsui (2000) there is still no universally acknowledged definition for knowledge management. In the context of this study knowledge management can be defined as a discipline, capability or organisational practice that creates, share, store, interprets and transforms information or knowledge from sources of experience, skills, repositories, technology, experts, communities of practices, lessons learnt and intellectual assets enabling the environment to proliferate innovation and Organisational Capability Efficiency (Andreeva and Kianto, 2011: 1016–1034; Kör and Maden, 2013: 294; Beijerse, 1999:102; Halawi, Aronson & McCarthy, 2005: 75).

2.2.3 Organisational Capabilities

Organisational capability academics have shown that the prominence of capabilities to organisations nowadays is considerably superior than it was previously, as a consequence of the relatively open and varied bases of innovation that is nowadays accessible to organisations (Teece, 2000: 35). According to Chung, Wang, Huang & Yang (2016), organisations largely overlook internal factors such as organisational capabilities. Durmus-Őzdemir and Abdukhoshimov (2018: 597) describes organisational capabilities as a complex knowledge system that comprises of the technology system, managerial system and the value system of the organisation.

2.3 Dilemma for the Charismatic Organisation

As mentioned before, the organisational practice of both innovation and knowledge management is complex and resource intensive (Kühl and Cunha, 2013; Aujirapongpan et al., 2010). Nonetheless, organisations are expected to exploit their organisational capabilities to successfully confront emerging technologies, empowered knowledgeable customers and globalisation which compel the organisations to implement strategic imperatives such as innovation and knowledge management (Ukko and Saunila, 2013).

Regardless of the costly resources and diversity of capability required because of the multifaceted nature of innovation and knowledge management (Souza and Bruno-Faria, 2013; Bogner, Thomas, & McGee, 1999), organisations have accelerated the adoption of these strategic imperatives as critical components to gain competitive advantage (Slavkovic and Babic, 2013; Bosua and Venkitachalam, 2013). However, this has been done to the degree of experiencing inter-departmental integration, impairing cooperation between departments, ineffective communication, shortage of knowledge and skills, ineffective use of financial resources due to duplicated efforts and lack of technology resources (Souza and Bruno-Faria, 2013). According to Venus Lun, Shang, Lai & Cheng (2016), implementation of innovation to attain customer needs and market requirements is closely related to organisational capability, whereby it possibly will also experience higher operating costs.

In addition, due to the homogeneous characteristics of Innovation Capability and Knowledge Management Capabilities, there is the probability of duplicated and redundant

activities, the brawl for similar resources and capabilities in the organisation, inappropriate consulting, and partnership contracts to fill the capability gap (Souza and Bruno-Faria, 2013; Jay, 2013). Adding to the quandary, an organisation has to deal with other strategic imperatives that are homogeneous in nature, such as centre of excellence (COE). Walker and Christenson (2005) describe centre of excellence as a strategic initiative that facilitates and enables organisations to better exploit communities of practices to flourish and augment knowledge transfer and, through individuals sharing opulent visions, allow their staff to increase knowledge and wisdom.

Furthermore, Martinez-Conesa, Soto-Acosta & Carayannis (2017: 553) states that when organisations implement innovation processes, there is a heightened possibility of disappointment in dealing with the dissimilar knowledge processes, since knowledge processes require an integrative knowledge management. Martinez-Conesa (2017: 553) further suggests that an organisation should desire to reconfigure and realign its knowledge management capabilities to suitable changing environments, which supports the importance of the current study.

The acceleration through which original products, processes and services are accomplished, forces competitive organisations to produce and implement fresh management practices, structures and tools to adjust to the prevailing situations or anticipated change (Souza and Bruno-Faria, 2013: 108-129). In this sense, the capability to innovate (Souza and Bruno-Faria, 2013); the capability to manage the data, information and knowledge (Kör and Maden, 2013) in a manner that would provide organisational capability efficiency, is central for the success of organisations, therefore, it is strategic to shape long-term advantages in relation to competitors (Souza and Bruno-Faria, 2013).

Moreover, the emergence of innovation and knowledge management as disciplines in the early 1990s attracted considerable interest, both in theory and practice (Slavkovic and Babic, 2013; Lambe, 2011). Increasingly, knowledge-driven organisations have been intensively investing in innovation and knowledge management strategic imperatives and capabilities when endeavouring to manage the business knowledge assets, knowledge development, knowledge sharing and knowledge leveraging processes, knowledge

networks and communities of practice infrastructure. However, this has been done discretely even though there might be areas of overlap as the theory suggests (Souza and Bruno-Faria, 2013; Wuryaninggrat, 2013). As appropriately mentioned by Jay (2013), organisations conforming to homogeneous intuitional fields, such as innovation and knowledge management, may suffer inertia caused by the grappling of multiple influences and depleted organisational capability. Nevertheless, as indicated by organisational capability theorists, the prominence of capabilities for organisations today is much greater than it was previously; therefore, there is a snowballing necessity to promulgate the alignment of the capabilities of these homogeneous strategic imperatives to capitalise on optimum capability in the organisation (Teece, 2000).

Organisations should adopt a more systemic approach when implementing Innovation Capability and Knowledge Management Capability (Kör and Maden, 2013; Slavkovic and Babic, 2013; Bosua and Venkitachalam, 2013). The approach adopted by businesses should be to capitalise on capability that can be shared across the implementation of innovation and knowledge management. This necessitates an understanding by business of the synthesis of Innovation Capability and Knowledge Management Capability, encouraging their alignment to establish interrelatedness and to ultimately converge towards business advantage through the incorporation and sharing of strategy, infrastructure, knowledge and resource capability (Souza and Bruno-Faria, 2013; Jay, 2013). Consequently, it is imperative to review the theoretical definitions and existing models of Innovation Capability and Knowledge Management Capability, to possibly attain an alignment of these aspects to leverage on organisational capability when implementing these strategic imperatives.

2.4 Theoretical Aspects and Scope of the Study

Although there are segmented attempts by theorists to understand some relationships and certain aspects of Innovation Capability, Knowledge Management Capability and Organisational Capability Efficiency, it is important to derive a systemic conceptual framework that would assist organisations to overcome the homogenous inertia by comprehensively understanding the alignment of these strategic imperatives and their complete resource-based and knowledge-based capabilities (Lin et al. 2013). Ultimately, organisations would benefit in economising on capability, mobilising existing resources

appropriately, determining resource gaps and redundancies across domains and building an optimal capability for the future (Lin et al. 2013). The scope of this study is limited to the constructs of Innovation Capability, Knowledge Management Capability and Organisational Capability Efficiency.

2.4.1 Innovation Capability

Innovation Capability can be seen as the organisations ability to produce, adopt and implement new concepts, thinking, methods, products or services and remains one of the crucial resources that drives an organisations success in the marketplace (Wang and Dass: 2017: 127). Researchers have found that organisations can develop Innovation Capabilities in numerous ways, encompassing investment in research and development, attaining knowledge from several stakeholders, developing a market and learning orientated culture and increasing knowledge sharing within the organisation (Wang and Dass: 2017: 127).

2.4.2 Knowledge Management Capability

Knowledge Management Capability is the ability of an organisation to obtain, generate, transfer, integrate, share and apply knowledge associated assets and activities across functional limitations to produce new knowledge for the organisation (Chuang, 2004).

2.4.3 Organisational Capability Efficiency

There is scarce formal definition found of Organisational Capability Efficiency that is described in literature. A synthesise of the Itami and Noto (2007: 132) and Hamel and Prahalad (1992: 79-91) contribution can define Organisational Capability Efficiency as the economising, mobilising, determination of gaps, reduced redundancy and optimising of organisational capability.

2.4.4 Resource-based and Knowledge-based Capabilities

This study will adopt both the resource-based perspective and the knowledge-based perspective which are complementary to determine the interrelatedness of Innovation Capability and Knowledge Management Capability (Theriou, Aggelidis and Theriou, 2009). The resource-based view understands the organisation as an ownership or amalgamation of resources and capabilities which are valuable, rare, inimitable and non-substitutable that has the ability to provide the organisation with a viable competitive gain

(Amit and Schoemaker, 1993: 17; Barney, 1991). The resource-based capability, which originated from strategic management literature, highlights organisations resources that deduce tangible and intangible assets, i.e. land, buildings, instruments, the organisational management structuring system and organisational culture (Aujirapongpan et al., 2010). Resources, in this understanding, are described as stocks of available elements that are owned or perhaps measured by the organisation. These resources are converted into ultimate products or services by focusing a varied range of other organisations assets and connecting capabilities such as technology, management information systems, reward systems, and reliance between the organisations management and employees (Amit and Schoemaker, 1993: 17; Barney, 1991).

Comparably, the knowledge-based view suggests that the manner in which to acquire competitive advantage is through the organisations capability to generate, manage and retain knowledge (Nonaka and Takeuchi, 1995). In the knowledge-based age, knowledge is regarded as the main strategic resource for organisational existence, solidity, development and expansion (Hassan and Al-Hakim, 2011). This refers to resources that are essential to an organisation's capacity to produce innovation and fundamental in the growth of new products. Connecting with other organisations, intra-organisational learning, and an organisation's culture are practices that, when pooled together, form a capability that supports the organisation to integrate, reconfigure, increase, and exploit their knowledge resources and assets (Leonard-Barton, 1992: 111). To nurture innovation, the amalgamations of processes that an organisation is depended upon are essential to allow the acquisition, sharing and integration of knowledge over a period of time (Teece and Pisano, 1994; Kogut and Zander, 1992). Inter-organisational alliance in the practice of connecting with other organisations, and intra-organisational learning in the method of knowledge interchange amongst the organisation's workers, are processes that support organisations in their probe for understanding. This method gives special prominence on intangible assets i.e. expertise, learning and knowledge (Aujirapongpan et al., 2010).

2.4.5 Alignment Theory

Academics frequently emphasise alignment's positive aspects in theoretical frameworks and empirical research. Alignment research largely focuses on firm performance such as improved sales revenue, better operational efficiency, cost reductions, and superior

customer value (Gerow, Grover, Thatcher & Roth, 2014). Consequently, several synonyms for alignment have been used in literature, which includes strategic alignment, integration and linkage (Jelonek, 2013: 116). As supported by Camio, Romero, Alvarez, & Rébori, (2018:4) that a superior degree of organisational assimilation may improve the harmonisation, preparation and enactment of innovation strategies. Dobni (2008: 539-559) also maintains the idea that it is essential that the innovation vision be aligned with other strategic components. More applicable to the current study, Jelonek (2013: 116) describes alignment as a concept of "synergy", which is the formation of the whole that is greater than the sum of its parts. The researcher further states that synergy means the combined effect that influences different practical or experimental domains (Jelonek, 2013). The synergistic effect is observed when the interaction of at least two factors affecting a particular performance in a system yields the effect which is greater than the sum of the effects of individual factors that affect the system independently (Jelonek, 2013). The foremost focus of further investigations discussed in the current paper is on the synergistic effect when combining Innovation Capability and Knowledge Management Capability, which translates directly into improved Organisational Capability Efficiency.

The major trends of alignment in the literature are conceptual definitions of alignment, operational definitions of alignment, and measurement models and constructs of alignment (Jelonek, 2013). This study specifically adopts the constructs of alignment approach to construct a conceptual framework, to determine what the combined effect of Innovation Capability and Knowledge Management Capability on Organisational Capability Efficiency (Jelonek, 2013).

2.5 The Link of Innovation and Knowledge Management

Although the study is limited to constructs of Innovation Capability, Knowledge Management Capability and Organisational Capability Efficiency, it is relevant to understand the interest and development in research of its antecedents, i.e. innovation and knowledge management. There has been both academic and business interest in both innovation and knowledge management as a means to competitive advantage with research inclusive of knowledge creation, creative industry, Innovation Capability and open innovation (Godin, 2012; Heisig, 2014). Interestingly, there has also been research undertaken to investigate the alignment of innovation and knowledge management.

2.5.1 Innovation Studies

Godin (2012: 397) mentions that from the early 1900s anthropologists, sociologists, historians and economists began theorising about innovation, each from his own perspective. In the twentieth century innovation had become a very popular concept due to it being a key source of organisational growth and profitability. There are various studies of types of innovation such as organisational innovation, which are administrative and technical, product and process, and radical and incremental (Damanpour, 1991: 555-590; Gopalakrishnan and Damanpour, 1997:15-28). Globalisation and the increase in knowledge-based organisations have increased the theoretical and empirical interest into the integration of innovation with other organisations disciplines such as the organisations strategy process (Dobni and Sand, 2018:797) and knowledge management (Chen & Huang, 2009: 104-114). The research by Dobni and Sand (2018:797) presents a framework that delineates the interdependency of innovation and strategy and formerly outlines the role of top management to constantly renew the positioning of the organisation. This framework offers guidance that business leaders can practice to embrace innovation into their strategy process. More related to this study, since innovation is an antecedent to Innovation Capability, knowledge management is expected to impact or influence all types of innovation (Huang & Li, 2009: 285-301; Chen & Huang, 2009: 104-114).

2.5.2 Knowledge Management Studies

Since 1990, knowledge management is no more purely a science of organisational management, with the prominence on technological and networking applications, but a new science to which the world's prominent global organisations have specified paramount importance and persistently made available efficient knowledge management improvement methods, which was imperative to allow practitioners, including the proliferation in productivity and organisational innovations (Aujirapongpan et al., 2010: 1). A study by Ponis, Vagenas and Koronis (2012: 40) identifies at least 34 knowledge management frameworks that have been developed that are categorised towards either the application of intellectual capital, processes, information technology or holistic. There has been various research on the components of knowledge management (knowledge, people, process and technology), dimensions of knowledge (embodied, embedded, embrained, encultured and encoded), the processes of knowledge management (creation, organisation, sharing and application) (Omatayo, 2015:3).

Heisig (2014) in his study using a sample of 222 knowledge management experts from 38 countries determined that the prominence of future knowledge management studies in the following categories are: business outcome, human and social factors, strategy, knowledge management processes, technology enablers, organisational environment, knowledge economy, knowledge society and interestingly organisational capabilities, which is the focus of the current study. In the same study many experts see knowledge management closely related to innovation, which is the view of this study, but more pertinent to organisational capabilities.

2.5.3 The relationship of Innovation and Knowledge Management Studies

Academics have seen the benefits to organisations by observing the link between innovation and knowledge management. Moreover, there are a few studies that have concentrated on the relationship between innovation and knowledge management, since knowledge and innovation were valuable assets that equipped the organisation with a competitive advantage (Durmus-Őzdemir and Abdukhoshimov, 2018: 597). Likewise, Durmus-Őzdemir and Abdukhoshimov (2018: 596-608) explores the mediating role of innovation in the effect of the knowledge management process on performance. The research provides guidance into how organisations can manage their knowledge to attain competitive advantage grounded on innovation efforts.

The study undertaken by Kör and Maden (2013: 293-304) examines the relationship between effective knowledge management processes and innovation categories in organisations. Supplementing the current research, the study concludes that knowledge management practices relate positively to innovativeness (Kör and Maden, 2013: 293). Knowledge management augments commitment in innovation by producing, consuming and sharing new concepts and utilisation of the organisation's intellectual influence and is a crucial precursor to embracing and applying different forms of innovations in the organisation (Kör and Maden, 2013: 294). The study was knowledge-centric and according to Kör and Maden (2013: 293) organisations must create, transform and manage knowledge in order to maintain the Innovation Capability. However, the study is limited to the knowledge management process capability and does not address the resource-based and knowledge-based capabilities. Therefore, it would be beneficial to see if this

relationship still exists when considering the additional variables of resource-based and knowledge-based capabilities. Moreover, the study is limited to the innovation initiative processes only, and does not investigate how the Knowledge Management Capabilities influence the entire Innovation Capabilities, such as strategic capability, ideation capability, implementation capability and commercialisation capability (Kumar et al., 2013).

Similarly, Slavkovic and Babic (2013: 85-107) analyses the effect of knowledge management on innovativeness. The outcomes indicate that knowledge management is positively related to the diverse dimensions of organisational innovation, for example, process innovation and administrative innovation. The study is restricted to the process capabilities of knowledge management and innovativeness and does not address the resource-based and knowledge-based capabilities of the organisation. The study's findings reveal that enhancement in the processes related to knowledge management also means highlighting innovation programmes in the organisation.

On the other hand Wuryaningrat (2013) examines how knowledge sharing could possibly be transformed into Innovation Capabilities. The study gives a better understanding of the prominence of knowledge sharing for enhancing absorptive capacity and Innovation Capabilities. In addition, Lin et al. (2013) observes the effect of learning capability on innovation. The results of the study show that the amalgamation of these practices has a greater effect on innovation. However, this study is restricted to the learning capability of knowledge management and determines its impact on innovation.

Podrug et al. (2017) distinguishes knowledge sharing and the organisations Innovation Capability in Croatian companies. The results of the empirical research point to the enjoyment in helping others as an individual factor, top management support as an organisational factor and Information Communication and Technology (ICT) use as a technology factor significantly influence the knowledge-sharing processes of the organisation. The result furthermore suggests that the willingness of employees to donate and gather knowledge enables the organisation to improve Innovation Capability. From a practical standpoint, the relationships between knowledge-sharing enablers, processes, and

organisational Innovation Capability could offer a guide concerning how organisations can stimulate knowledge sharing cultures to improve their innovation performance.

The study by Martinez-Conesa et al. (2017: 553) provides insight on the internal and external antecedents of open innovation (OI) in the context of small- and medium-sized enterprises (SMEs), with emphasis on the role of Knowledge Management Capability. The research evaluates the effect of internal factors on Knowledge Management Capability; the impact of organisational and external factors, namely, Knowledge Management Capability and environmental dynamism, on Open Innovation; and if environmental dynamism moderates the relationship between Knowledge Management Capability and Open Innovation. The outcomes of the research endorse that information technology-supported operations and commitment-based human resource practices have a positive and significant effect on Knowledge Management Capability. The study supports the notion that Knowledge Management Capability plays a critical role in the implementation of innovation. However, the study does not address Innovation Capabilities and Knowledge Management Capabilities in detail, and it does not consider how these strategic imperatives affect Organisational Capability Efficiency.

Al-Hakim and Hassan (2016) examines the association among core requirements of knowledge management implementation, innovation, and organisational performance. Interestingly, the research outcome indicated that core requirements of knowledge management implementation had a direct positive effect on innovation. Al-Hakim and Hassan (2016: 112) also mentions that there have been a few empirical studies that have observed the relationship between knowledge management and innovation. This supports the idea to provide organisations with a better appreciation of the relationship between knowledge management and innovation, especially their capabilities, which was the focus of the current study.

There have been studies that have confirmed the positive impact of knowledge management processes, practices, and infrastructure on innovation (Du, 2011; Al-Husseini and Elbeltagi, 2015). For instance, Shujahat, Sousa, Hussain, Nawaz, Wang & Umer (2017:1) investigate the mediating role of knowledge worker productivity between

knowledge management process and innovation. The outcome of the research indicates that knowledge worker mediates between only two knowledge management processes, i.e. knowledge creation and knowledge utilisation and innovation. The role of the Knowledge worker to advocate knowledge management practices in the work place has been restricted, since it relies heavily on an individual's capacity rather than a composite of resource-based and knowledge-based capabilities enabling the organisation to create, transform, store, retain, collaborate and disseminate knowledge at real-time or efficiently for decision making or the development of knowledge.

It is evident that many researchers have thus far maintained that the effective management of knowledge leads to organisational innovation and some organisations view knowledge management as an important antecedent of adopting and implementing innovation whereby knowledge improves engagement in innovation through creating, utilising and collaborating new ideas and exploitation of the organisations intellectual authority (Kör and Maden, 2013:294).

Table 2.1: Summary of Knowledge Management and Innovation research models

Author / Study	Findings	Gaps
Durmus-Őzdemir and Abdukhoshimov (2018: 596-608) explores the mediating role of innovation in the effect of the knowledge management process on performance.	The research determines how organisations can manage their knowledge to attain competitive advantage based on innovation efforts.	The study is limited to innovation, knowledge management process and performance.
Kör and Maden (2013) examined the relationship of effective knowledge management processes and innovation types in organisations.	The research found that knowledge management processes relate positively to innovativeness.	The study only addresses the knowledge management process impact on innovation and does not deal with the infrastructure and knowledge capabilities.
Wuryaningrat (2013) examines how knowledge sharing, a knowledge management process can be transformed into innovation capabilities.	The research provides an understanding about the importance of knowledge sharing for improving absorptive capacity and innovation capabilities.	The study lacks an understanding of the relationship of knowledge management capability on innovation capability.
Slavkovic and Babic (2013) analyses the impact of knowledge management on innovativeness	The study concludes that knowledge management is positively related to the different dimensions of organisational innovation.	The study is limited to the process capabilities of knowledge management and does not attend to how the overall knowledge management capabilities impact innovation capabilities.

Lin et al. (2013) Managing the Exploitation/Exploration Paradox: The Role of a Learning Capability and Innovation Ambidexterity	The study determines the impact of learning capability on innovation.	Is limited to the learning capability of knowledge management. It does not address the composite of capabilities found in knowledge management and innovation.
Podrug et al. (2017) Knowledge Sharing and firm innovation capability in Croatian companies	The outcome of the empirical research determines that the enjoyment in helping others as an individual factor, top management support as an organisational factor and ICT practice as a technology factor significantly influence knowledge-sharing processes. The research findings also suggest that the willingness of employees to donate and collect knowledge enables the organisation to improve innovation capability.	This study only addresses knowledge sharing capability.
Martinez-Conesa et al. (2017) Open innovation: assess the role of KMC & environmental dynamism in SMEs	The research confirms that information technology-supported operations and commitment-based HR practices have a positive and significant influence on KMC. The study supports the notion that KMC plays a critical role for the implementation of innovation.	The study does not address INNOs and KMCs in detail, and it does not consider how these strategic imperatives affect OCE.
Al-Hakim and Hassan (2016) investigates the Core Requirements of KM implementation, innovation & organisational performance.	The results indicated that core requirements of KM implementation had a direct positive effect on innovation	The study does not address INNOs, KMCs and OCE.
Shujahat, Sousa, Hussain, Nawaz, Wang and Umer (2017) investigate the mediating role of knowledge worker productivity between KM process & innovation.	The research outcomes confirm that knowledge worker mediates between two KM process (knowledge creation and knowledge utilisation) & innovation.	The study does not address INNOs, KMCs and OCE.

It is quite apparent from the above mentioned studies, that the increased researches on innovation, knowledge management, Innovation Capability and Knowledge Management Capability especially in the last two decades have derived a number of concepts, frameworks and models and knowledge management can be seen as strategy to foster innovation. Still, another viewpoint is that some experts may view organisational capability as important and some most important for the success of knowledge management or innovation in the organisation (Heisig, 2014).

However, there seems to be limited theory that has attempted to align Innovation Capability and Knowledge Management Capability that would assist the organisations during implementation.

2.6 The Homogenous Behaviour of Innovation Capabilities and Knowledge Management Capabilities

As can be seen from literature the implementation capabilities of innovation and knowledge management can be seen as similar or some cases identical, thus described as homogenous. Nevertheless, many organisations that implement Innovation Capability and Knowledge Management Capability do so in an isolated approach (Shafique, 2012). Besides, there are many theoretical studies that confirms the multifaceted nature of innovation and knowledge management in organisations, which has often created redundancy, overlap and sometimes even has a spiralling effect on organisational resources and capabilities (Kör and Maden, 2013, Shafique, 2012; Souza and Bruno-Faria , 2013). Therefore, organisations need to recombine or align interrelated capability across domains (Shafique, 2012). As suggested by Lin et al. (2013) organisations need to discover methods to combine practices and capabilities in means that will enable the synthesis, exchange, and application of learned knowledge through employees in the organisation. Following the resource-based and knowledge-based view, this might mean borrowing aspects, practices and capabilities, such as technology, structure, culture, information, expertise and learning from each of these strategic imperatives to optimise capability and reduce cost.

2.6.1 Technology

Discussions around technology have been prominent in innovation and knowledge management literature (Kör and Maden, 2013; Aujirapongpan et al., 2010). Kühl and Cunha (2013) acknowledge that the innovations are based on some technology and in some cases state-of-the-art technologies, while Kumar et al. (2013) maintain that an organisation's success in innovation depends on its ability to understand its technological environments. Similarly for knowledge management, implementation has been ubiquitous with technology utilisation of knowledge solutions, processes-automation, repositories, dashboards and databases (Kenney and Gudergan, 2006). Evidently, whilst technology plays a key role for these strategic imperatives, conversely it is complex and resource intensive, whether applied for operational capability or product development (Zhang, Garrett-Jones and Szeto, 2013). Thus, organisations will benefit if technology capability is converged for the sharing of knowledge bases, repositories, databases, content management, common information technology platform, technical communities of

practice, networks and solutions, where correlation is appropriate and justifiable (Walker and Christenson, 2005).

2.6.2 Structure

According to theoretical studies the structure capability is a realised benefit for innovation and knowledge management implementations. Literature describes a social structure for innovation (Kör and Maden, 2013) and an informal structure to enable knowledge creation and sharing for knowledge management (Reich, 2007). However, organisations are grappling towards maintaining structures such as communities of practices and social communities due to the inundated enquiry and consultation across departments, projects and teams.

In view of this, a study by Walker and Christenson (2005: 276) describes that structurally, knowledge networks social capital encompasses network ties, network configurations and applicable establishment for these networks, which forms a foundation for developing organisational memory as a valued strategic knowledge asset. Innovation Capability and Knowledge Management Capability teams within the organisation can have access to the same knowledge asset, as long as they are in the same formal or informal network. This supports the benefit to align Innovation Capability and Knowledge Management Capability for optimum organisational value.

Moreover, organisational structures are essential in encouraging organisations towards innovativeness, which improves sharing, collaboration, coordination, adaptability, flexibility and organisational agility if organisational structures are aligned appropriately (Kühl and Cunha, 2013; Kumar et al., 2013; Ukko and Saunila, 2013). Most importantly, the alignment of the organisations structural capability can create channels and link resources and activities between disciplinary groups and organisational units, such as innovation and knowledge management. This means that the entire organisation is up to date and interacting with information, new development, changes, risks and the competition (Reich, 2007).

2.6.3 Culture

The cultural features of learning, knowledge sharing and rewards is associated with both Innovation Capability and Knowledge Management Capability theory (Kör and Maden, 2013; Alavi et al., 2006). For example, Alavi et al. (2006: 191) explore how organisational culture influences knowledge management practices and conclude that those organisations capable of successfully managing their knowledge resources can anticipate rewards such as lower costs in individuals, improved customer service and infrastructure, innovation, improved decision making, better corporate agility, prompt creation of innovative product lines, problem resolution, and efficient adoption of best practices. Therefore, a cohesive cultural capability can increase openness, learning and the diffusion of knowledge for innovation and knowledge management processes in tandem in the organisation (Huang and Li, 2009). As suggested by Goh (2007: 335) in a knowledge economy, it's crucial to create strategic knowledge networks more than strategic business units. Aligning the implementation of Innovation capability and Knowledge Management Capability reduces distances between communities, and permits organisations to attain complete information control and economies of scale rather than isolated information assets for functional business processes.

2.6.4 Information and knowledge

A parallel interest in international business research, including areas in innovation and knowledge management, has focused information and knowledge as a strategic resource and asset (Kühl and Cunha, 2013). In organisations, innovation departments can manage and reward knowledge discoveries to ensure success (Wuryaninggrat, 2013) and the knowledge management unit can utilise the important information and knowledge as an intellectual asset and useful tool for the organisation (Kör and Maden, 2013). The question is: how do organisations purposefully synthesis and share their knowledge assets and capabilities across departments, teams and individuals without superior influence? This provides the need to demonstrate unequivocal value to stakeholders, individuals, communities, teams and individuals when aligning the process of knowledge creation, dissemination and reuse across domains and strategic imperatives in organisations.

In most organisations, the capability of an organisation to create innovative commercial culminations hinge on the business ability to properly manage its knowledge assets which

should have the characteristics of "transferability", for absorption by other units in the organisation such as knowledge management (Wuryaninggrat, 2013: 61). "Knowledge has always been a public good in this theoretical sense since it can be useful everyday by any person or organisation to a particular problem without eradicating the ability to apply the knowledge to some alternative use" (Rugman, 1980:26). For example, the emerging trends developed by Innovation Capability can be synthesised with Knowledge Management Capability in order of importance, providing a mutual benefit that is essential to a greater extent in organisations when undertaking resource intensive strategic imperatives such as implementation of Innovation Capability and Knowledge Management Capability.

2.6.5 Expertise

Likewise, the alignment of expertise capability in the organisation will improve coordination, management, response and retention of intellectual capital (Freeze and Kulkarni, 2007; Walker and Christenson, 2005). As highlighted by Reich (2007), teams could improve their performance by coordinating expertise. Equally, professionals are still challenged to utilise their expertise in training and development to recognise employees' needs, to know how they can contribute, to afford them with knowledge and resources, tools and systems, and to warrant their continued engagement (Conley and Zheng, 2009). According to the study by Walker and Christenson (2005: 275) the practice of knowledge creation and transfer within organisations is effective when communities participate together to resolve and answer complex problems. This process often involves a broad spectrum of experts. Consequently, when the experts participating in the implementation of Innovation Capability and Knowledge Management Capability collaborate and share information and know-how, organisations could ultimately benefit through optimisation, reducing and economising on organisational capability.

2.6.6 Learning

Learning is well-defined as the grouping of activities that endorse intra-organisational learning amongst workers, conglomerates with other organisations that allow the sharing of learning, and encourage an open culture inside the organisation that preserves distribution of knowledge (Lin et al., 2013: 262). It is evident from the literature that an organisation's learning capability is essential in the implementation of both Innovation Capability and Knowledge Management Capability (Tello-Gamarra and Zawislak, 2013; Hung Lien &

McLean, 2009). Knowledge Management Capability supports organisational knowledge (Hung et al., 2009), whilst an Innovation Capability requires intensive use of knowledge which is a result of a learning process (Tello-Gamarra and Zawislak, 2013). For example, if we synthesis the learning capability of both Innovation Capability and Knowledge Management Capability, the outcome learning material developed by the innovation environment can be categorised by the knowledge management department for educational dissemination and reuse by the organisation. The alignment will not only encourage appropriate learning that is related to the innovative process or product but, due to the innovative knowledge processing using the organisations Knowledge Management Capability, the organisation's competitive innovative knowledge intellect will be retained in the appropriate knowledge taxonomy of the organisation for retention, dissemination and transfer of knowledge. However, this cohesion and collaboration by units in the organisation is dependent on the synthesis of Innovation Capability and Knowledge Management Capability which could possibly require a framework that will guide organisations in the implementation.

2.7 The Concept of Alignment of Innovation Capability and Knowledge Management Capability

In practice innovation and knowledge management work-off each other, thus advocating a more prominent desire to align the implementation of Innovation Capability and Knowledge Management Capability. For instance, innovation is a practice the recombines prevailing knowledge comprising of implicit and explicit knowledge, in a manner for generating new innovative products or services (Del Giudice and Della Peruta, 2016: 484-498). Organisational innovation consequently shows that the vital role in guiding the design of knowledge management instruments for effectively executing knowledge management activities and in turn, a possible feedback to furthermore supporting organisational innovation (Laforet, 2013: 490-502).

While researchers have proposed some of the organisational practices of integrated processes of innovation and knowledge management, there seems to be a distinct deficiency of research to explore the aligned/synthesised implementation of Innovation Capability and Knowledge Management Capability. Ponis, Vagenas and Koronis (2012: 36) stated that "it is essential that knowledge management is managed not in isolation, but

in coordination with other corporate activities, reflecting the fundamental view that it is certainly not a goal to itself". It is apparent that the convergence of disciplines such as Innovation Capability and Knowledge Management Capability requires to be clearly understood to capture lessons learned, to improve organisational competency, to share, to generate, and to integrate knowledge that will create a body of collective learning as suggested by Reich (2007). Also supported by Goh (2007: 338), organisations should embrace best practices grounded on a collaborative knowledge strategy which reassures a win-win status quo through synergetic interactions by cutting across all boundaries. This might mean drawing from diverse strategic imperatives such as Innovation Capability and Knowledge Management Capability in unison. Organisations that refrain from collaboration practices in knowledge sharing frequently become causality to suboptimal outcomes in projects (Goh, 2007: 336).

The following concept of alignment of Innovation Capability and Knowledge Management Capability has been derived from the literature (figure 2.1 below).

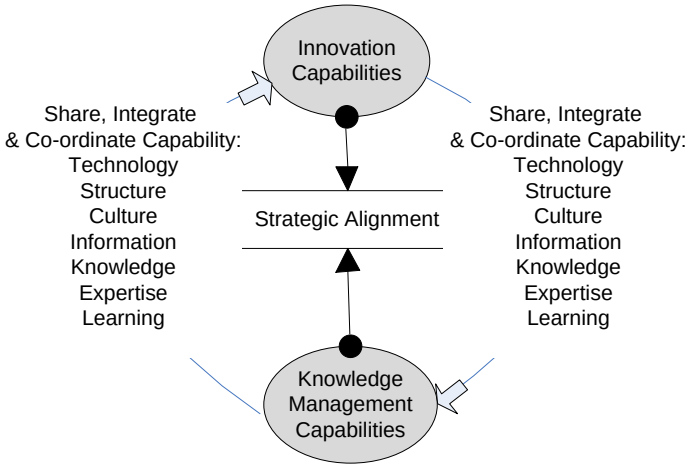

Figure 2.1: The concept of alignment of INNO and KMC (Author)

The focus of the study was not to replace existing frameworks on knowledge management and innovation but rather to develop knowledge on the alignment/synthesis of Knowledge Management Capability and Innovation Capability constructs and to determine if the

alignment of these constructs when done in their order of their importance improved Organisational Capability Efficiency.

Similar studies can be done in the future with other homogeneous strategic imperatives, such as aligning Innovation Capabilities with centre of excellence capabilities and aligning Knowledge Management Capabilities with centre of excellence capabilities to attain Organisational Capability Efficiency.

2.8 Gaps in the Existing Theory, Frameworks and Models

To date there has been several researches on either Innovation Capability or Knowledge Management Capability. There has been limited research on Organisational Capability Efficiency.

2.8.1 Innovation Capability Studies

Implementing innovation and improving Innovation Capability are attractively one of the topics of interests of academics and experts (Breznik and Hisrich, 2014: 368-384). According to Iddris (2016) there have been fifty one (51) articles from thirty (30) published journals between 2000 and 2015, which have been fittingly focusing on the Innovation Capability. Organisations are endeavouring to improve their Innovation Capability in order to stay competitive (Kumar et al., 2013). Towards this notion, there has been both theoretical and pragmatic attention paid to the implementation of Innovation Capabilities in organisations.

For instance, Drucker (1954; cited by Camio et al., 2018) was one of the earlier researchers that discussed the significance of Innovation Capability for organisations attempting to survive in a volatile environment. There has been an increase in the interest on Innovation Capability due to organisations attempting to rapidly and flexibly undertake process and product innovation. Camio et al. (2018, 1) looks at organisational capabilities that differentiate Argentine software companies with high innovation results and high innovation impacts compared to those with lesser results and impacts. The findings add to the theory of capabilities for innovation in the software sector and provide us with a basis to consider the comparative importance of diverse capabilities variables in the generation of innovation results and impacts. Whereas Camisón, Boronat-Navarro & Fores (2018:

1559) undertook an explanatory research to determine the interplay between the organisations internal and external capabilities as antecedents of an organisations radical and incremental innovation by differentiating between exploration and exploitation in the two types of capabilities. It was found that both the organisations internal and external capabilities are interchangeable in the effect they have on incremental innovation.

Interestingly, the study by Yang, Nguyen and Le (2018:958) aimed to examine the correlation between collaborative cultures, knowledge sharing and Innovation Capabilities in Chinese organisations. The outcome of the study shows that knowledge sharing plays a mediating role between collaborative culture, product and process innovation. Product innovation reveals the organisations ability of providing innovative new product/services in the market to obtain customer satisfaction in the market while process innovation produces the organisations ability to provide a superior practice than existing operations to obtain an enhanced performance.

Similar studies were undertaken by Wang and Dass (2016:127) to determine if top management in building Innovation Capability; Skarzynski and Gibson (2008) who emphasised the sharing of common vision of innovation among leaders and the organisation, a methodical approach to developing Innovation Capabilities in the organisation, support tools to enable idea-generation, a collaborative open culture and incentives that reward.

It is quite clear that the interest in Innovation Capability is increasing due to global competiveness, technology development and the upsurge in knowledge-based organisations (Iddris, 2016) but as argued previously, will the alignment of Innovation Capability with Knowledge Management Capability optimise organisational capability.

2.8.2 Knowledge Management Capability Studies

There has been recent development and academic interest on Knowledge Management Capability and how it impacts or how it is impacted by other business and managerial components. For instance Attia and Eldin (2018: 1217) examined the influence of Knowledge Management Capabilities on organisational learning and supply chain management practices and to investigate the influence of organisational learning,

Knowledge Management Capability (KMC) and supply chain management on organisational performance. According to the study's findings, supply chain management practices and organisational learning are positively affected by Knowledge Management Capability (KMC) and organisational performance is directly affected by Knowledge Management Capability, organisational learning and supply chain management processes.

Naqshbandi and Jasimuddin (2017:701) discuss the relationship of knowledge-orientated leadership and Knowledge Management Capability. The study investigated the mediating role of Knowledge Management Capability in the association between knowledge-orientated leadership and open innovation. The outcomes of the research indicated that greater levels of knowledge-orientated leadership can achieve enhanced Knowledge Management Capability and enhanced open innovation outcomes. Although the study stimulates the understanding of Knowledge Management Capability, it focuses mainly on the underlying Organisational Theory which is encapsulated in the processes of organisational learning capability of the knowledge-based view. Similarly, Bamel and Bamel (2018: 1555) assess the relationship of organisational resources and strategic flexibility through the knowledge management process capability. The outcomes of the research advocate that organisational resources are positively and significantly connected with strategic flexibility and knowledge management process capability partly mediates these relationships.

Aujirapongpan et al. (2010: 1) synthesise and recommend the indicators of Knowledge Management Capability that are necessary in the various knowledge management processes to measure knowledge management effectiveness. In addition, the study provides the indicators for those who are interested in the study of Knowledge Management Capability. The findings of the investigation recommend two main features of Knowledge Management Capability for knowledge management effectiveness. Firstly a resource-based view comprising of technology, structure and culture and secondly, knowledge-based perspective, comprising of expertise, learning and information.

Moreover, there has been academic interest in the relationship of Knowledge Management Capability, with supply chain management practices and organisational learning (Esam and

Salama (2017), customer relationship management and service quality (Tseng (2016) and experiential support of the influence impact of individual organisational learning dimensions on an organisations knowledge management (Turulja and Bajgorić, 2018:1). Similarly, it would also be interesting to attain an understanding of the alignment of Innovation Capability and Knowledge Management Capability implementation, since it has been appreciated in the discussion above that innovation has a strong relationship with knowledge management. An organisation capability can benefit more during implementation with a framework that provides greater understanding of the underlying constructs of Innovation Capability, Knowledge Management Capability and Organisational Capability Efficiency.

2.8.3 Organisational Capability Efficiency Studies

There are limited studies on Organisational Capability Efficiency, even though it is becoming increasingly important to create real use of knowledge assets and resources that would enable innovation and organisational success Bamel and Bamel (2018: 1556). Organisations require greater understanding of how organisation can attain greater mobility, optimised capability and economised capability through the syntheses of the implementation of Innovation Capability and Knowledge Management Capability with due consideration of the order of importance of these capabilities which will assist the organisation to attain capability efficiency and to prioritise on scarce and costly capability during implementation.

2.8.4 Innovation Capability and Knowledge Management Capability Studies

It is evident from the current literature summarised in Table 2.1 above that there are studies concluding the positive effect of knowledge management on innovation (Kör and Maden, 2013; Wuryaningrat, 2013), However, there seems to be limited theory that aligns Innovation Capability (INNO) and Knowledge Management Capability (KMC). There seems to be limited study that looks at the relationship, linkage, alignment or synthesis of Innovation Capability and Knowledge Management Capability. **This might be a gap in the literature.**

2.8.5 Innovation Capability and Knowledge Management Capability and Organisational Capability Efficiency Studies

More importantly the study looked at, if Organisational Capability Efficiency was improved if organisations aligned/synthesised Innovation Capability and Knowledge Management Capability. There is very scarce literature on Organisational Capability Efficiency. The literatures that were found were referenced in this study. The researcher has not come across research that looks at the alignment or synthesis of Innovation Capability and Knowledge Management Capability and how it improves Organisational Capability Efficiency. **This might be a gap in the literature.**

Based on the theoretical and empirical findings in the literature, the following are the research questions:

1. Is there an effective model of the link between each of the dimensions of INNO and KMC and the dimensions of OCE?

2. What will be the conceptual framework to align organisational capabilities when implementing innovation and knowledge management to improve OCE?

The relevant hypotheses are presented below:

Hypothesis 1

H_0^1 INNO does not affect OCE.

H_1: INNO positively affects OCE.

Hypothesis 2

H_0^2 KMC does not affect OCE.

H_2: KMC positively affects OCE.

Hypothesis 3

H_0^3 The combination of INNO and KMC does not have a larger positive effect on OCE than their effects on OCE individually.

H_3: The combination of INNO and KMC has a larger positive effect on OCE than their effects on OCE individually.

2.9 Model of literature review

This research proposes a model that extends the current models that is available in literature and states that there is a relationship between Innovation Capability and Knowledge Management Capability and Organisational Capability Efficiency. Based on the discussion about alignment of Innovation Capability, Knowledge Management Capability and Organisational Capability Efficiency theory that has been described previously and the hypotheses that have been formulated, one model of literature review can be formulated as seen in figure 2.2 below.

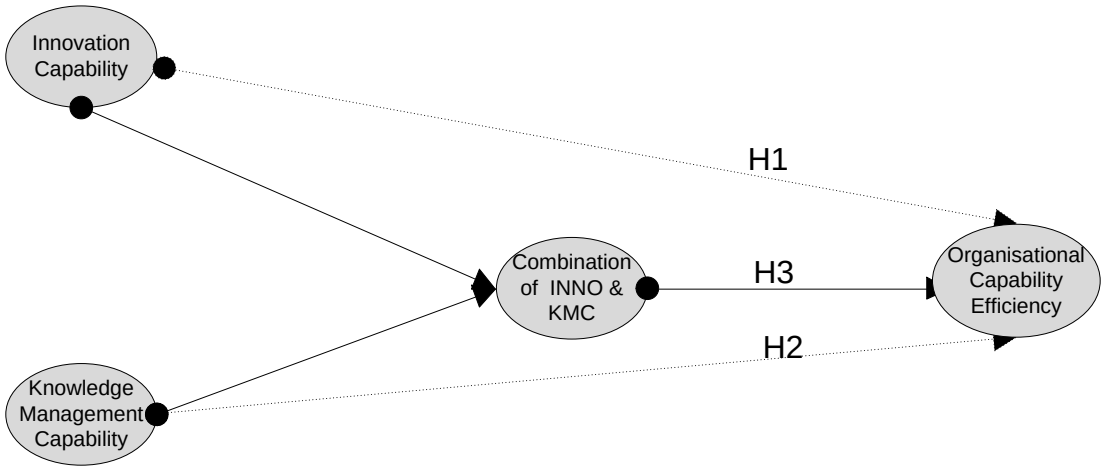

Figure 2.2: Model of literature review: Aligning INNO and KMC (Author)

2.10 Alignment of Innovation Capability, Knowledge Management Capability and Organisational Capability Efficiency

2.10.1 Innovation Capabilities

Burgelman, Christensen & Wheelwright (2004) highlight that the factors influencing innovation strategy are resource accessibility, knowledge of the industry environment and

its progression, organisational structural context and managerial aptitude to craft and control the strategic environment. Some have advocated Innovation Capability as the application of important knowledge to the achievement of market value and is the effective implementation of new ideas within an organisation (Amabile, Conti, Coon, Jeffrey & Herron, 1996; cited by Camio et al., 2018:2). Un (2002) proposes that the organisation's Innovation Capability is its capability to mobilise the knowledge embodied in its workers and to use it to create added knowledge resultant in the creativity of a new product or process innovation. Certain studies merely define innovation purely as a technological capability as the obligatory resource or intellectual knowledge to produce innovative activities and technological change. However, researchers overall, acknowledge that the fundamentals creating Innovation Capability are clustered into idea generation, idea selection, idea conversion, commercialisation and diffusion capabilities towards implementing innovation (Hansen and Birkinshaw, 2007). Accordingly, this study will adopt the elements of Innovation Capability that was comprehensively derived from literature by Kumar et al. (2013:40) as four groups:

a) Strategic capability is necessary to conceptualise innovation programs and ideation, implementation and commercialisation capabilities, manage the innovation funnel, and understand the business environment and to plan, conceptualise and design innovation programs. The strategic capability encapsulates management of the knowledge of competitor strategies, industry trends, customer needs; the knowledge of technology environment and emerging trends; organisational culture, structure, resources and competences.

b) Ideation capability is required to generate ideas in-house or through collaborative efforts or external sources. This entails capability for in-house idea generation, capability for collaboration and cross-pollination of ideas and capability for open innovation and partner engagement.

c) Implementation capability is vital to prioritise ideas and convert them into products or processes that create value. The components of this capability is effectiveness of the screening and selection process, risk management and strategic disruptive decision making; new product development, customer engagement and assessing market

potential; new business development, partner engagement and platform management; and effective product launch, roll-out, ramp-up and scaling-up of resources.

d) Commercialisation capabilities are essential to organisation, capturing a part of that value. This capability accesses and penetrates multiple channels, customer groups and regions ahead of competition.

Notwithstanding the contribution of existing researches on Innovation Capability, such as identification, evaluation, quality and development of Innovation Capability (Hansen and Birkinshaw, 2007; Kumar et al., 2013) there still remains ambiguity in terms of the Innovation Capability alignment with Knowledge Management Capability.

2.10.2 Knowledge Management Capabilities

Pee and Kankanhalli (2016: 188) suggests that there are two factors that highlight the relevance of developing strong Knowledge Management Capability. The first is the human crisis and the second is the increasing use of information technology.

Organisations can adopt an extensive range of Knowledge Management Capability that has been articulated through a number of Knowledge Management Capability research studies (Ekionea and Fillion, 2009; Aujirapongpan et al., 2010). Ekionea and Fillion (2009) describe the concept of Knowledge Management Capabilities as the sum of the whole organisational capability associated to knowledge management infrastructures, the knowledge management processes, and the knowledge management actors or people.

Aujirapongpan et al. (2010: 186) in his research states that a resource-based capability encompassing technology, structure and organisational culture, and a knowledge-based capability containing expertise, learning and information are required by organisations implementing knowledge management. Some studies on Knowledge Management Capability such as Turulja and Bajgorić (2018:1) only adopt the organisational theory approach whereby Knowledge Management Capability is seen as the knowledge management process of acquisition, creation, storage and application. However, this study will adopt the Knowledge Management Capability definition that is applicably and

comprehensively described by Aujirapongpan et al. (2010: 1) whereby the knowledge management processes of acquisition, creation, storage and application processes is encapsulated in the knowledge-based capabilities of learning and information constructs.

a) Technology is the vital information technological infrastructure of the organisation, both hardware and software, comprising of the database and network systems that impact the organisations (Yang and Chen, 2007: 96) and which are linked and effective in the use of information technology. Progressive technological infrastructures in the system of robust communications networks sanction structures which are further suitable for effective knowledge management (Holsapple and Joshi, 2001: 39).

b) Organisational structure includes the operational and command structure of the organisations, both formal and informal. Moreover, it comprises of the incentive scheme, management support policy of supervisors and business rules, work design, and code of practice (Yang and Chen, 2007: 96) that impact the knowledge management practice and organisational management (Collison and Parcell, 2004). An applicable structure for effective knowledge management could be the one which has a least of hierarchies and encourages combined knowledge instead of a discrete behaviour. Possible indicators for knowledge management effectiveness include the capability of cross-functional boundaries to acquire information and knowledge, the distribution of knowledge, and co-operative performance amongst individuals in the organisation (Peachey, 2006).

c) Organisational culture is the environment and the work ethics of the employees in the organisation impacting the efficiency and effectiveness of the adoption of knowledge management. It embraces a culture of knowledge sharing, knowledge co-operating knowledge coordinating and knowledge acquisition by the employees in the organisations (Yang and Chen, 2007: 96). The capability of employees to harmonise their exertions and assimilate their individual abilities is contingent not solely on their interactive abilities but also the organisational environment, which is determined by the organisational culture. Therefore, the Innovation Capability and Knowledge Management Capability can benefit if the organisational culture capability is harmonised across the organisation, instead of being departmentalised. This requires an

open culture capability required for all the strategic imperatives in the organisation. Potential indicators for the features of culture include a well-known corporate vision, recognition of know-how, collaboration, employee's attitudes, and creative innovativeness (Gold et al., 2001: 185-210).

d) Expertise capability can be described as the capability of doing something in a favourable way due to possessing a distinctive type of knowledge and skill which emanates from repetition, experience and teamwork (Freeze, 2006). Employees that attain know-how with knowledge and capability are embraced as knowledge champions and are of significant organisational knowledge creation and development. Organisations are beginning to rely more on attitude, enthusiasm, learning ability, and potential for cooperation and team work rather than individual's qualifications and experience (Alavi and Leidner, 2001: 107). Therefore, expertise capability being shared across the innovation and knowledge management strategic imperatives will ultimately benefit the organisation. For instance, the expertise being utilised by the Innovation Capability of the organisation for product development can ultimately benefit the organisation through knowledge retention if the expert information is captured and categorised for retrieval by the Knowledge Management Capability. Potential pointers in the capacity of individual expertise capability for knowledge management efficiency are the capability to perceive and pursue knowledge to retort the questions and the ability to utilise information technology and linguistic, the capability to build knowledge network, the capacity to collaborate and distribute knowledge and the inspiration to generate creativity and innovation in the organisation (Alavi and Leidner, 2001: 107-136).

e) Learning capability is the increase in information and knowledge while an employee collaborates under several situations and settings. Lessons learned could be a method of best practice and globally benchmarking for practices in knowledge management (Alavi and Leidner, 2001: 108). As for Davenport, De Long & Beers (1998: 43-57), the exploitation of best practices will intensify learning in the organisation and is valuable in knowledge acquisition and capture, knowledge creation, storage and knowledge distribution. Learning from different lessons can be accessible both internally and externally to the organisation (Freeze, 2006). Possible pointers concerning employees

learning capability for knowledge management effectiveness are the aptitude to learn from lesson learned, best practices, and job tasking (Freeze, 2006).

f) Information capability is when an organisation possesses valued and useful quantitative and qualitative information, for example, information and knowledge on tasking scenarios, gained from experimentations, exploring or different reports including systems data (Freeze, 2006). Alexander, Schallert & Hare (1991: 35) state that knowledge is the information storage, abilities and experience gained through practice and the individual's memories of the organisation. Therefore, the organisational databases, knowledge repositories and dashboards are important instruments in knowledge management application (Brown and Duguid, 2000). Obtaining adequate information may also produce knowledge founded on interpretation and conversion of the meaning without having experiences or abilities (Beveren, 2002: 18) and data in database storage is termed to be business intelligence when aggregated to trends and patterns (Rogers, McDonald & Brown, 2005: 46-57). The information capability in this research therefore is inclusive of data, information and knowledge which exist in the organisation. Probable indicators of the organisation's information capability are modernity, the availability and the recovery, the diversities, and the examination and screening of the importance of the information (Alavi and Leidner, 2001: 107-136).

The drivers in the modern organisation, such as: managing the complex systems, places, things and people; the accelerated growth of technology, especially the introduction of mobile users, will continuously induce organisations to strive for insight and foresight, and as such, adopt knowledge management practices (Walker and Christenson, 2005). Nevertheless, when considering the global economic climate and scarcity of costly resources, this excess needs to be balanced with other business priorities such as Innovation Capability. Organisations especially in emerging economies have to make firm decisions on investments and the prioritising of strategic imperatives. As accentuated by Aujirapongpan et al. (2010: 183-203) Knowledge Management Capabilities need to embrace a suitable grouping of shared relationships, management practices and technical tools. This appropriation may enhance Organisational Capability Efficiency when Knowledge Management Capability converges with Innovation Capability.

2.10.3 Organisational Capability Efficiency

The criteria to measure Organisational Capability Efficiency for this study were adopted from Itami and Noto (2007: 132) as well as Hamel and Prahalad (1992: 79-91). Organisational Capability Efficiency was defined by five observable variables: improved economising on capability, improved mobilising of capability, improved determination of capability gaps, reduced capability redundancy across domains and enhanced optimal capability. These features of Organisational Capability Efficiency adopted from Itami and Noto (2007: 132) and Hamel and Prahalad (1992: 79-91) resonate with organisations competing for the same scarce resource and the increasing need to leverage on existing expensive organisational capability.

Furthermore, Itami and Noto (2007:150) describe improved economising on capability as the usage of lessor resources to maintain the same level of business or to utilise the prevailing resources to maintain the greater capacity of business. According to Hamel and Prahalad (1992), it is not the extent of the organisation's resources that is the key element of capability, but the organisation's capability to leverage and mobilise its resources. As mentioned by Zander and Kogut (2007:77) as much as skills define the competence of an individual, organising principles underlie the capabilities of the organisation. They further add that to be flexible requires rules by which work is coordinated. Improved determination of capability gaps includes resource analysis, filling those gaps and developing organisational capability for the future (Itami and Noto, 2007:29). Reduced capability redundancy across domains can be attained through concentrating and converging capability on clear goals and focused efforts (Itami and Noto, 2007:150). Enhanced optimal capability involves conserving and utilising resources and capabilities to the optimum by co-opting resources through collaborative arrangements (Itami and Noto, 2007:150).

2.11 Model of Conceptual Framework

Table 2.2 below is the summary of Innovation Capabilities, Knowledge Management Capabilities and Organisational Capability Efficiency constructs as derived from the literature:

Table 2.2: Literature Summary of INNO, KMC and OCE

Strategic Imperative	Capability	Definition/Attributes	Source
Innovation capability	Strategic	Conceptualise innovation programs and ideation, implementation and commercialisation capabilities, to manage the innovation funnel, to understand the business environment and to plan, conceptualise and design innovation programs.	(Kumar et al. , 2013)
		Encapsulates management of the knowledge of competitor strategies, industry trends, customer needs; the knowledge of technology environment and emerging trends; organisational culture, structure, resources and competences.	(Kumar et al. , 2013)
	Ideation	Generate ideas in-house or through collaborative efforts or external sources.	(Kumar et al. , 2013)
		In-house idea generation, capability for collaboration and cross-pollination of ideas and capability for open innovation and partner engagement.	(Kumar et al. , 2013)
	Implementation	Vital to prioritise ideas and convert them into products or processes that generate worth.	(Kumar et al. , 2013)
		The components of this capability is effectiveness of screening and selection process, risk management and strategic disruptive decision making; new product development, customer engagement and assessing market potential; new business development, partner engagement and platform management and effective product launch, roll-out, ramp-up and scaling-up of resources.	(Kumar et al. , 2013)
	Commercialisation	Essential to deliver value to customer, capturing a part of that value.	(Kumar et al. , 2013)
		This capability accesses and penetrates multiple channels, customer groups and regions ahead of competition.	(Kumar et al. , 2013)
Knowledge Management Capability	Technology	Supporting infrastructure of information technology applications and knowledge bases. Used to accumulate knowledge.	Adenfelt and Lagerström (2006)
		Hardware and software such as the data storage and the network systems	(Yang and Chen, 2007)
		Robust communications networks	(Holsapple and Joshi, 2001).
		State-of-the-art technologies	Kühl and Cunha (2013)
		Knowledge solutions, processes-automation, repositories, dashboards and databases.	Kenney and Gudergan (2006)
		Sharing of knowledge bases, repositories, databases, content management, common information technology platforms, and technical communities of practice, networks and solutions.	(Walker and Christenson, 2005). (Aujirapongpan, et al. 2010)
	Structure	Established structure for centre of excellence with prevailing practices and routines.	(Aujirapongpan, et al. 2010) (Adenfelt and Lagerström, 2006)
		Operational and command structure of the organisations. Inclusive of incentive system, work design, management policies of the administrators, guidelines, principles and practices.	Yang and Chen, 2007
		Organisational leadership	(Collison and Parcell, 2004)

		Social structure for innovation	(Kör and Maden, 2013
		Informal structure to enable knowledge creation and sharing for knowledge management	(Reich, 2007
		Knowledge networks comprising of network ties and network configurations which forms a solid basis for building organisational memory as a valued knowledge asset.	Walker and Christenson (2005)
		Organisational structures improves sharing, collaboration, coordination, adaptability, flexibility and organisational agility	(Kühl and Cunha, 2013; Kumar et al., 2013; Ukko and Saunila, 2013)
		Create channels, link resources and activities	(Reich, 2007).
	Culture	learning, knowledge sharing and rewards	Aujirapongpan, et al. (2010), Kör and Maden (2013), Walker and Christenson (2005), Alavi et al., (2006)
		Environment and work practices of the individuals in the organisation. Includes a culture of knowledge sharing, coordinating, co-operating and acquiring by the employees in the organisations.	(Chuang, 2004; Yang and Chen, 2007)
		Harmonise efforts and integrate skills. Corporate vision, expertise, collaboration, attitudes and innovativeness.	(Peachey, 2006; Gold et al., 2001).
		Social networks to share information and knowledge. Help each other to solve business problems.	Walker and Christenson (2005)
		Increase openness, learning and the diffusion of knowledge for innovation	(Huang and Li, 2009)
		Increases communication between knowledge communities, and allows organisations to achieve information authority and economies of scale.	Goh (2007)
	Knowledge/Information	Information and knowledge as a strategic resource and asset	(Aujirapongpan, et al. 2010), (Kühl and Cunha, 2013; Adenfelt and Lagerström, 2008
		Valuable and beneficial information i.e. information on effort reality, which may come from experimentations, assessments or various reports including data storage. This information could be both quantitative and qualitative,	(Freeze, 2006)
		Raw data in the data storage is considered Business Intelligence	(Rogers, McDonald & Brown, 2005)
		Accessing, retrieving and screening the value of the organisations information.	(Alavi and Leidner, 2001; Freeze, 2006).
		Information storage, skills, experiences and personal memories. Database, knowledge repositories, dashboards are vital mechanisms in knowledge management (KM)	Alexander, Schallert & Hare (1991) (Brown and Duguid, 2000)
		Create organisations knowledge based on analysis and conversion.	(Beveren, 2002)
		Leverage knowledge	(Adenfelt and Lagerström, 2006
		Knowledge discoveries	(Wuryaninggrat, 2013)
		Intellectual asset	(Kör and Maden, 2013)
		Knowledge can be used by any individual or organisation to a specific problem without abolishing the ability to reuse.	(Rugman, 1980
		Knowledge resources must be managed and have the characteristics of "transferability", for absorption by other unit.	(Wuryaninggrat, 2013
	Expertise	Retention of intellectual capital	(Aujirapongpan, et al. 2010) (Freeze and Kulkarni, 2007; Walker and Christenson, 2005)
		Having a superior kind of knowledge which comes from practice, and co-operation.	(Freeze, 2006
		Knowledge champion who has an important role in knowledge transferring or knowledge sharing within the	(Hansen, Nohria and Tierney, 1999; Jones)

		organisation.	
		Ability to analyse knowledge to answer the questions, the ability to use information technology and language, the ability to interchange knowledge.	Alavi and Leidner, 2001; Freeze, 2006).
		Coordinating expertise.	Reich (2007)
		Knowledge creation and transfer by a wide variety of experts working together to solve complex problems.	Walker and Christenson (2005)
		Pinpoint specialized and expert knowledge	Adenfelt and Lagerström, 2006).
	Learning	Permutation of practices that encourage intra-organisational learning. Facilitate the spread of learning through partnerships with firms. Promotes and maintains sharing of knowledge.	(Aujirapongpan, et al. 2010), (Lin et al., 2013)
		Lessons learning under different scenarios through which knowledge is increased. May be in the method of best practice or benchmarking.	(Alavi and Leidner, 2001)
		Best practices or benchmarking for lessons learning will improve learning and is advantageous in knowledge acquisition, capturing, creation & dissemination.	.Davenport, De Long & Beers (1998)
		Learning from internally and externally to the organisation.	(Freeze, 2006).
		Intensive use of knowledge which is a result of a learning process. Learning capability includes collaboration, promoting learning, facilitating knowledge transfer	(Tello-Gamarra and Zawislak, 2013)
		Knowledge development involves learning new ways	(Adenfelt and Lagerström, 2006)
		Capture lessons learned, to improve organisational competency, to share, to generate, & to integrate knowledge that will create a body of collective learning	Reich (2007)
Organisational Capability Efficiency	improved economising on capability	The usage of smaller amount of resources to maintain the same level of business or to utilise the current resources to maintain the higher capacity of business.	Itami and Noto (2007)
	Improved Mobilising of existing resources	The organisation's ability to leverage & mobilise its resources is the primary determinant of capability	Hamel and Prahalad (1992)
	Improved determination of capability gaps	Includes resource analysis, filling those gaps & developing capability for the future.	Itami and Noto (2007)
	Reduced capability redundancy across domains	Can be attained through concentrating and converging capability on clear goals and focused efforts.	Itami and Noto (2007)
	Enhanced optimal capability	Involves conserving and utilising resources & capabilities to the maximum by co-opting resources through collaborative arrangements.	Itami and Noto (2007)

As derived from previous literature, figure 2.3 below, which is the conceptual framework model, constructs that Knowledge Management Capability is positively related to Innovation Capability. Aujirapongpan et al. (2010) was adopted to define the concept of the Knowledge Management Capability which he described as technology, structure, culture, expertise, learning and information capability. Kumar et al. (2013) was adopted to define the concept of Innovation Capability which was described as strategic, ideation, implementation and commercialisation.

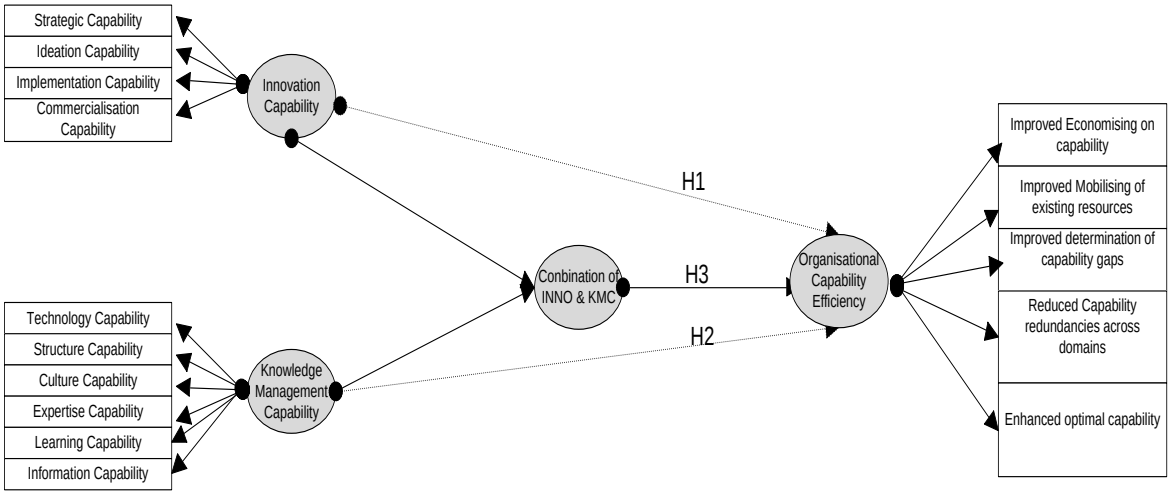

Figure 2.3: Model of aligning INNO, KMC and OCE (Author)

The proposed conceptual framework model (figure 2.3) was tested to verify the correlation and interrelatedness of Innovation Capability, Knowledge Management Capability and Organisational Capability Efficiency. The findings and conclusion of the research has provided a conceptual framework, which illustrates an alignment, relationship and understanding for an aligned/synthesised implementation of Innovation Capability and Knowledge Management Capability. Organisations adopting the conceptual framework will understand how to effectively manoeuvre its depleted and costly resources across the domains of homogeneous strategic imperatives successfully without overlap and redundancy of expensive capability.

2.12 Chapter Summary

Chapter 2 discusses the theoretical aspects of innovation, knowledge management, Innovation Capability, Knowledge Management Capability, Organisational Capability Efficiency, strategic alignment, resource-based capability, knowledge-based capability, organisational capability and gaps in the existing theory that is related to the study.

As per the literature there is an increasing interest in Innovation Capability and Knowledge Management Capability and organisational capability, however there is still a dilemma in organisations managing the costly resources and diversity of capability required when implementing these homogenous strategic initiatives such as innovation and knowledge management. The organisation’s scarce and costly capabilities are negatively affected. The idea of alignment of these strategic imperative capabilities, more specifically Innovation

Capability and Knowledge Management Capability is explored to attain Organisational Capability Efficiency. The current literature has limited theory on the relationship of Innovation Capability, Knowledge Management Capability and Organisational Capability Efficiency, which is the focus area of this study. Therefore, it is necessary to conduct an exploratory study in organisations to acquire a better understanding of the aligning of organisational capabilities when implementing Innovation Capability and Knowledge Management Capability to improve Organisational Capability Efficiency.

The underlying constructs of Innovation Capability, Knowledge Management Capability and Organisational Capability Efficiency were identified in the literature review and Structured Equation Model (SEM) aligning Innovation Capability, Knowledge Management Capability and Organisational Capability Efficiency was developed.

An appropriate research design methodology is considered in the next chapter (Chapter 3) to appropriately obtain data and analyse the SEM and to determine if alignment of Innovation Capability and Knowledge Management Capability will have a positive effect on Organisational Capability Efficiency.

Chapter 3: Research Design and Methodology

3.1 Introduction

Chapter one (1) summarised the context and aims of the study. The chapter provided a synopsis of the research, the necessity for the study was discussed, the research problem was discussed and the general research questions and research objectives were formulated.

The objectives of the study are the following:

Main objective

To develop a conceptual framework for the alignment of Innovation Capability (INNO) and Knowledge Management Capability (KMC) that would assist managers in organisations to improve Organisational Capability Efficiency (OCE).

Specific objectives

Literature objectives

1. To examine the factors that affect INNO.
2. To examine the factors that affect KMC.
3. To examine the factors that affect OCE.

Empirical objectives

4. To investigate the relationships between INNO, KMC and OCE.
5. To evaluate the important factors of KMC that affect INNO.

In Chapter 2, the theoretical and empirical knowledge of Innovation Capability and Knowledge Management Capability, Organisational Capability Efficiency and strategic alignment were reviewed. Each of the capabilities of Innovation Capability and Knowledge Management Capability were discussed in detail. Resource-based capability and knowledge-based capability theories were discussed and the existing theoretical models and definitions that were applicable to Innovation Capability, Knowledge Management Capability and Organisational Capability Efficiency were reviewed.

The focus areas of discussion appropriate to the research design and methodology which are addressed in this chapter are:

- Research questions and hypotheses;
- Research philosophy;
- Research design;
- Target population and sampling;
- Research instrument;
- Data collection;
- Statistical analyses;
- Limitations of the research; and
- Ethical considerations.

3.2 Research Questions and Hypotheses

This study was aimed at answering the following research questions:

1. Is there an effective model of the link between each of the dimensions of INNO and KMC and the dimensions of OCE?

2. What will the conceptual framework be to align organisational capabilities when implementing INNO and KMC to improve OCE?

In Chapter 2, the theoretical dimensions of each of Innovation Capability, Knowledge Management Capability and Organisational Capability Efficiency were discussed in detail. In the study model (figure 2.1 in chapter 2); strategic alignment is an emergent construct, resulting from the covariation of the two constructs Innovation Capability and Knowledge Management Capability. Innovation Capability, Knowledge Management Capability and Organisational Capability Efficiency are considered as first order factors that can be measured quantitatively using questions in the questionnaire.

As presented in Chapter one the statistical hypotheses are:

Hypothesis 1

H_0^1 INNO does not affect OCE.

H_1: INNO positively affects OCE.

Hypothesis 2

H_0^2 KMC does not affect OCE.

H_2: KMC positively affects OCE.

Hypothesis 3

H_0^3 The combination of INNO and KMC does not have a larger positive effect on OCE than their effects on OCE individually.

H_3: The combination of INNO and KMC has a larger positive effect on OCE than their effects on OCE individually.

In terms of this chapter, and to elucidate the above hypotheses, these dimensions are specified in the table below:

Table 3.1: Construct Variables

Construct (Independent variable)	Dimensions	Dependent variable	Dimensions
Innovation Capability (INNO)	Strategic capability, ideation capability, implementation capability and commercialisation capability	Organisational Capability Efficiency (OCE)	Improved economising on capability, improved mobilising of existing resources, improved determination of capability gaps, reduced capability redundancies across domains and enhanced optimal capability.
Knowledge Management Capability (KMC)	technology capability, structure capability, culture capability, expertise capability, learning capability and information capability	Organisational Capability Efficiency (OCE)	Improved economising on capability, improved mobilising of existing resources, improved determination of capability gaps, reduced capability redundancies across domains and enhanced optimal capability.
Alignment	Alignment	Organisational	Improved economising on capability,

(Combination of INNO and KMC)		Capability Efficiency (OCE)	improved mobilising of existing resources, improved determination of capability gaps, reduced capability redundancies across domains and enhanced optimal capability.

Figure 3.1 below illustrates these hypotheses more clearly. The hypotheses were tested by using structural equation modelling (SEM).

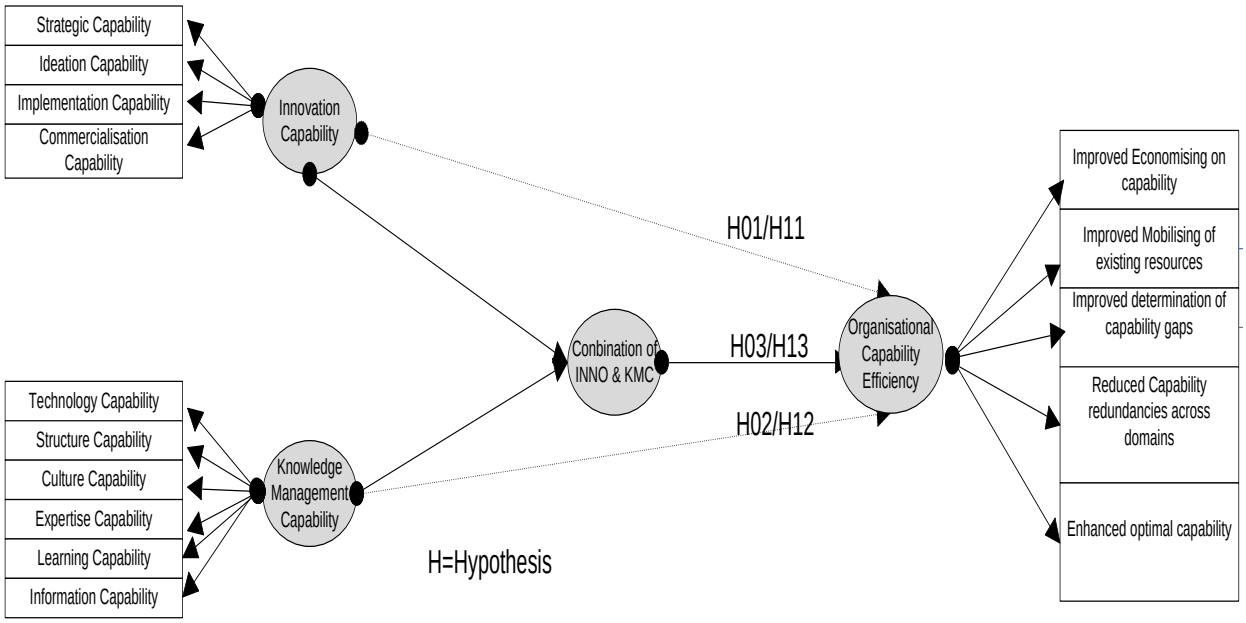

Figure 3.1: Structural Equation Model

3.3 Research Philosophy

Research philosophy is a belief of the manner in which a research study ought to be done in terms of how the data should be collected, analysed, interpreted and used (including the research strategy and research instruments used) (Schurink, 2009: 803-823). According to Saunders et al. (2012:83), research questions usually inform the selected research strategy, the adoption of collection techniques and analysis procedures, and the time horizon over which the researcher undertakes the research project. The onion (figure 3.2 below) illustrates this better.

Outside the research onion diagram there are three research philosophies, namely ontology, axiology and epistemology (Saunders et al., 2009:165-196). These research philosophies are assumptions that direct a researcher to choose the appropriate research methodology to use.

Ontology leans more towards the qualitative research methodology. It shows how a researcher visions the world, and with the assumptions around how the world is made up and the nature (being) of things.

Axiology helps the researcher to comprehend and recognise the part his/her values and opinion plays in collecting and analysis of the study compared to removing or attempting to equilibrium its effect. This forms the whole study, including how the data is analysed, according to the approaches selected (Saunders et al., 2009:165-196).

Epistemology describes whether, or how, we can attain knowledge of realism, and the conditions for what counts as knowledge usually includes references to fact and to the justification thereof (Serumaga-Zake, 2014). Epistemology concerns the researcher's views on how an individual might discern knowledge about a phenomenon or the reality (Creswell, 2012: 13) and it refers to the science of knowing (Mouton & Marais, 1990: 150), specifically asking the question: who can supply the information?

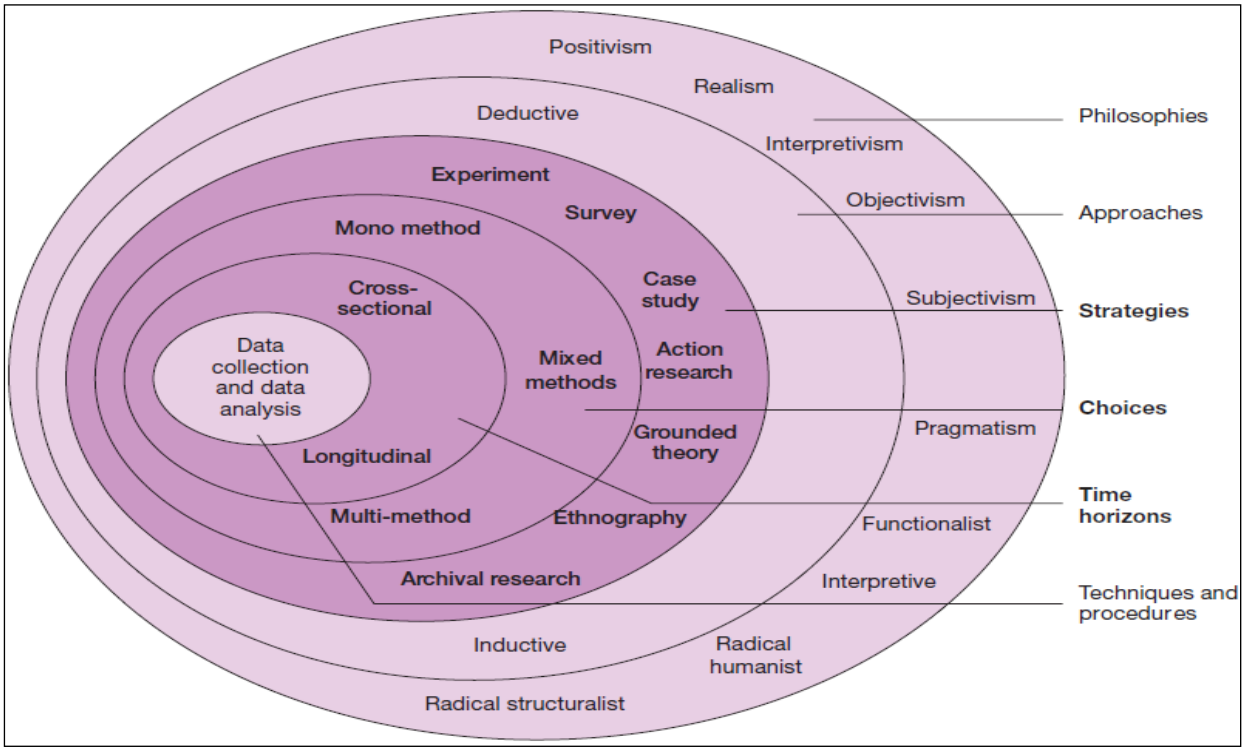

Figure 3.2: Research Onion Diagram

Source: Saunders et al. (2012:83)

According to figure 3.2 above, the first layer of the onion, we have research approaches that include idealism, positivism, interpretivism or nonpositivism, realism, axiology, and pragmatism. Positivism includes the increase of knowledge centred on observable social realism, the finished artefact of research being built on generalisations from natural laws comparable to ones fashioned by natural scientists (Saunders, Lewis & Thornhill, 2007: 108). It deals with verifiable observations and measurable relations between those observations, which do not depend on subjective beliefs. Saunders et al. (2007:108) states that interpretivism offers a holistic appreciative of various variables in the background of that which is being investigated. It therefore pursues to offer knowledge by studying phenomena from a diversity of sources rather than simply giving a disconnected presentation of statistical data. Realism is the advancement of knowledge grounded on scientific method and adopts the sovereign existence of objects from the human mind (Blumberg, Cooper & Schindler, 2011: 19; Saunders, Lewis & Thornhill, 2009: 114). Pragmatism holds the position that the significant determinant of the research philosophy embraced is the research question, though another approach may be more accepted than the other for retorting that particular question (Saunders et. al, 2012:83).

One can apply either a positivist or interpretivist philosophy or both within one study (Teddlie & Tashakkori, 2009:7). For this study, the researcher's epistemological view was positivism because the phenomenon of alignment of capabilities is not context-bound and the researcher did not need physical contact with the context and the people who possessed the knowledge he needed to collect.

Positivists believe that there is one objective reality which can be studied by applying the natural laws. The positivism philosophy is centred upon the highly structured methodology to support generalisation and measureable observations and evaluate the outcome with the assistance of mathematical and statistical analysis (Gratton and Jones, 2010: 25). Similar to this study, it was mostly characterised by the examination of relationships between variables, which are measured numerically and associated with survey research strategies (Druckman, 2005:5). Quantitative measures are used to test hypotheses and measurement and analysis of causal relationships between variables are emphasised (Denzin and Lincoln, 1998: 8).

Positivism was applied in this study because the researcher was independent of the research, and the research explored causality and fundamental facts about the alignment of Innovation Capability and Knowledge Management Capability and its effect on OCE. The advantage of this quantitative approach was that it placed a large premium on objectivity and the reliability of findings (Cooper & Schindler, 2011: 138). The research followed a deductive approach, whereby a clear formulation of the research questions and hypothesis testing were undertaken to study the phenomenon (Morris, 2006: 77). The strategy was a survey. The time horizon was a cross-sectional survey i.e. it was taken at a specific time (Creswell, 2012).

3.4 Research Design

This study used exploratory research as a survey research design (Creswell, 2012: 540), because the main purpose of this research was to investigate the relationship between the variables Innovation Capability, Knowledge Management Capability and Organisational Capability Efficiency. The study's objective was to determine if OCE is affected positively by aligning/synthesising organisational capabilities when implementing innovation and knowledge management strategic imperatives for organisations. These objectives lead to a positivist, objective approach to the study.

According to Serumaga-Zake (2014:223), survey research can be defined as an empirical and logical study that involves the systematic and empirical collection of information or data from population units as well as the statistical analysis of the findings. In other words, it is a formal procedure by which information is obtained. In general, the research should be free from the personal bias of the researcher and it should provide data, which is more reliable, credible and objective than personal assumptions and prejudices. Surveys overall use large samples and are conducted for various reasons and in many different ways including telephonic, electronic, mail or even in personal surveys. However, all surveys have some characteristics which are common: persons or organisations are randomly selected (not haphazardly) in such a way that each person or organisation has a measurable chance to be selected as part of the sample. In this way, the survey results can be reliably predictable to a larger population. Data is collected through use of standardised procedures to ensure each individual is being asked the same questions in the similar manner. The intention of a survey is not to describe the individual persons or organisations, which by

chance happened to be selected into the study sample, but rather to attain a combined profile of the population. One of the advantages of a survey is that it delivers a speedy and inexpensive means for determining evidence and facts, for example, about our knowledge, attitudes, opinions, beliefs, expectations and behaviours. A structured or semi-structured questionnaire is used to collect data in surveys. A structured questionnaire has only closed-ended questions and a semi-structured questionnaire have both closed- and open-ended questions. A questionnaire is a set of questions that have been formed to collect information from the respondents. Hofstee (2006: 133) states that the questionnaires may have open questions, but that it is generally better to elude this when possible as respondents may be different in their aptitude and readiness to write answers, and also answers to open-ended questions may be problematic to analyse. In this survey, mainly closed-ended questions were used.

3.5 Research Methodology

The research methodology describes the general approach evident in the research process and includes the methods of data collection, analysis, and interpretation that the researcher suggests for the study (Creswell, 2014:266). In general, there are two major research methodologies, namely qualitative and quantitative research. These can be used in conjunction with one another in what is known as a mixed methodology design.

Qualitative research comprises of two elements namely, the practice of close-up, detailed explanations of the natural world undertaken by the researcher, and the effort to circumvent prior assurance to any theoretical model (Van Maanen, Dabbs & Faulkner, 1982:16). A qualitative paradigm helps the researcher collect opulent and in-depth information in the field. According to Henning and Smith (2004: 3), the difference between a qualitative paradigm and the quantitative paradigm is found in the pursuit for understanding and for in-depth investigation.

In a quantitative study, the emphasis is more in the control of all the components in the activities and representation of the respondents (those who took part in the study and have been selected in the sample) (Henning and Smith, 2004: 3). The variables are controlled and the research is directed with a serious attention on the profile of each variable and/or

how variables are correlated. The researcher plans and implements this control in the manner in which the study and the research instruments have been designed. Respondents typically do not have the freedom to express data that cannot be captured by the prearranged instrument (questionnaire). In quantitative research, random samples are used which are preferably large. Also, the sample must be a representative of the target population because, unlike for qualitative research, the aim of the study is to generalise the study results. Quantitative research tends to be more objective than the qualitative research (ontologically), as data is collected in numbers (Henning and Smith (2004: 3). A questionnaire is usually adopted as the data collection tool and questions are standardised and the questions are enquired in precisely the similar technique for each respondent.

In this study, quantitative research was utilised as it related to a positivist epistemology, as discussed in paragraph 3.3. In the following paragraphs the detailed usage of the survey methodology by means of a self-administered emailed questionnaire for this study was described. The aim of the following paragraphs justified the appropriateness of the selected research methodology to gather data and the analysis utilised to realise the study objectives. These paragraphs are:

- Target population
- Research instrument
- Data Collection methods
- Statistical Analyses.

Each major construct was factor analysed separately and not combined.

3.6 The Choice of Population and Sample Size

3.6.1 Target Population

The term "…target population…" discusses the "…specific pool of cases…" that a researcher wishes to investigate (Neuman, 2000:201). The study was done in the South African context and the sample was a representative of an emergent economy. Therefore, the target population consisted of all organisations including national government

departments, state-owned enterprises and listed companies that are engaged in innovation and knowledge management in South Africa.

It was assumed that by the time this study was done in 2016, innovation and knowledge management (KM) capabilities in the national government departments, state-owned enterprises and listed companies that are engaged in innovation and knowledge management in South Africa, had been applied long enough and hence were mature enough for them to be investigated and for me to be able to scientifically find out whether aligning organisational capabilities when implementing innovation and knowledge management strategic imperatives improves Organisational Capability Efficiency in organisations.

Other emergent economies similar to South Africa, including African countries stand to benefit especially these days as knowledge management, innovation and organisational capability are important topic of interest in organisations including the state-owned ones, listed companies and NGOs.

3.6.2 Sampling and Sampling Size

The researcher did not know how many employees (possible respondents) there were in each of these organisations that qualified. The researcher conducted a census survey. There was a possibility of the problem of “non-coverage”, since the researcher did not know all the potential respondents and where they could be found. This is a situation where the “target population” is not equal to the “research population”. A research population is defined as the population which is actually used in a research study, whereas a target population is the population which is being studied (Creswell, 2012). If the target population is not equal to the research population, the study may have missing data due to the non-coverage problem. Due to time and budget constraints, the researcher initially struggled to ascertain where all the potential respondents could be found in order to come up with a sample frame for the study. This might have resulted in missing data for this study, which could, in return, have affected the validity and reliability of the study negatively.

Suhr (2004: 203-230) recommends that for factor analysis (which is a statistical technique to be used in this study), "the minimum sample size for reliable results is at least 100 observations". This recommendation was strengthened by the rule of thumb as suggested by Nunnally (1967:355), that structural equation modelling (SEM) (which will be used in the analysis), requires at least 10 observations per indicator, i.e. per individual question or item. For this study, 17 indicators were derived in total, which was, 4 for INNO, 12 for KMC and one for OCE. This made up the sample size of 170 (17 X 10) that was required. This study actually used 291, which exceeded the minimum number of respondents that were required for the study.

Unit of analysis refers to the level at which the study is focused. The unit of analysis of this study was the innovation and knowledge management employee in the organisation.

3.7 Data Collection Methods

In this research, an electronic semi-structured questionnaire was applied to collect data. An electronic data collection method tends to be an efficient method of collecting attitude, opinion and behavioural data and is preferred where timeliness is a reason and the extent of the survey is limited. Electronic surveys are relatively low in cost but present a problem in terms of getting sufficient attention to achieve high levels of cooperation (Neuman, 2000: 348). For this study, the questionnaires were electronically distributed and were therefore self-administered by the respondents.

The advantages of self-administered questionnaires are as follows (Neuman, 2000: 345):

- Questionnaires can be directed to an extensive geographical region.
- The respondent is able to finish the questionnaire when suitable and can access personal records, if necessary.
- It is relatively easier to administer for the researcher.
- The method is more cost effective when compared to face-to-face or telephonic interviews.
- The method offers confidentiality and avoids interviewer bias.

Electronic, self-administered surveys also have some disadvantages as mentioned below (Neuman, 2000:345):

- Low response rates, especially when respondents perceive the content to be of a sensitive nature, they might not be willing to complete the questionnaire.
- Conditions under which the questionnaire is completed cannot be controlled, e.g., the questionnaire can be given to someone other than the intended respondent to complete or assist.
- Incomplete questionnaires can be returned to the researcher due to the lack of understanding, perceived sensitivity of the research questions and perceptions by the respondents that the questionnaire is not anonymous.

For this study, the Research Support Services Company emailed the online questionnaire link to the organisations' management to forward to innovation and knowledge management employees for completion. The website link allowed the respondents to complete the questionnaire and save the data. In certain circumstances, management notified the research company that the online function was not accessible, either due to security or company policy. In these cases, the research company emailed the questionnaires to the management of these organisations to make the questionnaire available to innovation and knowledge management employees. The online survey database was accessible to the researcher and the completed questionnaires were sent to the researcher.

A filtering question was posed at the beginning of the questionnaire to differentiate between those business units which are actively involved in implementation of innovation or knowledge management and those which are not. If the unit was involved, then the respondent would continue with the rest of the questionnaire, otherwise, he or she did not.

The main reasons for selecting South African organisations which were actively involved in the implementation of innovation and knowledge management included the following:

- Organisations in South Africa generally adopt strategic imperatives such as innovation and knowledge management as organisational goals.
- All these organisations are South African organisations, which make it a study of a geographically comparable population.
- These organisations represent organisations in South Africa.

The reasonable deadline was communicated to the respondents. The research company monitored the participation and reminded the respondents to complete the questionnaire. Access to the captured data was password protected, and was only used by the company, researcher and statistician. The data were then compiled into a table format as required for statistical analysis and sent to the statistician once the researcher retrieved all the data. The data obtained from the survey was treated confidentially and the names of respondents were not disclosed.

3.8 Research Instrument

Questionnaires usually form an integral part of opinion-related surveys and the creation of the questions and the structure of the questionnaire instrument are important to the accomplishment of the research survey (Cooper & Schindler, 2011: 334). Preceding administration of the questionnaire to sampling units in the study, the researcher pilot tested the questionnaire on a lesser number of employees who were potential respondents, in order to assess whether questions were unambiguously phrased and understood in the same way by all. The analysis of the pilot survey revealed flaws and suggested improvements.

The features concerning the structure of the questionnaire as suggested by Sekaran and Bougie (2010: 236), such as the use of a covering letter, using an attractive design and logically ordering the questions, were considered. A covering letter containing the purpose of the questionnaire was attached to the research questionnaire. The questionnaire had an introductory section that clearly and concisely described the purpose of the study and the importance of the participants' involvement in the study. It also included main definitions of the study to avoid ambiguity for the respondents' understanding of the subject areas being discussed. The covering letter also included the name of the

researcher, name of the institution, letter of ethical approval by the institution, approximate time that was required to complete the questionnaire, information guiding the completion of the questionnaire and how to submit it. It assured the respondent that the information given was strictly confidential, and advised him or her that they were free to withdraw from the participation in the survey at any given time without any negative consequence. Refer to Annexure B for a copy of the questionnaire.

3.8.1 Reasons for the Choice of Research Instrument

In quantitative surveys, questionnaires are possibly the most widely used primary data collection method (Cooper & Schindler, 2011:414). Questionnaires are mostly easier to analyse and provide the possibility for transforming the data into quantifiable facts and results. The explanations for the selection of questionnaire as the research instrument are the following:

- **Volume:** emailed questionnaires could be directed to the whole target population and each respondent could complete the questionnaire conveniently in his or her own time.
- **Cost:** The geographical distribution and the size of the target population can make the research very costly and expensive, especially when using other data collection methods such as interviews.
- **Bias:** Respondents were not prejudiced by the presence or the opinion of the researcher.
- **Analysis:** Information from quantitative questionnaires is usually simpler to analyse.

3.8.2 Design of Research Instrument

All the steps for ensuring that the questionnaire design complied with the guidelines of an effective and efficient questionnaire as suggested by Creswell (2012: 375) (such as designing of the research question and research objectives, developing a profile of the respondents by including questions about gender, age group, occupation, reviewing the current literature to discover questions that may be pertinent to this study) were followed.

Although there are advantages and disadvantages of self-administered electronic questionnaires as a research instrument, it was the preferred method for this research, since the study was highly structured with mainly closed-ended questions and a few open

questions to provoke more in-depth information. 'Closed-ended' questions that restrict the respondents' range of responses to questions are more suited to questionnaires, as they purposefully afford themselves to coding and to quantitative analysis (Cooper & Schindler, 2011:419) and were considered appropriate for the purpose of this study.

In addition, closed-ended questions provide the following advantages (Neuman, 2000:345):

- It is faster and effective for respondents to answer;
- It is easier to compare different respondents' answers;
- Replication is easier; and
- There are lessor inappropriate and possibly unclear answers to questions.

The study focused on predetermined questions that were not sensitive. In addition, all respondents were literate and had access to a computer.

3.8.3 Questionnaire Design

The first set of questions in the questionnaire was background questions. These sought to provide the respondent's profile. The second set of questions was Likert scale type questions concerned with the key study concepts and constructs.

The valid reliable construct scores which are created from ordinal Likert scale questions can be used as continuous variables (Creswell, 2012:165). Hofstee (2006:117) indicated that, to covert data into information, it must be statistically processed and analysed. The landscape of the data and the association between the method and the research objectives were carefully considered when the statistical methods for this study were selected.

Table 3.2 below shows a typical question in the questionnaire whereby there is one question containing twelve (12) items. Each item is an ordinal variable but when you add the answers to the twelve (12) questions you get a variable that is close to being a continuous variable, which was what was needed in order to do correlation analysis, factor analysis and structural equation modelling pertinent to this study.

Table 3.2: Example of Question

Please answer the questions in the table below by marking an 'X' in the appropriate column. **STRONGLY AGREE (1), AGREE (2), UNDECIDED (3), DISAGREE (4), STRONGLY DISAGREE (5))** for each of the following:

ORGANISATIONAL CAPABILITY EFFICIENCY is improved when "Managing organisational culture, structure, resources and competences for innovation" is implemented in parallel with:		1	2	3	4	5
1	Knowledge bases, repositories, databases, content management and dashboards.					
2	The structure for centre of excellence.					
3	Operational command structure and leadership.					
4	Informal structure to enable knowledge creation, sharing, collaboration and coordination.					
5	Increasing openness, knowledge sharing and the diffusion of knowledge for innovation.					
6	Positioning information and knowledge as a strategic resource.					
7	Creating valuable information from experiments, explorations or business Intelligence.					
8	Generating knowledge based on interpretation and translation.					
9	Managing Knowledge resources for transferability.					
10	Creating and retaining intellectual Assets.					
11	Coordinating expertise and pinpointing expert knowledge.					
12	Adopting best practices, lessons learning or benchmarking.					

The main categories of the questions in the questionnaire were the following:

- Innovation Capability (strategic, ideation, implementation, commercialisation);
- Knowledge Management Capability (technology, structure, culture, information, knowledge, expertise); and

- Organisational Capability Efficiency (economising on capability, mobilising of existing resources, determination of capability gaps, capability redundancy and optimising capability).

The following definitions which deemed important for the study and to answer the questionnaire were provided clearly to the respondents:

- Innovation;
- Knowledge Management;
- Innovation Capability;
- Knowledge Management Capability;
- Organisational Capability; and
- Organisational Capability Efficiency.

Overall, outline is a very important issue for questionnaire design. As shown in the question example above, the questions for this study were short, simple and to the point; questions were designed to facilitate computer analysis; questions gave clear instructions and questions did not have prestige bias (Eiselen, Uys and Potgieter, 2005:10). Refer Annexure C for survey questions.

In addition, the questions avoided double negatives; emotive language; accommodated all possible answers; were phrased neutrally and did not make assumptions. The response alternatives were mutually exclusive.

3.8.4 Choice of Measurement Scales

A five-point Likert scale was used in this study, where 1 = strongly agree, 2 = agree, 3 = Undecided, 4 = disagree and 5 = strongly disagree. In general, the Likert scales are extensively used and are appropriate in survey research. Likert scales are also typically named ‘summated rating’ or ‘additive’ scales since a respondents score on the scale is calculated by summing the responses to each individual item that the respondent provides. In this study, the items that were used to measure the constructs in the questionnaire are referred to as variables. Hence, variables and items are used interchangeably. Surveys are increasingly being used to measure quantitative variables and constructs (e.g. job

satisfaction) by using scales like the Likert Scale (Rensis, 1932). The Likert scale was mostly used in this research, due to the following advantages (Neuman, 2000: 271):

- Simplicity and ease of use for respondents;
- More complete multiple indicator measurement is probable when numerous items are combined;
- A comprehensive choice of constructs can be measured, which was the case in the study;
- Factor analysis typically lends itself to Likert scale questions or items; and
- Allows the researcher to use several statistical techniques.

The disadvantages of the Likert scale are (Neuman, 2000: 272):

- Diverse permutations of numerous scale items can consequently result in the matching overall score or value; and
- The response set is a possible shortcoming in terms of the validity of the results.

3.9 Research Data and Statistical Analysis

The analyses that were done in this study are shown in following table 3.3 and table 3.4.

Table 3.3: Descriptive Analysis

DESCRIPTIVE ANALYSIS (i.e., calculating measures of central tendency and variation in data, and making frequency distributions)	REASON
Exploratory analysis (frequency distribution)	To edit the data by checking for outliers to find out whether data makes sense or not.
Calculations of mean score, standard deviation, frequencies and percentages	To summarise the data and profile the target population.
Reliability tests (using Cronbach's Alpha coefficient)	To determine if the variables (i.e., constructs) were measured consistently and thus reliable.

Table 3.4: Inferential Analysis

INFERENTIAL ANALYSIS	REASON
Correlational analysis	Correlation analysis is utilised to conclude whether two scale variables (continuous) variables are linearly related. Determines whether factor analysis was worthwhile by using the KMO test.
Normality tests	Normality tests are utilised to conclude whether the observed distribution is Normally distributed. This is done using a Chi-squared test. Kolmogorov-Smirnov and/or Shapiro-Wilk tests.
Exploratory factor Analysis	To explore and know the underlying factors of a construct.
Confirmatory factor analysis	To test theories and for construct validity.
Structural equation modelling	To test the hypotheses and the proposed model.

In this study, each item in the opinion related sections of the questionnaire was measured on an ordinal Likert-type scale with 5 categories (numbered 1-5). By summating the responses of these items (related to the same issue) the researcher created a more continuous type of variable. Variables like these (continuous) lend themselves to more sophisticated and multivariate statistical analysis techniques. The landscape of the data and the association between the method and the research objectives were carefully considered when selecting the right statistical methods for this study.

3.10 Data Capturing

Firstly, the frequencies and/or descriptive of each item or question were captured. No incorrect data entries were allowed on the system. Users were constrained to select only one to five. If nothing was selected for a particular question, the system showed an error. The emailed questionnaires were inspected for correctness. The answers captured and stored were inspected for correctness. The software program SPSS (spss.en.softonic.com), which is designed for statistical processing, was used for processing the data.

3.11 Data Analysis

3.11.1 Quantitative Data Analysis

For this study, data analysis started with a simple descriptive of each variable, that is, frequencies and later on inferential analysis which involved factor analysis, SEM and regression analysis were done.

The analysis proceeded through the following process (Suhr, 2015:200):

1. Purpose of model identification whereby unique values are derived for parameter estimation; the number of degrees of freedom (d.f) and to determine if model testing is positive.
2. Preliminary descriptive statistical analysis (e.g., scaling, missing data, collinearity issues, outlier detection).
3. Estimation of the parameters in the regression models fit in the structural equation model.
4. Assessment of model fit (diagnostic statics and goodness of fit statistics). Assessment of model fit essentially estimates how comparable the predicted data are to matrices containing the relationships in the real data. Some of the frequently used measures of fit were ensued. These included: (1) Chi-square test and (2) Root mean square error of approximation (RMSEA). The RMSEA is normally used in Structural Equation Modelling to offer a mechanism for amending for sample size where chi-square statistics are utilised. It shows how well the model, with unidentified but optimally selected parameter estimates would fit the populations. Good models are measured to have a RMSEA of .05 or less. Models whose RMSEA is .1 or greater have a poor fit.
5. Presentation and interpretation of the results.

3.11.1.1 Pearson's Correlation Coefficient.

The strength and the direction of the linear relationship between a pair of continuous variables was Pearson's correlation (Creswell, 2012:351). Pearson's correlation analysis fluctuates between -1 and +1. When the correlation between the two variables was -1 or +1, it would denote a perfect correlation (either negative or positive) (Bryman and Cramer, 2001: 217). Levels between -1 and 1 refer to a degree of a linear relationship but not a perfect relationship while a level 0 refers to no linear relationship. To ascertain whether a

relationship was statistically significant, i.e. whether one can reject the Null-hypothesis of no relationship, a significant level of 0.05 was used in this study.

3.11.1.2 Collinearity and Outlier Detection

In regression analysis, when independent variables are uncorrelated, the value of a regression weight is unchanged irrespective of all the other predictor variables comprised in the regression equation. However, if they are correlated, the value of a regression weight is contingent on which other variables are incorporated in the model. Therefore, when independent variables are correlated, a regression coefficient does not merely reflect an inherent effect of the independent variable on the dependent variable but instead a partial effect. Because of this, estimated regression coefficients can fluctuate widely from one data set to an alternative data set (Dimitruk, Schermelleh-Engel, Kelava & Moosbrugger, 2007: 100-114). When independent variables are highly correlated, it is frequently problematic to differentiate between variance explained by X and variance explained by Z due to a high amount of shared variance and this is referred to as the collinearity problem. In order to sort this problem out, the analyst can drop a variable from the model, or ridge regression, a special type of regression, can be used.

In regression analysis, occasionally smaller outlying observations can have an extra-large effect on the estimated coefficients in the model. This has to be avoided by the analyst because it gives a poor model fit. In this study, leveraging was used to recognise and erase such observations from the data set. SPSS calculates centred leverages, which lie between 0 and (n-1)/n, where n is the number of observations. The mean value of this measure of leverage is p/n, where p is the number of independent variables. If all the observations have roughly equivalent effect on the estimated value of the coefficients, the leverages would be close to p/n. Observations for which leverage was greater than 2p/n were deleted for this study.

3.11.1.3 Exploratory Factor Analysis

Exploratory Factor Analysis (EFA) was done on each construct combining all items that measured it. This type of factor analysis differs from Confirmatory Factor Analysis (CFA). While EFA is used to explore the factor structure or dimensionality of a construct, CFA is used to confirm its uni-dimensionality. Exploratory Factor Analysis (EFA) is utilised to

reduce the dimensions of the items or questions related to the same issue or the items or questions within a given construct into meaningful scales (Suhr, 2004: 203-230). In this study, it was adopted to explore the possible underlying factor structure of a set of items for each of the constructs, that is, Innovation Capability, Knowledge Management Capability and Organisational Capability Efficiency and it was used to confirm that the items used to measure each of the constructs, indeed formed a single factor (Suhr, 2004; Jelonek, 2013).

3.11.1.4 Confirmatory Factor Analysis (CFA)

Confirmatory Factor Analysis (CFA) is used to deduce the ability of a predefined factor model to fit an observed set of data. Confirmatory Factor Analysis (CFA) is a statistical technique utilised to verify the factor structure of a set of observed variables (Suhr, 2004). In this study, CFA allowed the researcher to test the hypothesis that a relationship between observed variables and their underlying latent constructs, i.e. factors, exists (Suhr, 2004). It was used to check the uni-dimensionality of the constructs (whether the items in a construct indeed forms a single factor) namely Innovation Capability, Knowledge Management Capability and Organisational Capability Efficiency. If CFA could not confirm the uni-dimensionality of a construct or factor structure, EFA was done to explore the factor structure first.

According to Suhr (2015: 200), the utilisation of CFA could be effected by:

- The research hypothesis that is being tested;
- The necessity of sufficient sample size (e.g. 5-20 cases per parameter estimate);
- The measurement instruments that are being used;
- Multivariate normality;
- Parameter identification;
- Outliers;
- Missing data; and
- Interpretation of model fit indices.

All these issues were investigated to determine whether the results were valid.

3.11.1.5 Cronbach Alpha Coefficient

A prevalent method in measuring reliability of an underlying factor is the Cronbach Coefficient (Alpha value). The usage of Cronbach Alpha aimed to prove reliability or internal consistency of the items forming a factor according to EFA (Field, 2005:1). Values range between 0 and 1.0 with higher values representing higher reliability between the items. A low alpha value (< 0.7) shows that the underlying factor is not reliable. Should a single item increase the reliability of the factor, it is common practice to omit it from the factor as a means of increasing the alpha value of the factor (Hair, Anderson, Tatham & Black, 1995:618).

3.11.1.6 Structural Equation Model (SEM)

Structural Equation Modelling (SEM) is a succession of statistical methods that permit complex relationships between one or more independent variables and one or more dependent variables. Given there are many ways to describe SEM, it is most commonly understood of as a hybrid between a certain form of regression and some form of factor analysis.

SEM was used in this study. SEM is a methodology for demonstrating, estimating, and testing a network of relationships between variables (measured variables and latent constructs). It is a comprehensive statistical method used to test hypotheses about relations between observed and latent variables a methodology used to represent, estimate, and test a theory or methodology that is used to test hypothesised patterns of directional and non-directional relationships among a set of observed (measured) and unobserved (latent) variables. The goals in SEM are: 1) to recognise the patterns of correlation/covariance among a set of variables and 2) to explain as much of their variance as possible with the model that is specified in the research (Hox and Bechger, 2001: 354-373).

The SEM fitted in this study specified how well Innovation Capability and Knowledge Management Capability could predict OCE through alignment, as well as direct influences; and because prediction involves relationships, it could be viewed as five different regression models. The five paths represent the five regression models, namely:

1. Regression model of Combination of INNO & KMC (CIK), where CIK is the dependent variable and INNO is the independent variable;
2. Regression model where CIK is the dependent variable and KMC is the independent variable;
3. Regression model of OCE where OCE is the dependent variable and CIK is the independent variable;
4. OCE regression model where OCE is the dependent variable and INNO is the independent variable; and
5. Regression model of OCE where OCE is the dependent variable and KMC is the independent variable.

In general, path diagrams are a perfect way of summarising SEMs, where observed variables are shown as boxes and latent variables are shown as circles or ellipses. When one variable is thought to "cause" another variable, the relationship between the variables is shown as a directed or one-headed arrow, from cause to effect. Coefficients between two variables are also included as SEM, using a curved, two-headed arrow relating the variables. For each arrow, there can be an estimated loading or weight.

The resulting factors from the CFA were used in SEM. SEM was constructed and analysed using AMOS graphics (see Byme, 2001 for details). AMOS (Analysis of a Moment Structures) is statistical software which is an added SPSS module, particularly used for SEM, path analysis, and Confirmatory Factor Analysis. It is also identified as causal modelling software. A SEM for multivariate analyses with ordinal data was used for data analysis. For the research, a correlation matrix was used to determine the overall relationship of Innovation Capability, Knowledge Management Capability and Organisational Capability Efficiency. This was important to show significant correlations and interrelatedness among Innovation Capability, Knowledge Management Capability and Organisational Capability Efficiency.

SEMs may comprise one or more linear regression equations that show how some variables depend on others (Kline, 1998: 140). A linear regression model is a mathematical equation having a dependent variable on the left but independent variables on the right

hand side. The model is fitted to determine the effects of the independent variables on the dependent variable. These are referred to as structural equations, and the collection of them is named the Structural Equations Model. The coefficients describing how dependent variables depend on independent variables are sometimes called path coefficients. The SEM diagram (figure 3.3 below) represents the dependent variables, independent variables and constructs resulting from the literature review in Chapter 2, which was used for analysis.

To reiterate, regression analysis is a statistical method which can be utilised to analyse the relationship between a single dependent variable and a single of several independent variables. The objective of the regression analysis is to use the independent variables to predict the single dependent value which has been chosen by the researcher (Hair et al., 1998: 161).

The assumptions for regression analysis included (Hair et al., 1998: 181):

- That the sample is representative of the population for the inference prediction;
- The error is a random variable, which is normally distributed with a mean of zero and constant variable;
- The independent variables are measured with no error;
- The independent variables are linearly independent and not correlated, which means, that it is not likely to express any independent variable as a linear combination of the others to avoid the problem of collinearity or multi-collinearity;
- The errors are not correlated; and
- The variance of the error is constant across observations (i.e. homoscedasticity).

The path coefficient, which is derived from regression analysis, was used to measure the variability accounted for by the regression. The research utilised the t-test to test the regression coefficient and the slope of the regression line for significance (Creswell, 2012: 163).

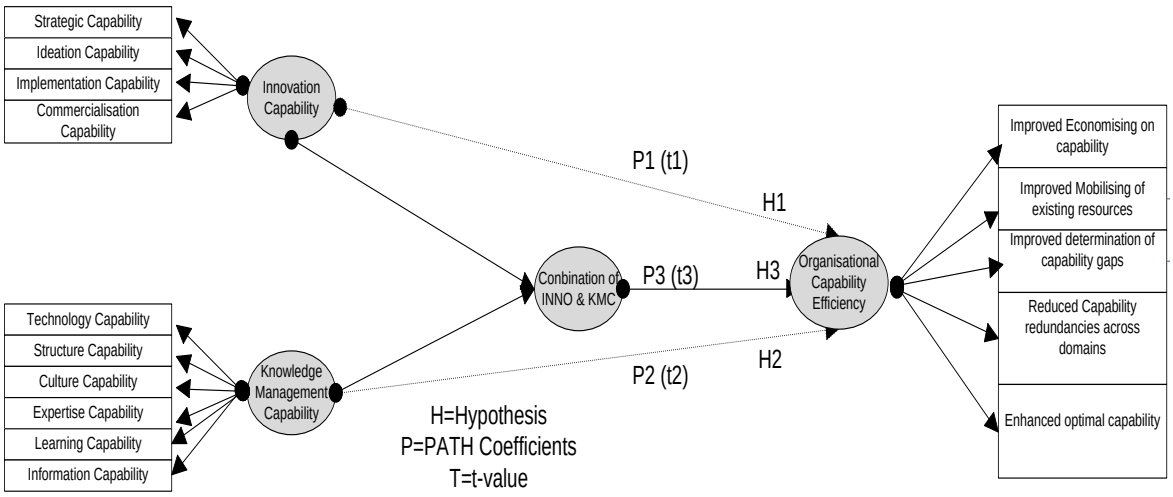

Figure 3.3: Structured Equation Model (Author, 2017)

Since the variable "Combination of INNO & KMC (CIK)" is a latent (hidden) variable, SEM was used to assess its impact on OCE (Jelonek, 2013). The "CIK" variable was treated as dependent on the two observed or indicator variables, namely, KMC and INNO, and was treated as an independent variable of OCE (as a dependent variable). This is a causal structure of relationships specified between KMC, INNO and OCE.

When using SEMs, the researcher specified which loadings and path coefficients were free to fluctuate, and which was static at specific values. The researcher specified whether the variables should theoretically be independent of each other, or whether they can co-vary from a theoretical perspective.

The procedure for estimating and assessing the fit of the SEM were as follows:

- The data were examined and checked to see if the necessary distributional assumption of normality was reasonable. Overall, the most applied estimation method for SEMs is maximum likelihood (ML) estimation. As indicated above, a key assumption for this method is multivariate normality for the exogenous variables, which are the variable determined outside the model or the independent variables. Goodness-of-fit measures assist to evaluate the model's fit.

- After reviewing the results, if necessary, he will try to adjust the model and try to improve the fit. In this research it was necessary to adjust the model to improve the fit.
- Competing models were compared to find out which were better than the other, and finally to come up with the best SEM.

Table 3.5 below, as presented by Hair et al. (1998: 601), details the absolute fit measures, incremental fit measures, and parsimonious fit measures that were used for diagnoses to satisfy the requirements of model fit. Incremental fit measures are model fit indexes, analogous to R2 for which a value of zero specifies having the worst possible model. The RMSEA is currently the most popular measure of model fit and it is presently stated in practically most published papers (Lee and Hershberger, 1990: 313-334; Hershberger, 1994: 68-105; Hair et al., 1998). The word Parsimony means developing an optimum simplest and shortest regression model. Parsimony-corrected fit indices in SEM are relative fit indices that are adjustments to most of the model fit indices such as χ2, GFI, and AGFI. The adjustments are to correct models that are less parsimonious, so that simpler theoretical processes are favoured above the ones which are more complex. The more complex the model is the lower is the fit index. Parsimonious fit indices include PGFI (based on the GFI), PNFI (based on the NFI), PNFI2 (based on Bollen's IFI), and PCFI.

Table 3.5: Fit test of the model (Hair et al., 1998: 601)

Absolute fit measures	X^2 with 71 degrees of freedom
	Goodness of fit index (GFI)
	Root mean square error of approximation (RMSEA)
	P-value for test of close fit (RMSEA
	Expected cross-validation index (ECVI)
	90 percent confidence interval for ECVI
	ECVI for saturated model
	ECVI for independence model
	Adjusted goodness of fit index (AGFI)
Incremental fit measures	Normed fit index (NFI)
	Non-normed fit index (NNFI)
	Comparative fit index (CFI)
	Incremental fit index (IFI)
	Relative fit index (RFI)
Parsimonious fit measures	Parsimony normed fit index (PNFI)
	Parsimony goodness of fit index (PGFI)
	Critical N (CN)
	Normed χ^2

Finally, the fit of the internal structure of the model was conducted to test the internal quality of the model.

As indicated above, for the first part of the model shown above, CIK is a dependent variable, KMC and INNO are the independent variables; but for the next causal flow, OCE is a dependent variable while CIK is the independent variable.

3.11.1.6.1 Hypotheses

For Hypothesis 1 four criteria derived from the literature were used to measure the INNO, that is: strategic, ideation, implementation and commercialisation (Kumar, 2013). The five criteria for OCE were economising on capability, mobilising existing resources appropriately, determining resource gaps and redundancies across domains and building an optimal capability for the future (Lin *et al*. 2013). For Hypothesis 1, a regression model (one of the paths) involving OCE as the dependent variable and INNO as the independent variable was fitted. The coefficient of INNO, as the effect of INNO on OCE was then tested using the t –test (i.e. whether it is statistically significant from zero (0)). If the probability of the t value occurring (as calculated from the sample values), was less than 0.05 (the level of significance) the null hypothesis was rejected and the alternative hypothesis that INNO positively affects OCE would be accepted. If the probability was more than 0.05, it would not be rejected, and if it was equal to 0.05, the null hypothesis would be inconclusive, regardless of whether the t -value is negative or positive.

For Hypothesis 2, a regression model involving OCE as the dependent variable and KMC as the independent variable was fitted. The coefficient of KMC, as the effect of KMC on OCE was then tested using the t –test. If the probability of the t value, calculated from the sample values, was less than 0.05 (the level of significance) the null hypothesis was rejected and the alternative hypothesis that KMC positively affect OCE would be accepted. If the probability was more than 0.05, it would not be rejected, and if it was equal to 0.05, the null hypothesis would be inconclusive.

For hypothesis 3, a regression model involving OCE as the dependent variable and Combination of INNO and KMC (CIK) as the independent variable was fitted. The coefficient of CIK, as the effect of CIK on OCE was then tested using the t –test. If the probability of the t value, calculated from the sample values, was less than 0.05 (the level of significance) the null hypothesis was rejected and the alternative hypothesis that, the

combination of INNO and KMC has a larger positive effect on OCE than their effects on OCE individually would be accepted. If the probability was more than 0.05, it would not be rejected, and if it was equal to 0.05, the null hypothesis would be inconclusive.

3.11.1.7 Regression Analysis to determine important KM factors of Innovation

A regression analysis was done to determine the important KMC factors that were needed to be aligned to INNO. INNO constructs were the dependent variables and the individual KMC items were the independent variables.

A regression model can be written as:

$$Y = \alpha + \beta x + e$$

Where Y is the dependent variable (e.g., INN1), x is a non-random variable, which is the independent variable (i.e., KM factor) and e is a random error distributed with mean zero and variance σ^2. α and β are the coefficients of the model. β is the effect of the independent variable (i.e., reverse auction) on the dependent variable.

3.11.2 Qualitative Data Analysis

These were the steps that were taken to analyse the qualitative data (Creswell, 1998:15):

Step 1: Organising the Data

The researcher viewed the full data set and systematically arranged it to address the research objectives (Mile & Huberman, 1994: 432).

Step 2: Finding and organising ideas and concepts

Data was categorised into salient themes or recurring ideas, and patterns (Marshall and Ross, 1995: 114).

Step 3: Building over-arching themes in the data

Response categories formed themes that gave a deeper meaning to the data. Some different categories were collapsed under one main over-arching theme.

Step 4: Ensuring validity and reliability in the data analysis and in the findings

The researcher ensured that accurate data was used by making sure that the data collected from the respondents was valid and really represented the reality; and was reliable, and not biased (Schopper, Doussantoussen & Orav, 1993: 401-412).

Step 5: Finding possible and plausible explanations of the findings

The researcher made an effort to find explanations for the findings and the implications of the findings by re-visiting the literature review.

3.12 Validity and Reliability Evaluation

Validity and reliability are important criteria for evaluating the accuracy of the research findings.

3.12.1 Validity

Validity describes how well scientific test measures are purported to measure or how well a research study actually reveals the realism it asserts to represent. There are different types of validity. These include internal validity, face validity, content validity, construct validity, external validity, criterion-related validity and sampling validity (Creswell, 2012: 303). The concept of internal validity refers to the way a study is conducted. The study was conducted so that inferences from the data were accurate (i.e., valid) and the extraneous factors on events were ruled out in the interpretation of the data. For face validity, the measure assessed the intended construct under study. It has to do with the attractiveness of the measurement instrument in terms of structure, formatting, colour, etc. Content validity ensures that all the research questions and study objectives are covered in the questionnaire; construct validity is utilised to warrant that the measure is measuring the construct accurately, making sure that all the aspects of the construct are taken into consideration; external validity intends to make sure that the sample results can justifiably be applied to the target population (Bryman, 2012:47). This is about generalising the study results. External validity was addressed by trying to use the entire target population. Criterion-related validity is adopted to forecast forthcoming or existing performance by correlating test results with alternative criterion of interest; sampling validity, like content validity, guarantees that the measure covers the extensive range of areas within the concept

that is being researched. In this study, validity was improved by, for example, making sure that the objectives of the research were clearly defined and operationalised, and by aligning the questionnaire to these objectives (Creswell, 2012: 491).

For the quantitative research, internal validity was insured by using a good representative sample of the target population. For a good representative sample, every characteristic in the target population must be well represented (i.e., proportionally) in the sample. In this study, every characteristic in the target population was fairly represented in the sample, whereby there were no biases in the sample. In addition, proper statistical data analysis techniques were used.

External validity was taken care of in this study by using the entire target population.

3.12.2 Reliability

Reliability is described as the repeatability of a specific set of research findings or how exactly they can be simulated in another identical study (Golafshani, 2010:7). Reliability can also be explained as the degree to which an assessment instrument yields stable and consistent outcomes. According to Takavol (2011:1), reliability can be described as the internal consistency of measuring a construct, which defines the degree to which all the items in a test measure the same concept or construct, therefore, it is associated to the inter-relatedness of the research items. Internal consistency must be determined prior a test can be employed for research or examination purposes to guarantee validity (Takavol, 2011:1). There are several ways of testing for reliability. For example, reliability can be measured by: iterating the same test or measure (test-retest), administering a comparable form (parallel test forms), by utilising single-administration techniques, dividing the test into two or more equal parts, or internal consistency to be measured with Cronbach's coefficient alpha. In this research, Cronbach coefficient (alpha) was used to measure reliability. The other methods can be an area for future research. The issue of reliability was also assured by sticking to the research results to be concluded only from the collected data.

3.12.3 Validity and Reliability of data gathering instrument

Validity ensures whether the researcher is actually measuring what he/she has set out to do (Sekaran and Bougie, 2010: 250). Validity is the establishment of sound confirmation to validate that the test interpretation (of scores about the concept or construct that the test is assumed to measure) matches its suggested use (Creswell, 2012:630). Validity is the degree to which all of the research evidence points to the envisioned interpretation of test scores for the planned purpose (Creswell, 2012:159). To meet the validity requirements, the following were undertaken in this study:

- A pilot study of the questionnaire was undertaken to judge the content and understanding of the items in questionnaire;
- The Likert Scale type questionnaires used to measure opinion-related items were considered an appropriate and effective instrument in research by increasing item homogeneity;
- The researcher ensured the completeness of questionnaires when they were received back from respondents. Incomplete questionnaires would produce missing data, which could affect the validity of SEM. Missing data affects the statistical power of SEM. For e.g., they can make the model fail to be identified or if identified, the model may not be appropriate;
- To encourage and stimulate the respondents, the importance of the research was explained to each respondent telephonically and in a cover letter; and
- The questions used in this research have been adapted from existing related studies, which placed a prominence on attaining the requirements of validity and reliability.

Face reliability of the data collection tool was addressed by consulting the literature on the various constructs the researcher wished to assess in the study. Face validity was verified by making sure that the formatting (i.e., spacing, size of letters, use of dark or light letters) was attractive. A pilot study was done to assess whether questions were understandable by individuals similar to those in the target group, and construct validity was determined through assessment by the supervisor and experts in the field as well as the literature.

In addition, the content validity was checked by confirming that the data collection instrument (i.e., questionnaire) was designed prudently to include all the essential

questions to answer the research question. All the principles of developing a questionnaire were stringently adhered to. This included length of the questionnaire, the structure, and format, the length and clarity of questions, etc. The research questionnaire was found to be long in the pilot study and questions were appropriately reduced thereafter for the actual study. This proved to be much more effective in the actual survey study. The validity of the research instruments were established by following the logic in which the questions was checked and rechecked against the objectives of the study both by the researcher and by acquiring support from experts. In this research, EFA was done to ensure construct validity. The researcher ensured that the data collection methods were error free and during the process of gathering the questionnaire, the researcher ensured that it was the selected respondents who actually completed the questionnaire.

Face validity of the questionnaire was dealt with by applying the principles of constructing a questionnaire, such as attending to the format of the questionnaire and the layout and making sure that it was user friendly.

The researcher considered the following to ensure reliability of the research instrument:

- Reliability of a measure point to the extent to which it is without bias and warrants consistent measurement across time and across different items in the instrument (Sekaran, 2003).

3.13 Research Methodology Limitations

The research method used in this study had the following limitations:

- The use of a questionnaire was a possible limitation, as it did not allow for observation, reflection of and rapport with respondents;
- Cost and time constraints limited the research design options. Not all employees in the target population responded;
- The researcher could not determine whether the sample was representative or not, and hence extrapolation of the results is questionable;
- Respondents were possibly NOT anonymous although confidentiality was assured in the cover letter (refer Annexure B for copy of questionnaire); and

- Respondents may have given socially acceptable answers to opinion related questions as a result of the previous limitation.

Despite the above-mentioned limitations, the research will still be worthwhile in respect of its contribution to the Innovation Capability, Knowledge Management Capability and Organisational Capability Efficiency studies.

3.14 Ethical Considerations

Neuman (2000: 91) emphasised that ethics in research spans the whole research process, that is, from the nature of the problem being examined, the reporting of the theoretical frameworks and studies, the background in which the research is conducted, the data gathering instruments being used, the data collection methods, the research subjects, the procedures selected to analyse the data, and the manner in which the data and findings are reported.

The issue of ethics in research methodology is primarily an issue with studies involving human beings, that is, the people the study is targeting. Although a researcher has the right to search for new knowledge, he or she cannot conduct a research at the expense and liability of the individuals being researched (Creswell, 2012: 277-280).

The following efforts were made to ensure that the research adhered to strict ethical guidelines:

- Partaking in the research study was voluntary;
- Information and evidence provided by respondents was preserved as confidential at all times (i.e. no information on any particular subject was released);
- The manner in which the research used, analysed and reported on the data did not discredit, cause harm or create negativity towards the participants;
- The researcher displayed professional mannerisms and ensured objectivity at all times when collecting data and communicating with the respondents;
- All work was clearly referenced to preclude possible plagiarism;
- Research information was not falsified; and

- This research did not condemn research undertaken by others, but did attempt to offer valuable criticism.

The following diagram depicts the research framework.

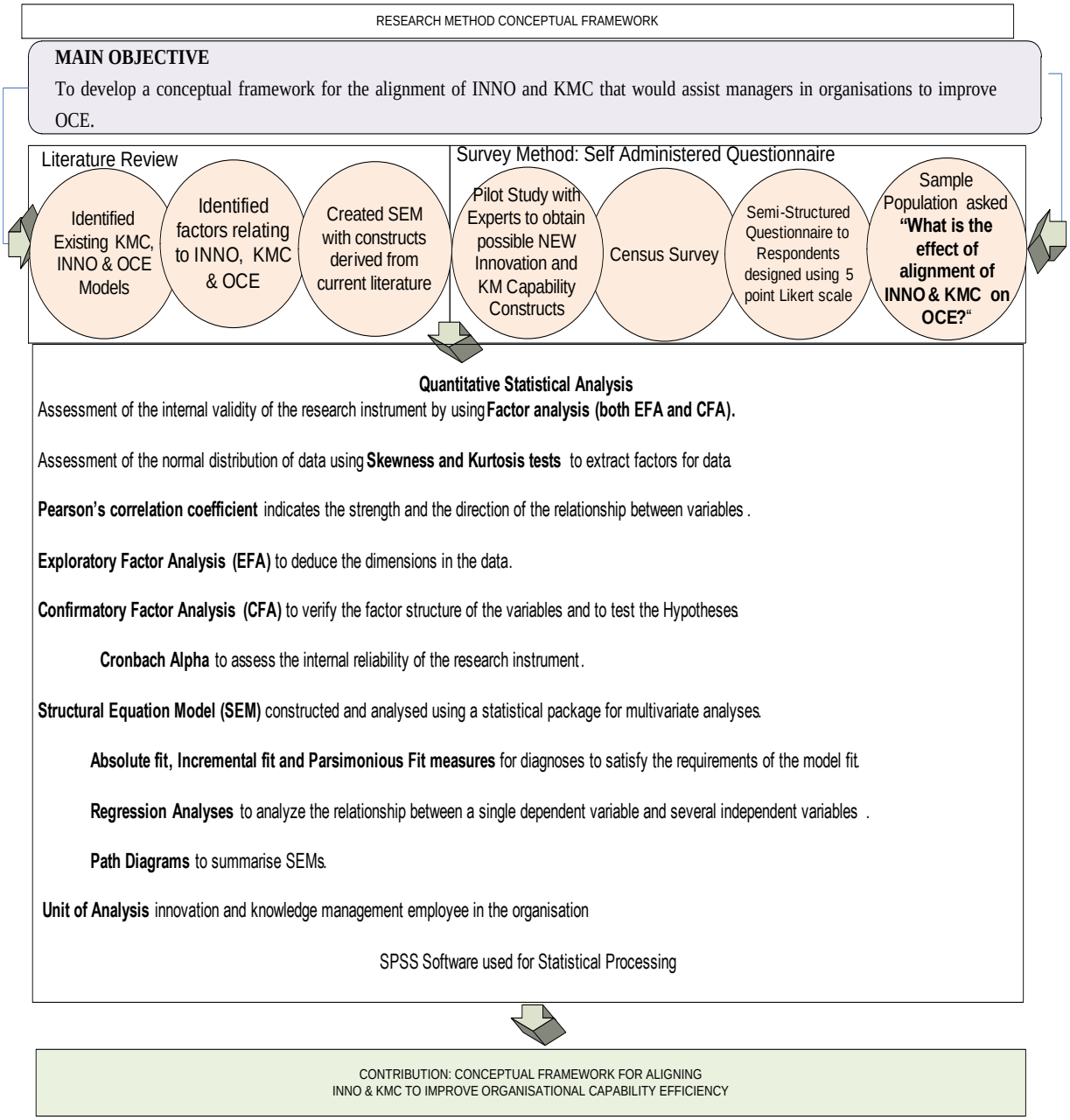

Figure 3.4: Research Method Conceptual Framework (Author)

3.15 Chapter Summary

The research methodology used was discussed in detail. Chapter 3 provided the opportunity to present the structure of the research methodology and the assurance that the research was undertaken in a methodological sequence. It justifies the chosen research design and approach by referring to literature from prominent research methodology authors. Research design, research methodology, the target population and sample size, data collection method, research instrument, research data, statistical analysis methods, validity and reliability, data analysis, limitations and ethical considerations of the research were considered in detail. The epistemological philosophy view was applied, which was positivism. The strategy was a cross-sectional survey.

For data analysis the researcher adopted a quantitative approach conducted through self-administered questionnaires, to achieve the study objectives. The questionnaire design and layout, population and sample and the procedure that was used for administering the questionnaire was discussed in this chapter.

The next chapter discusses the analysis of the data collected from the use of the questionnaires.

Chapter 4: Data Analysis and Discussion of Research Results

4.1 Introduction

This chapter presents the results of the study.

Of the following organisations that were contacted: i.e. 46 national government departments, 126 state-owned enterprises and 271 listed SA companies, approximately 95 organisations were willing to distribute the questionnaire to the relevant employees. For some, the researcher did not have contact details and other organisations refused to participate. Therefore, the target population consisted of all organisations including national government departments, state-owned enterprises and SA listed companies that are engaged in innovation and knowledge management in South Africa with contact information and were willing to participate.

Refer to Annexure D (National Government Directory, 2015 – Public organisations) and Annexure E (https://en.wikipedia.org/wiki/List_of_companies_traded_on_the_JSE - SA listed companies) for the details of the organisations contacted.

Only fully completed questionnaires, that is, questionnaires where all questions were answered were used. The respondents were all innovation and/or knowledge management employees. The reliability of the constructs and results of factor analysis, Structural Equation Modelling (SEM) and hypothesis tests are discussed. The chapter ends with a conclusion, which highlights the findings of the study.

The chapter consists of two sections: the first, section A, comprises of the results of descriptive whereas the second, section B, presents the results of inferential analysis.

Section A: Descriptive analysis

4.2 Background Information

4.2.1 Involvement in innovation and/or knowledge management programmes:

A total of 291 respondents filled in the questionnaire. Table 4.1 shows the total number of years respondents were involved in innovation and/or knowledge management programmes.

Table 4.1: Relevant work experience

Total number of years	Frequency	Percentage (%)	Cumulative percentage (%)
2 – 5 years	59	20.3	20.3
6 – 9 years	125	43.0	63.3
10 years or more	107	36.7	100.0
Total	291	100.0	

The figure below illustrates the distribution more clearly.

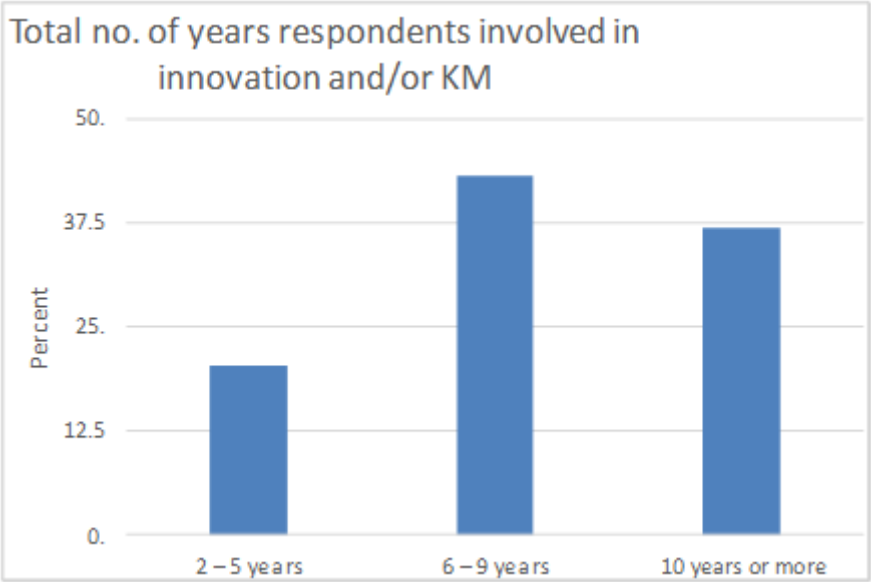

Figure 4.1: Relevant work experience

Table 4.1 and figure 4.1 show that a large number of respondents (63.3%) had been employed 10 years or more in the area of innovation and/or knowledge management. These people were assumed to have a good understanding, experience and expertise in this area.

4.2.2 Position held in organisation

Table 4.2: Position

Area	Frequency	Percentage (%)
Top Management (Board/Executive level)	18	6.2
Senior/Middle Management (Departmental Head, Business Unit Level)	86	29.6
Technical Consultant, Technical Lead, Senior Specialist	130	44.7
Specialist, Innovation or Knowledge Worker	49	16.8
Other(please specify)	8	2.7
	291	100.0

The figure below illustrates the distribution more clearly

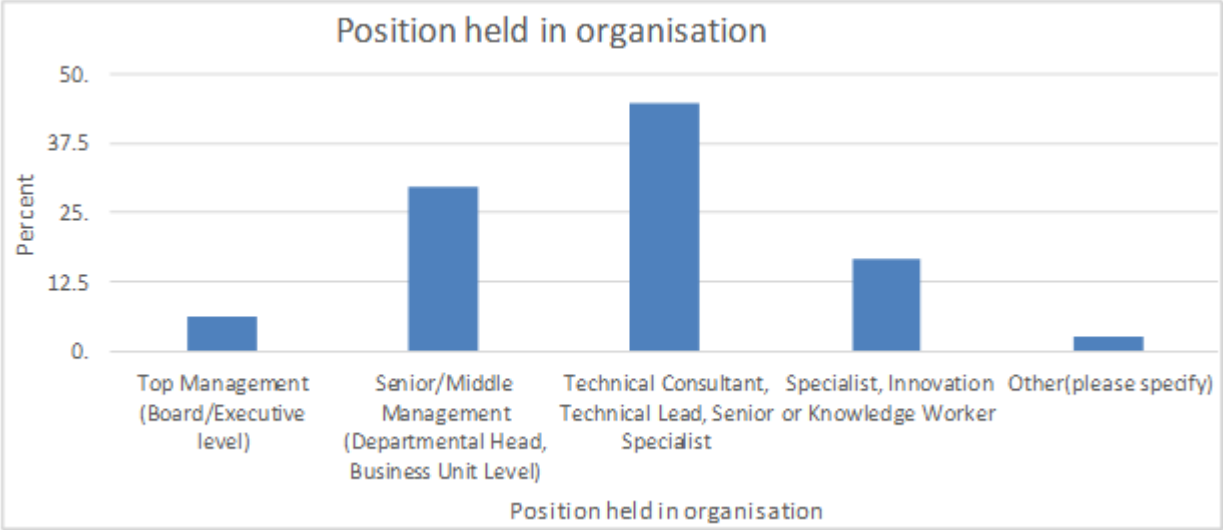

Figure 4.2: Position held in organisation

For this study, all respondents involved at different levels in innovation and knowledge management programmes in their organisations were targeted. The results indicate that the majority (74.3% = 29.6% + 44.7%) of the respondents were in senior/middle management, technical consultant, technical lead or senior specialist roles.

4.2.3 Highest education qualification obtained

The percentage distribution of education qualification is shown in table 4.3 and figure 4.3.

Table 4.3: Highest education

Highest qualification	Frequency	Percentage (%)
Matric	11	3.8
Diploma	28	9.6
Degree (undergraduate)	123	42.3
Degree (honours)	46	15.8
Degree (masters)	58	19.9
Degree (doctorate)	25	8.6
	291	100.0

Figure 4.3 shows the highest level of education distribution.

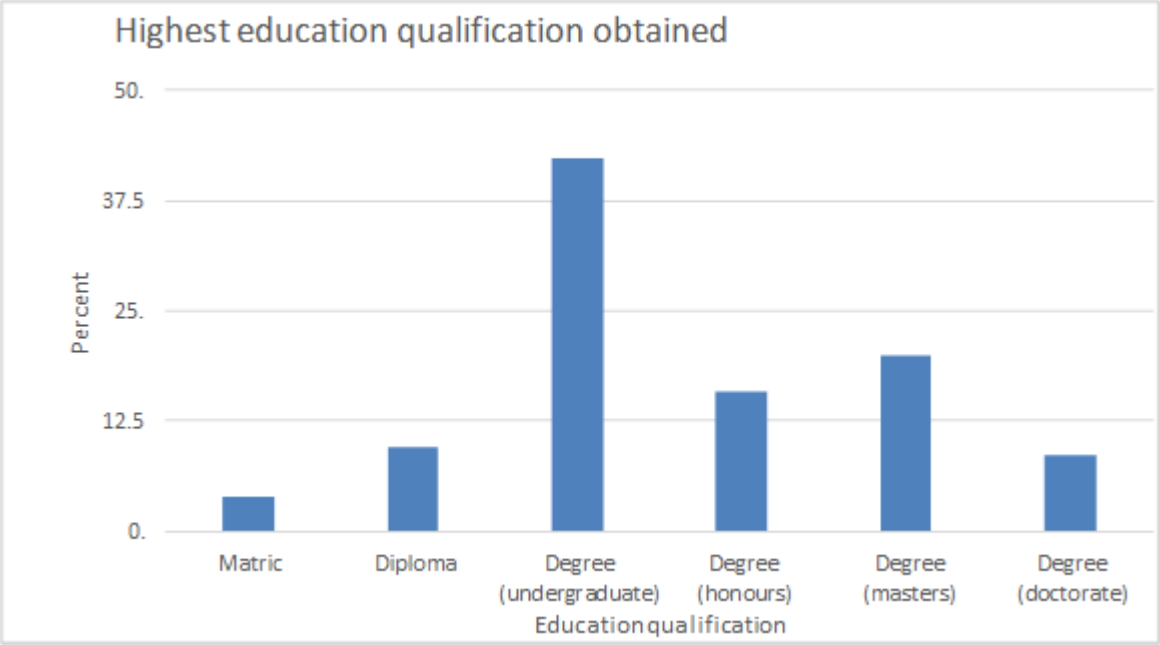

Figure 4.3: Highest Education

The results indicate that the majority of the respondents had an undergraduate degree (42.3%). It is interesting to note that 8.6% of the respondents held doctoral degrees. According to the results, 96.2% had at least a degree or diploma.

4.2.4 Core responsibilities to the organisation

Core responsibilities of the respondents are shown in table 4.4.

Table 4.4: Core Responsibilities

Core Responsibility	Frequency	Percentage (%)
To sponsor innovation and/or knowledge management programmes	13	4.5
To manage innovation and/or knowledge management programmes	44	15.1
To lead innovation and/or knowledge management programmes	65	22.3
To perform innovation and/or knowledge management programmes	147	50.5
Other Responsibilities (Please specify)	22	7.6
	291	100.0

Figure 4.4 shows the core responsibility of each respondent to the organisation.

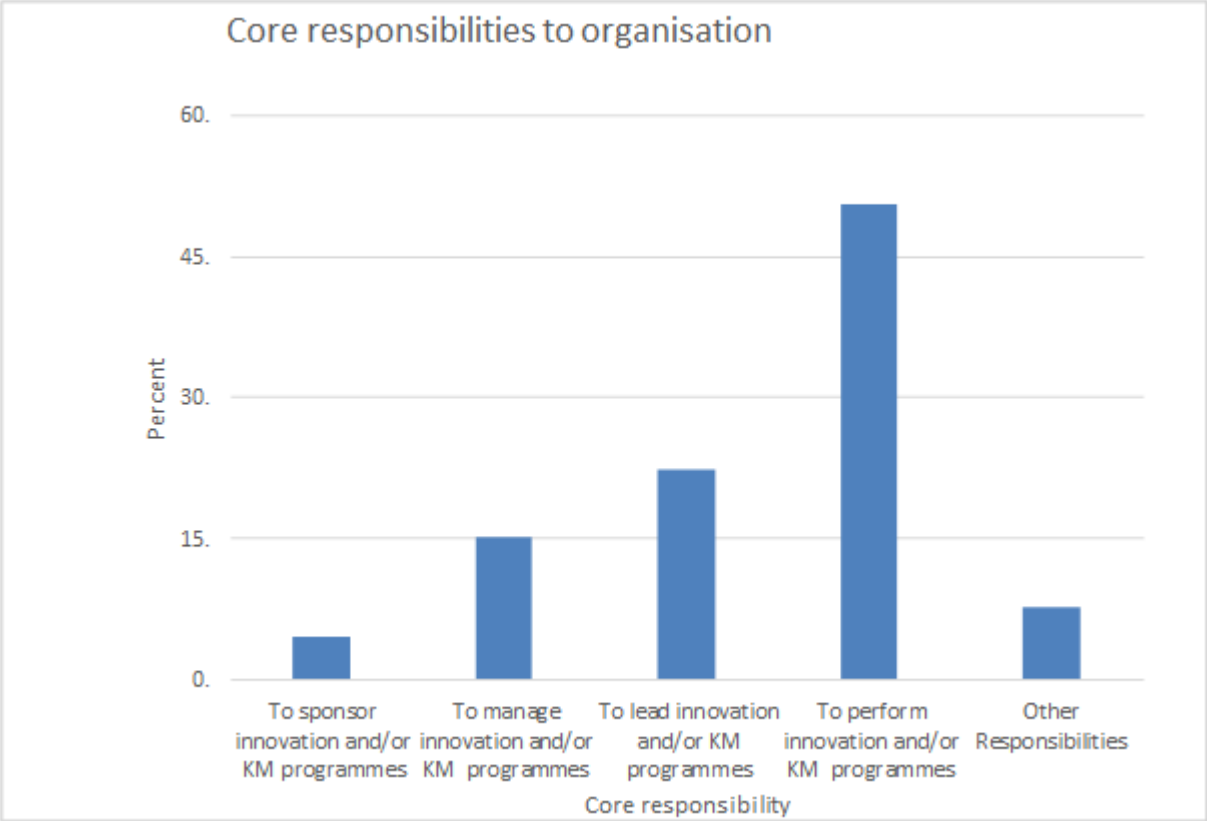

Figure 4.4: Core responsibilities to the organisation

Figure 4.4 shows that the core responsibilities of the majority of the respondents were to perform innovation and/or knowledge management programmes (50.5%).

4.2.5 Number of programmes

Table 4.5 shows the number innovation and/or knowledge management programmes respondents were involved in.

Table 4.5: Number of programmes

No of Programmes	Frequency	Percentage (%)
Less than 5	84	28.9
6 to 10	169	58.1
11 to 50	29	10.0
51 to 100	9	3.1
	291	100.0

Figure 4.5 illustrates this more clearly.

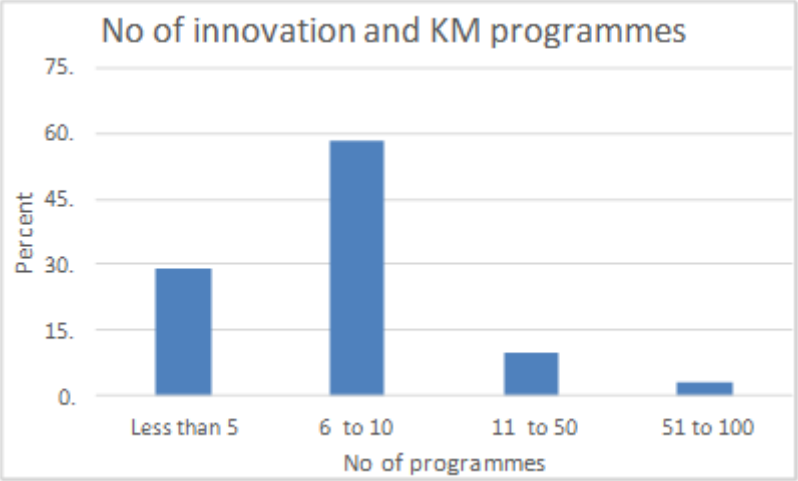

Figure 4.5: Number of programmes

According to the figure, the majority of the respondents were involved in between 6 and 10 or more innovation and / or knowledge management programmes (71.1%).

4.3 Study Constructs

The key study constructs for this study were Innovation Capability (INNO), Knowledge Management Capability (KMC) and Organisational Capability Efficiency (OCE).

4.3.1 Innovation Capability

Section B of the questionnaire of "Innovation Strategic Capability" comprised of four constructs: B1 (Conceptualising, designing, implementing and commercialising innovation programmes); B2 (The knowledge of competitor strategies, industry trends, and customer needs for innovation); B3 (The knowledge of technology environment and emerging trends for innovation); and B4 (Managing organisational culture, structure, resources and competences for innovation). These constructs were labelled INNO1, INNO2, INNO3 and INNO4 respectively.

Section C of the questionnaire had only one construct, C1 (Generating ideas in-house or through collaborative efforts or cross pollinating ideas or partner engagement) on which respondents were asked questions. This construct was labelled INNO5.

Like section B, section D comprised four different constructs. These are: D1 (prioritising ideas and converting them into products or processes that create value for innovation), D2 (screening and performing selection process, risk management and strategic disruptive decision making for innovation), D3 (undertaking new product development, customer engagement and assessing market potential for innovation) and D4 (doing new business development and partner engagement for innovation). The results were as follows. These constructs were labelled INNO6, INNO7, INNO8 and INNO9.

Section E of the questionnaire consisted of two constructs E1 and E2. These are E1 (delivering value to the customer and capturing a part of that value for innovation) and E2 (penetrating multiple channels, customer groups and competitive regions with innovation). These constructs were labelled INNO10 AND INNO11.

It should be noted that for each of these constructs, all the concepts were assumed to form one common factor. The first-order factors that had been extracted from them were too correlated, which resulted in having a collinearity problem, and the sample size necessary for valid results was not large enough for the many independent variables or indicators for the SEM. These problems did not exist when only eleven factors or indicators for INNO (when each construct formed one factor) were used in the analysis.

4.3.2 Knowledge Management Capability

For KMC as well, all the concepts, KMC1 to KMC12 were assumed to form one common factor.

The concepts were:

KMC1	Knowledge bases, repositories, databases, content management and dashboards.
KMC2	The structure for centre of excellence.
KMC3	Operational command structure and leadership.
KMC4	Informal structure to enable knowledge creation, sharing, collaboration and coordination.
KMC5	Increasing openness, knowledge sharing and the diffusion of

	knowledge for innovation.
KMC6	Positioning information and knowledge as a strategic resource.
KMC7	Creating valuable information from experiments, explorations or business Intelligence.
KMC8	Generating knowledge based on interpretation and translation.
KMC9	Managing knowledge resources for transferability.
KMC10	Creating and retaining intellectual Assets.
KMC11	Coordinating expertise and pinpointing expert knowledge.
KMC12	Adopting best practices, lessons learning or benchmarking.

4.3.3 Organisational Efficiency Capability

Similar to INNO and KMC, for OCE, all the five concepts that were used to measure the construct were assumed to form one common factor. The concepts were:

OCE1	Using fewer resources to support the same level of business or using the existing resources to support the larger volume of business improves Organisational Capability Efficiency?
OCE2	Leveraging and mobilising its resources improves Organisational Capability Efficiency?
OCE3	Performing resource analysis, filling those gaps and building capability for the future improves Organisational Capability Efficiency?
OCE4	Converging capability on clear goals and focused efforts improves Organisational Capability Efficiency?
OCE5	Conserving and utilising resources and capabilities to the fullest by co-opting resources through collaborative arrangements improves Organisational Capability Efficiency?

4.3.4 Mean scores and t test

As the Cronbach's Alpha coefficients of the variables were so high, all over .9, which may have indicated some systematic or random ticking of the answer on the questionnaire, the researcher combined 1 and 2 (strongly agree/agree), and 3, 4 and 5 (undecided, disagree/strongly disagree).

4.3.5 One sample t-test

The t distribution was applied to compare the mean scores on the Likert scale with the undecided score of 3 (which was the mid-point between strongly agree and strongly disagree) by using the one-sample t test.

THE T-SCORE IS CALCULATED AS FOLLOWS

$$T = \frac{\overline{X} - \mu}{S/\sqrt{n}}$$

Where $\overline{X}$ is the mean score, μ is the assumed mean value (in this case, it equals to 3), S is the sample standard deviation of the scores, Xi's (where i = 1, 2,…, n) and n is the sample size.

The following hypothesis:

H0: The mean score of a particular variable is equal to 3 or more than 3.
H1: The mean score of a particular variable is less than 3.

If the variance between the two values was statistically significant from zero, then the null hypothesis would be rejected and the alternative hypothesis that the mean score of the variable is less than 3 would be accepted. This would imply that the respondents agreed with the statement. Otherwise, if the variance was not significant the null hypothesis will not be rejected. This would imply that the respondents were either undecided or disagreed with the statement. The level of significance used was 0.05.

As an example, for question B1 [1], the mean score was 1.79 (which was less than 3), and the t-test analysis produced the following results: t = -24.505 (p=.000<.05).

The null hypothesis that the mean score = 3 was rejected because the P – value (0.000) for probability of the t value of -24.505 to occur was less than 0.05, the level of significance, and the alternative hypothesis that the mean score was less than 3 was accepted. This

implied that the respondents agreed with the statement that OCE is improved when "Conceptualising, designing, implementing and commercialising innovation programmes" is implemented aligned with knowledge bases, repositories, databases, content management and dashboards. Table 1 (Annexure F) shows the t-test results for all the items used to measure the constructs. Table 4.6 below presents the mean scores of the different constructs as well as the independent one sample t-test results.

Table 4.6: Mean score and t – test results

Variable	Mean score	Std.dev.	Skewness	Kurtosis	t-value	P-value	Decision
INNO1	1.84	0.732	1.536	4.748	-27.066	0.000	Reject
INNO2	2.69	0.6	0.353	1.205	-8.885	0.000	Reject
INNO3	2.08	0.675	2.003	6.925	-23.198	0.000	Reject
INNO4	2.45	0.69	0.96	1.535	-13.506	0.000	Reject
INNO5	1.88	0.785	1.506	4.123	-24.339	0.000	Reject
INNO6	2.38	0.711	0.975	2.043	-14.838	0.000	Reject
INNO7	2.7	0.769	0.394	0.555	-6.710	0.000	Reject
INNO8	2.13	0.667	1.811	6.212	-22.234	0.000	Reject
INNO9	2.84	0.585	0.249	2.138	-4.706	0.000	Reject
INNO10	2.3	0.686	1.283	2.794	-17.511	0.000	Reject
INNO11	2.33	0.695	1.261	2.818	-16.537	0.000	Reject
OCE1	2.35	1.077	0.907	0.233	-10.230	0.000	Reject

OCE2	1.52	0.844	1.942	3.761	-29.998	0.000	Reject
OCE3	2.01	0.871	1.077	1.843	-19.319	0.000	Reject
OCE4	1.48	0.856	2.216	5.232	-30.258	0.000	Reject
OCE5	2.03	0.907	0.636	0.173	-18.220	0.000	Reject
KMC	2.257	.55401	2.411	8.579	-22.891	0.000	Reject

All the hypotheses that the mean scores on the constructs were equal to 3 or above were rejected, and the alternative hypotheses that they were less than 3 were accepted. This implies that the respondents inclined to agree or strongly agree with all the statements in the questionnaire.

4.3.6 Test for Normality

Most standard statistical tests need the assumption of normality. The skewness and kurtosis measures are applied to investigate if a variable is normally distributed or not. For normality, skewness should be around zero, that is, between -1 and +1; and kurtosis should be between -2 and +2 (George & Mallery, 2010). According to table 4.6 above, some of the variables were not normally distributed because skewness ranged between 0.249 (NNO09) and 2.411 (KMC) and kurtosis ranged between 0.173 (OCE5) and 8.579 (KMC).

The Kolmogorov-Smirnov (K-S) test and the Shapiro-Wilk test were also applied to conclude if the sample data were normally distributed. The null hypothesis to be tested was:

H0: The sample data is NOT significantly different from a normal population.
H1: The sample data is significantly different from a normal population.

The results from the Kolmogorov-Smirnov (K-S) and the Shapiro-Wilk tests are illustrated in table 4.7 below. A probability of 0.05 or lower for either statistic means that the data is not normally distributed.

Table 4.7: Test for normality

Variables	Label	Kolmogorov-Smirnov			Shapiro-Wilk		
		Statistic	df	Sig.	Statistic	df	Sig.
INNO1	Innovation Strategic Conceptualising	.337	291	.000	.695	291	.000
INNO2	Innovation Strategic: Knowledge of Competitor & Industry Trends	.338	291	.000	.740	291	.000
INNO3	Innovation Strategic: Technology & Emerging Trends	.428	291	.000	.605	291	.000
INNO4	Innovation Strategic: Culture & Structure	.336	291	.000	.768	291	.000
INNO5	Innovation Ideation	.329	291	.000	.730	291	.000
INNO6	Innovation Implementation: Prioritising Ideas	.336	291	.000	.775	291	.000
INNO7	Innovation Implementation: Selection process	.251	291	.000	.844	291	.000
INNO8	Innovation Implementation: Product Development	.413	291	.000	.647	291	.000
INNO9	Innovation Implementation: Business Development	.372	291	.000	.720	291	.000

INNO10	Innovation Commercialisation: Customer Value	.385	291	.000	.727	291	.000
INNO11	Innovation Commercialisation: Channels	.372	291	.000	.736	291	.000
OCE1	Using fewer resources to support the same level of business or using the existing resources to support the larger volume of business	.316	291	.000	.836	291	.000
OCE2	Leveraging and mobilising its resources	.372	291	.000	.645	291	.000
OCE3	Performing resource analysis, filling those gaps and building capability for the future	.290	291	.000	.812	291	.000
OCE4	Converging capability on clear goals and focused efforts	.390	291	.000	.610	291	.000
OCE5	Conserving and utilizing resources and capabilities to the fullest by co-opting resources through collaborative arrangements	.218	291	.000	.847	291	.000
KMC	KMC	.213	291	.000	.761	291	.000

The Kolmogorov-Smirnov (K-S) and the Shapiro-Wilk tests indicated that the data is not normally distributed. This means that H0 was rejected at the 0.05 percentage level of significance (.000 <0.005<0.05) for all the variables and H1 is accepted for all the variables.

Factor analysis using the Principal Component Method which was done in this study, do not require that the sub-constructs must be normally distributed (Bentler & Chou, 1987). However, normality is needed as a basic assumption to apply the SEM analysis (Byrne, 2010). This means that the distribution of the data should be normal distribution with mean=0, standard deviation=1 and a symmetric bell shaped curve. Normally, the Skewness and Kurtosis measures are tested such that Skewness value is within the range ±1 for normal distribution and Kurtosis value is within range ±3 for normal distribution. Nevertheless, unless the departure from normality is very severe, SEM can still be valid with non-normal data (Bentler & Chou, 1987; Reinartz, Haenlein & Henseler, 2009).

Section B: Inferential Analysis

4.4 Factor Analysis and Structural Equation Modelling

4.4.1 Factor Analysis

This sub-section presents the results of factor analysis that was done to reduce the dimensionality of each of the sets of items (i.e. the sets of questions in INN01 – INN011; OCE1 – OCE5 and KMC) to extract as few a number of factors while still explaining a large percentage of variance in the original set of items. Typical reasons why construct validity may be at threat include inappropriate selection of items, inadequate sample size, measurement undertaken in few contexts, measurement undertaken with few measurement variables or items, a great variation in data, inappropriate choice of target subjects or small sample size, complex interaction between constructs, respondents providing biased responses or attempting to predict what they should say, not valid or research lacking rigour (O‘Leary-Kelly and Vokurka, 1998: 389).

Factor analysis was done by investigating the pattern of correlations between the observed measures. The measures that were highly correlated (either positively or negatively) were

likely to be effected by the same underlying factors, whereas those that were relatively uncorrelated were likely to be effected by diverse factors.

The variance explained criterion was applied. The researcher used the rule of keeping enough factors to account for at least 50% of the variation in the data, while the aim was to emphasise parsimony (explaining variance with as few factors as possible). Before excluding questions that make up a factor, but explains very little additional variable, the researcher checked its correlation with the dependent variable. Every factor consisting of a small number or items can have a large correlation with the dependent variable, in which case it should not be dropped.

For Factor Analysis, the Kaiser-Meyer-Olkin (KMO) test was adopted to measure sampling adequacy. It is an index that is utilised to associate the magnitudes of the observed correlation coefficients to the magnitudes of the partial correlation coefficients (George and Mallery, 2010). The KMO value should be greater than 0.5 for a satisfactory factor analysis to continue. Large values for the KMO measure indicate that a factor analysis of the variables is justified. Bartlett's test of Sphericity is utilised to test the null hypothesis that the variables in the population correlation matrix are uncorrelated. In order to proceed with the EFA, the P-VALUE of this test (i.e. that the items are correlated should be rejected) – otherwise there is multicollinearity. In addition, confirmatory factor analysis (CFA) was done on every key construct, i.e. INNO, KMC, and OCE to test its validity. This was done to verify the factor structure of the set of observed variables that constituted the construct.

Table 4.8 below shows the correlation matrix for the KMC construct.

Table 4.8: Correlation matrix

	KMC1	KMC2	KMC3	KMC4	KMC5	KMC6	KMC7
KMC1	1	.564**	.604**	.567**	.642**	.670**	.569**

KMC2		1	.594**	.590**	.650**	.639**	.546**
KMC3			1	.570**	.628**	.587**	.578**
KMC4				1	.634**	.566**	.588**
KMC5					1	.702**	.597**
KMC6						1	.540**
KMC7							1
KMC8							
KMC9							
KMC10							
KMC11							
KMC12							

	KMC8	KMC9	KMC10	KMC11	KMC12
KMC1	.561**	.553**	.527**	.646**	.640**
KMC2	.530**	.551**	.559**	.660**	.665**
KMC3	.559**	.508**	.487**	.636**	.559**
KMC4	.514**	.530**	.448**	.648**	.554**
KMC5	.560**	.620**	.562**	.655**	.646**

KMC6	.545**	.561**	.602**	.633**	.677**
KMC7	.561**	.582**	.551**	.686**	.634**
KMC8	1	.568**	.524**	.598**	.576**
KMC9		1	.548**	.604**	.575**
KMC10			1	.617**	.625**
KMC11				1	.679**
KMC12					1

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

All the correlations are highly significant, which means that all the items are very strongly correlated. Principal Component Analysis (PCA) with Varimax rotation had a KMO of 0.875 and Bartlett's sphericity of 1585.445 (p=.000<0.01) signifying that such a process would end in a more parsimonious number of factors. The communalities, which indicate how much variability has been extracted from an item by the underlying factors, are detailed in Annexure G.

The principal component method was adopted to extract the common factors from the correlation matrix. The extraction was based on the Eigenvalue of greater than one. The scree plots diagram below (figure 4.6) shows very clearly that only one common factor with a percentage cumulative extraction sum of squared loadings of 62.551, should be extracted.

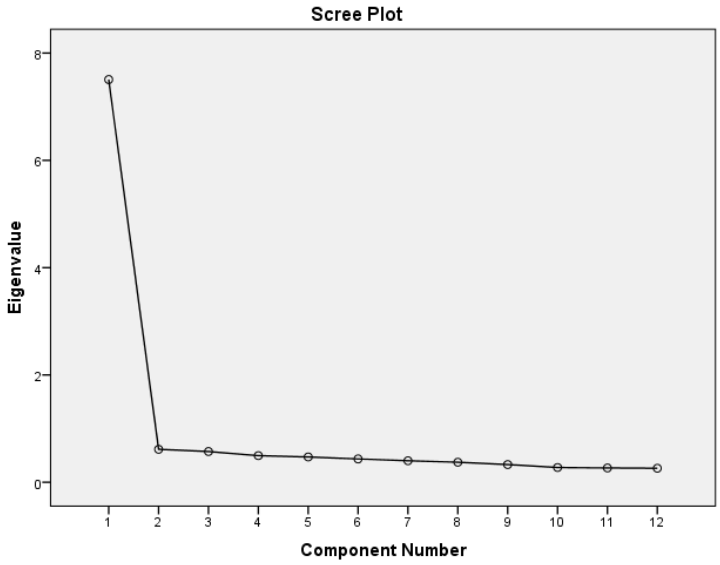

Figure 4.6: Scree Plots diagram

The total variance explained results are detailed in Annexure H.

The loadings of the variables were as follows:

Variable	Label	Loadings
KMC1	Knowledge bases, repositories, databases, content management and dashboards.	.797
KMC2	The structure for centre of excellence.	.797
KMC3	Operational command structure and leadership.	.770
KMC4	Informal structure to enable knowledge creation, sharing, collaboration and coordination.	.759
KMC5	Increasing openness, knowledge sharing and the diffusion of knowledge for innovation.	.835
KMC6	Positioning information and knowledge as a strategic resource.	.816
KMC7	Creating valuable information from experiments, explorations or business Intelligence.	.784
KMC8	Generating knowledge based on interpretation and translation.	.745

KMC9	Managing Knowledge resources for transferability.	.757
KMC10	Creating and retaining intellectual Assets.	.741
KMC11	Coordinating expertise and pinpointing expert knowledge.	.852
KMC12	Adopting best practices, lessons learning or benchmarking.	.828

All the items of KMC were combined by adding them together and mean scores were then used in SEM due to the fact that only one factor was extracted from the data.

4.4.1.1 Factors of constructs and reliability tests

1. Table 1 (Annexure I) shows the factors extracted from the key constructs and their reliability measures. The reliability was evaluated using Cronbach's coefficient alpha, where alpha coefficients more than 0.7 was accepted. Cronbach's alpha is a measurement of the variance within an item and the co-variance between a specific item and any other item on the scale (Field 2009: 674; Thorndike, Cunningham, Thorndike, and Hagen, 1991). All the Alpha coefficient estimates were above 0.7 except one, which implies that the data were reliable.

A first order factor analysis was used to validate the constructs by knowing exactly which concepts should be used to measure the construct or to know the actual dimensions of a particular construct. Confirmatory Factor Analysis was used to confirm these dimensions, i.e. they form the construct.

Table 4.9: Innovation Capability Factors

1. INNO1 consisted of two first order factors as follows:

Factor 1	Item	Cronbach's Alpha = 0.869	Loading
	B1[1]	Knowledge bases, repositories, databases, content management and dashboards.	.716
	B1[2]	The structure for centre of excellence.	.647
	B1[5]	Increasing openness, knowledge sharing and the diffusion of knowledge for innovation.	.755
	B1[6]	Positioning information and knowledge as a strategic resource.	.638

	B1[7]	Creating valuable information from experiments, explorations or business Intelligence.	.645
	B1[9]	Managing Knowledge resources for transferability.	.618
	B1[10]	Creating and retaining intellectual Assets.	.694
	B1[12]	Adopting best practices, lessons learning or benchmarking.	.637
Factor 2		**Cronbach's Alpha = 0.684**	
	B1[3]	Operational command structure and leadership.	.650
	B1[4]	Informal structure to enable knowledge creation, sharing, collaboration and coordination.	.764
	B1[8]	Generating knowledge based on interpretation and translation.	.622
	B1[11]	Coordinating expertise and pinpointing expert knowledge.	.601

2. INNO2 consisted of the following factors:

Factor 1	**Item**	**Cronbach's Alpha = 0.905**	**Loading**
	B2[2]	The structure for centre of excellence.	.842
	B2[7]	Creating valuable information from experiments, explorations or business Intelligence.	.851
	B2[9]	Managing Knowledge resources for transferability.	.885
	B2[10]	Creating and retaining intellectual Assets.	.888
	B2[11]	Coordinating expertise and pinpointing expert knowledge.	.873
Factor 2		**Cronbach's Alpha = 0.799**	
	B2[1]	Knowledge bases, repositories, databases, content management and dashboards.	.651
	B2[3]	Operational command structure and leadership.	.655
	B2[4]	Informal structure to enable knowledge creation, sharing, collaboration and coordination.	.657
	B2[5]	Increasing openness, knowledge sharing and the diffusion of knowledge for innovation.	.753
	B2[6]	Positioning information and knowledge as a strategic	.685

		resource.	
	B2[8]	Generating knowledge based on interpretation and translation.	.619
	B2[12]	Adopting best practices, lessons learning or benchmarking.	.628

3. INNO3 consisted of the following factors:

Factor 1	**Item**	**Cronbach's Alpha = 0.913**	**Loading**
	B3[1]	Knowledge bases, repositories, databases, content management and dashboards.	.731
	B3[2]	The structure for centre of excellence.	.646
	B3[4]	Informal structure to enable knowledge creation, sharing, collaboration and coordination.	.631
	B3[5]	Increasing openness, knowledge sharing and the diffusion of knowledge for innovation.	.723
	B3[6]	Positioning information and knowledge as a strategic resource.	.700
	B3[7]	Creating valuable information from experiments, explorations or business Intelligence.	.663
	B3[9]	Managing Knowledge resources for transferability.	.676
	B3[10]	Creating and retaining intellectual Assets.	.691
	B3[11]	Coordinating expertise and pinpointing expert knowledge.	.712
	B3[12]	Adopting best practices, lessons learning or benchmarking.	.746
Factor 2		**Cronbach's Alpha = 0.704**	**Loading**
	B3[3]	Operational command structure and leadership.	.899
	B3[8]	Generating knowledge based on interpretation and translation.	.909

4. INNO4 consisted of the following factors:

Factor 1	**Item**	**Cronbach's Alpha = 0.867**	**Loading**
	B4[1]	Knowledge bases, repositories, databases, content management and dashboards.	.810

	B4[4]	Informal structure to enable knowledge creation, sharing, collaboration and coordination.	.787
	B4[5]	Increasing openness, knowledge sharing and the diffusion of knowledge for innovation.	.858
	B4[7]	Creating valuable information from experiments, explorations or business Intelligence.	.842
	B4[8]	Generating knowledge based on interpretation and translation.	.832
	B4[12]	Adopting best practices, lessons learning or benchmarking.	.872
Factor 2		**Cronbach's Alpha = 0.835**	**Loading**
	B4[2]	The structure for centre of excellence.	.746
	B4[3]	Operational command structure and leadership.	.659
	B4[6]	Positioning information and knowledge as a strategic resource.	.665
	B4[9]	Managing Knowledge resources for transferability.	.691
	B4[10]	Creating and retaining intellectual Assets.	.714
	B4[11]	Coordinating expertise and pinpointing expert knowledge.	.656

5. INNO5 consisted of the following factors:

Factor 1	**Item**	**Cronbach's Alpha = 0.924**	**Loading**
	C1[1]	Knowledge bases, repositories, databases, content management and dashboards.	.525
	C1[2]	The structure for centre of excellence.	.623
	C1[4]	Informal structure to enable knowledge creation, sharing, collaboration and coordination.	.723
	C1[5]	Increasing openness, knowledge sharing and the diffusion of knowledge for innovation.	.595
	C1[6]	Positioning information and knowledge as a strategic resource.	.619
	C1[7]	Creating valuable information from experiments, explorations or business Intelligence.	.597
	C1[8]	Generating knowledge based on interpretation and translation.	.697
	C1[9]	Managing Knowledge resources for transferability.	.695

	C1[10]	Creating and retaining intellectual Assets.	.686
	C1[11]	Coordinating expertise and pinpointing expert knowledge.	.699
	C1[12]	Adopting best practices, lessons learning or benchmarking.	.604
Factor 2			
	C1[3]	Operational command structure and leadership.	

6. INNO6 consisted of the following factors:

Factor 1	**Item**	**Cronbach's Alpha = 0.854**	**Loading**
	D1[2]	The structure for centre of excellence.	.814
	D1[6]	Positioning information and knowledge as a strategic resource.	.864
	D1[7]	Creating valuable information from experiments, explorations or business Intelligence.	.834
	D1[8]	Generating knowledge based on interpretation and translation.	.816
	D1[9]	Managing Knowledge resources for transferability.	.841
Factor 2		**Cronbach's Alpha = 0.833**	**Loading**
	D1[1]	Knowledge bases, repositories, databases, content management and dashboards.	.522
	D1[3]	Operational command structure and leadership.	.512
	D1[4]	Informal structure to enable knowledge creation, sharing, collaboration and coordination.	.542
	D1[5]	Increasing openness, knowledge sharing and the diffusion of knowledge for innovation.	.658
	D1[10]	Creating and retaining intellectual Assets.	.660
	D1[11]	Coordinating expertise and pinpointing expert knowledge.	.687
	D1[12]	Adopting best practices, lessons learning or benchmarking.	.776

7. INNO7 consisted of the following factors:

Factor 1	**Item**	**Cronbach's Alpha = 0.881**	**Loading**

	D2[2]	The structure for centre of excellence.	.740
	D2[4]	Informal structure to enable knowledge creation, sharing, collaboration and coordination.	.757
	D2[5]	Increasing openness, knowledge sharing and the diffusion of knowledge for innovation.	.825
	D2[6]	Positioning information and knowledge as a strategic resource.	.870
	D2[8]	Generating knowledge based on interpretation and translation.	.814
	D2[10]	Creating and retaining intellectual Assets.	.854
	D2[11]	Coordinating expertise and pinpointing expert knowledge.	.832
Factor 2		**Cronbach's Alpha = 0.800**	**Loading**
	D2[1]	Knowledge bases, repositories, databases, content management and dashboards.	.702
	D2[3]	Operational command structure and leadership.	.689
	D2[7]	Creating valuable information from experiments, explorations or business Intelligence.	.699
	D2[9]	Managing Knowledge resources for transferability.	.689
	D2[12]	Adopting best practices, lessons learning or benchmarking.	.689

8. INNO8 consisted of the following factors:

Factor 1	**Item**	**Cronbach's Alpha = 0.826**	**Loading**
	D3[1]	Knowledge bases, repositories, databases, content management and dashboards.	.807
	D3[4]	Informal structure to enable knowledge creation, sharing, collaboration and coordination.	.661
	D3[5]	Increasing openness, knowledge sharing and the diffusion of knowledge for innovation.	.687
	D3[6]	Positioning information and knowledge as a strategic resource.	.504
	D3[9]	Managing Knowledge resources for transferability.	.496
	D3[12]	Adopting best practices, lessons learning or benchmarking.	.658

Factor 2		**Cronbach's Alpha = 0.771**	
	D3[2]	The structure for centre of excellence.	.860
	D3[3]	Operational command structure and leadership.	.841
	D3[10]	Creating and retaining intellectual Assets.	.864
Factor 3		**Cronbach's Alpha = 0.683**	**Loading**
	D3[7]	Creating valuable information from experiments, explorations or business Intelligence.	.737
	D3[8]	Generating knowledge based on interpretation and translation.	.779
	D3[11]	Coordinating expertise and pinpointing expert knowledge.	.623

9. INNO9 consisted of the following factors:

Factor 1	**Item**	**Cronbach's Alpha = 0.890**	**Loading**
	D4[1]	Knowledge bases, repositories, databases, content management and dashboards.	.771
	D4[2]	The structure for centre of excellence.	.832
	D4[4]	Informal structure to enable knowledge creation, sharing, collaboration and coordination.	.723
	D4[5]	Increasing openness, knowledge sharing and the diffusion of knowledge for innovation.	.781
	D4[7]	Creating valuable information from experiments, explorations or business Intelligence.	.801
	D4[8]	Generating knowledge based on interpretation and translation.	.776
	D4[9]	Managing Knowledge resources for transferability.	.849
	D4[10]	Creating and retaining intellectual Assets.	.832
Factor 2		**Cronbach's Alpha = 0.801**	**Loading**
	D4[3]	Operational command structure and leadership.	.718
	D4[6]	Positioning information and knowledge as a strategic resource.	.765
	D4[11]	Coordinating expertise and pinpointing expert knowledge.	.677
	D4[12]	Adopting best practices, lessons learning or	.711

		benchmarking.	

10. INNO10 consisted of the following factors:

Factor 1	Item	Cronbach's Alpha = 0.876	Loading
	E1[1]	Knowledge bases, repositories, databases, content management and dashboards.	.636
	E1[2]	The structure for centre of excellence.	.700
	E1[3]	Operational command structure and leadership.	.728
	E1[6]	Positioning information and knowledge as a strategic resource.	.697
	E1[7]	Creating valuable information from experiments, explorations or business Intelligence.	.672
	E1[8]	Generating knowledge based on interpretation and translation.	.720
	E1[11]	Coordinating expertise and pinpointing expert knowledge.	.630
	E1[12]	Adopting best practices, lessons learning or benchmarking.	.674
Factor 2		**Cronbach's Alpha = 0.831**	**Loading**
	E1[4]	Informal structure to enable knowledge creation, sharing, collaboration and coordination.	.791
	E1[5]	Increasing openness, knowledge sharing and the diffusion of knowledge for innovation.	.839
	E1[9]	Managing Knowledge resources for transferability.	.836
	E1[10]	Creating and retaining intellectual Assets.	.871

11. INNO11 consisted of the following factors:

Factor 1	Item	Cronbach's Alpha = 0.880	Loading
	E2[6]	Positioning information and knowledge as a strategic resource.	.855
	E2[8]	Generating knowledge based on interpretation and translation.	.736
	E2[10]	Creating and retaining intellectual Assets.	.847
	E2[11]	Coordinating expertise and pinpointing expert	.850

		knowledge.	
	E2[12]	Adopting best practices, lessons learning or benchmarking.	.865
Factor 2		**Cronbach's Alpha = 0.867**	**Loading**
	E2[1]	Knowledge bases, repositories, databases, content management and dashboards.	.658
	E2[2]	The structure for centre of excellence.	.787
	E2[3]	Operational command structure and leadership.	.707
	E2[4]	Informal structure to enable knowledge creation, sharing, collaboration and coordination.	.667
	E2[5]	Increasing openness, knowledge sharing and the diffusion of knowledge for innovation.	.707
	E2[7]	Creating valuable information from experiments, explorations or business Intelligence.	.672
	E2[9]	Managing knowledge resources for transferability.	.836

12. OCE consisted of the following factors:

Factor 1	**Item**	**Cronbach's Alpha = 0.703**	**Loading**
	F1sq001	Using fewer resources to support the same level of business or using the existing resources to support the larger volume of business improves Organisational Capability Efficiency?	0.308
	F1sq002	Leveraging and mobilising its resources improves Organisational Capability Efficiency?	0.798
	F1sq003	Performing resource analysis, filling those gaps and building capability for the future improves Organisational Capability Efficiency?	0.787
	F1sq004	Converging capability on clear goals and focused efforts improves Organisational Capability Efficiency?	0.813
	F1sq005	Conserving and utilizing resources and capabilities to the fullest by co-opting resources through collaborative arrangements improves Organisational Capability Efficiency?	0.792

The reliability of the factors ranged between 0.683 and 0.924, which implied that the constructs can be assumed reliable. This implies that similar results should be obtained if another researcher did the same study, using the same or similar methods. Referring to section 4.3.1, because of the collinearity problem and sample size problem, these first-order factors were not used in SEM as such; rather, one factor was formed from each construct and used in the analysis. These factors were formed by adding all scores for all items, measuring a construct and the sum being divided by 12 (i.e., the number of items) to obtain mean scores for particular factors (the INNOs). Therefore, this means that the INNOs were used as observed measures and not as latent variables in SEM.

It should be noted that KMC was used as an observed measure and not as a latent variable in the modelling. Confirmatory Factor Analysis (CFA) was done on the constructs before Structural Equation Modelling, which was used to fit a structural model for Organisational Capability Efficiency to find out whether the combination of INNO and KMC had a better effect on OCE than using them separately.

4.4.2 Structural Equation Modelling

Structural Equation Modelling is applied to analyse structural relationships. This research method is the combination of factor analysis and multiple regression analysis. It is utilised to analyse structural relationships between measured variables and latent constructs. So, Structural Equation Modelling, apart from being used to develop a framework, was also used to test the three hypotheses.

According to Serumaga-Zake (2014:47), the way Structural Equation Modelling (SEM) is applied is as follows:

- You state the manner that you consider the variables are inter-related, mostly using a path diagram;
- You determine, via some internal rules, what the inferences are for the variances and covariance of the variables;
- You check whether the variances and covariance fit this model;
- The results of the statistical analysing, and also parameter estimates and standard errors for the numerical coefficients in the linear equations are conveyed; and

- You resolve whether the model seems like a good fit to your data.

As described in chapter 3 (section 3.11.1.6), SEM allows the researcher to perform some type of multilevel regression on factors. It was derived through SEM the influence and relationship of each factor on the other. This exposed the critical dependent variables with respect to independent variables. Hence, SEM can theoretically be used to answer all research questions involving the indirect or direct observation of one or more independent variables or one or more dependent variables. However, the main aim of SEM is to determine and validate a proposed causal process and/or model. Therefore, SEM is a confirmatory technique.

4.4.2.1 Hypothesis tests

This study sought to explore the effect of alignment of INNO and KMC on OCE. The relevant hypotheses are as follows.

Hypothesis 1

H_0^1 INNO does not affect OCE.

H_1: INNO positively affects OCE.

Hypothesis 2

H_0^2 KMC does not affect OCE.

H_2: KMC positively affects OCE.

Hypothesis 3

H_0^3 The combination of INNO and KMC does not have a larger positive effect on OCE than their effects on OCE individually.

H_3: The combination of INNO and KMC has a larger positive effect on OCE than their effects on OCE individually.

In this research, seven (7) common measures of model fit were selected as shown in the table below. These include chi-square value, minimum discrepancy divided by degrees of freedom (CMIN/DF), Root mean square error of approximation (RAMSEA), Normed fit index (NFI), Incremental fit index (IFI), p-value for test of close fit (PCLOSE),

comparative fit index (CFI), and Parsimony comparative fit index (PCFI). CMIN is a Chi-square statistic that compares the tested model and Independent model to the saturated model. CMIN/DF is a relative Chi-square measuring how much the fit of data to model has been reduced by dropping one or more paths. Smaller $\chi 2$ values indicate better fitting model, an insignificant $\chi 2$ ($p>.05$, $p>.01$) is desirable. CFI and GFI are independent of model complexity and sample size. Multicollinearity was checked by checking the correlation matrix of the variables that were used in SEM. When multicollinearity is between 0.6 and 0.8, then Type II error rates (of accepting a wrong null hypothesis) can be substantial (greater than 50%) – leading to a wrong conclusion (Grewal, Cote & Baumqartner, 2004: 1).

The various model fit criteria are summarised in table 4.10 below.

The diagnostic test outcomes of the Structural Equation Model attained for the proposed conceptual model revealed a good model fit, and all the other measures of model fit were acceptable. For example, CMIN/DF = 1.373, NFI = .991 and RAMSEA = 0.036<.08, and PCFI = 0.154, which imply that the model fit was acceptable. Therefore, this suggested that the model fit was acceptable.

Table 4.10: Model fit criteria and acceptable fit interpretation

Model fit criterion	**Acceptable level**	**Obtained value**
Minimum discrepancy divided by degrees of freedom (CMIN/DF (χ^2))	>1 and < 3	1.373
Goodness-of-fit (GFI)	0 (no fit) to 1 (perfect fit)	

Root-mean-square error of approximation (RMSEA)	< 0.080	0.036
Normed-Fit-Index (NFI)	0 (no fit) to 1 (perfect fit)	0.991
Incremental fit Index (IFI)	0 (no fit) to 1 (perfect fit)	
p-value for test of close fit (PCLOSE)	0 (no fit) to 1 (perfect fit)	0.755
Comparative Fit Index (CFI)	0 (no fit) to 1 (perfect fit)	0.998
Parsimony comparative fit index ((PCFI)	0 (no fit) to 1 (perfect fit)	0.154

The regression weights are shown in table 4.11. The regression weight of INNO and Combination of INNO and KMC (CIK) was fixed to 1 for the model to be identified.

Table 4.11: Regression weights

			Estimate	S.E.	Prob.
INNO	<---	CIK	1.000		
KMC	<---	CIK	-.225	1.002	.822

OCE	<---	INNO	-1.678	4.988	.737
OCE	<---	KMC	-.098	1.552	.950
OCE	<---	CIK	1.000		

From table 4.11 above it can be deduced that, the variable "OCE" is influenced by only alignment, and it is not influenced by INNO and KMC individually.

Table 4.12: Standardized Regression Weights

			Estimate
Innovation Capability	<---	CIK	1.000
Knowledge Management Capability	<---	CIK	1.000
Organisational Capability Efficiency	<---	Knowledge Management Capability	-.382
Organisational Capability Efficiency	<---	CIK	1.000
Organisational			

			Estimate
Capability Efficiency	<---	Innovation Capability	-.650

The following tables 4.13, 4.14 and 4.15 show the standardised total effects, direct effects and indirect effects.

Table 4.13: Total Effects

	CIK	Innovation Capability	Knowledge Management Capability	Organisational Capability Efficiency
Innovation Capability	1.494	.000	.000	.000
Knowledge Management Capability	-.225	.000	.000	.000
Organisational Capability Efficiency	1.000	.600	-.323	.000

Table 4.14: Direct Effects

	CIK	Innovation Capability	Knowledge Management Capability	Organisational Capability Efficiency
Innovation Capability	1.000	.000	.000	.000
Knowledge Management Capability	-.225	.000	.000	.000
Organisational Capability Efficiency	1.000	-1.678	-.098	.000

Table 4.15: Indirect Effects

	CIK	Innovation Capability	Knowledge Management Capability	Organisational Capability Efficiency
Innovation Capability	.494	.000	.000	.000
Knowledge Management Capability	.000	.000	.000	.000
Organisational Capability Efficiency	.000	2.278	-.225	.000

The results indicate that the total effect of CIK is positive (B=1.000), through a direct effect of 1.000 and indirect effect of .000. INNO (1.494) has a significant positive total effect on CIK whereas KMC's total effect (-.225) on CIK is negative but insignificant (p=.822>.05).

4.4.2.2 Path Analysis

This section assesses and describes the casual effects amongst the variables tested. Figure 4.7 below refers to the SEM showing the measurement and structural components involved with INNO, KMC and OCE. The SEM provides the inter-relationships of factors affecting CIK and OCE. The figure has two measured variables (i.e., INNO and KMC) which form the CIK latent variable. The figures mean the estimated regression weights or coefficients and the figures in brackets are their corresponding standard errors. They have more or less equal regression weights around 1. OCE is also measured by five variables.

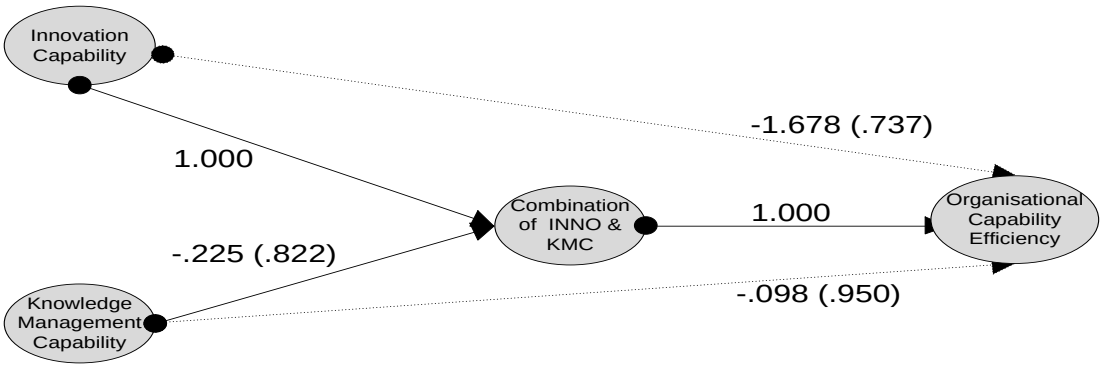

Figure 4.7: SEM Model

Source: author

These findings imply the following results of hypotheses testing:

4.4.3 Hypotheses

4.4.3.1 Hypothesis 1

The purpose of hypothesis 1 is to answer the exploratory question if INNO affects OCE.

H_0^1 INNO does not affect OCE.

H_1: INNO affects OCE.

The null hypothesis was not rejected that INNO (B=-1.678, prob.=.737>.05) does not affect OCE. From the results there is sufficient evidence that there is no significant relationship between INNO and OCE.

4.4.3.2 Hypothesis 2

The purpose of hypothesis 2 is to answer the exploratory question if KMC affects OCE.

H_0^2 KMC does not affect OCE.

H_2: KMC affects OCE.

The null hypothesis was not rejected that KMC (B=-.098, prob.=.950>.05) does not affect OCE. From the results there is sufficient evidence that there is no significant relationship between KMC and OCE.

4.4.3.3 Hypothesis 3

The purpose of hypothesis 3 is to answer the exploratory question if combining INNO and KMC affect OCE more significantly compared to these strategies considered individually.

H_0^3 The combination of INNO and KMC does not have a larger positive effect on OCE than their effects on OCE individually.

H_3: The combination of INNO and KMC has a larger positive effect on OCE than their effects on OCE individually.

The null hypothesis was rejected and the alternative, that the combination of INNO and KMC (B=1.000) has a larger positive effect on OCE than their effects on OCE individually was accepted. From the results there is sufficient evidence that the effect of combining INNO with KMC is higher than the sum of the effects of the individual components of this model.

This confirms that an organisation which implements INNOs should seriously consider aligning/synthesising the appropriate KMCs to improve OCE.

4.4.4 Regression Analysis for determining the important KMC factors to be aligned to Innovation Capability.

In addition to SEM regression that was done, another regression analysis was undertaken to determine the relationship between KMC and INNO, to determine the important KMC factors that should be aligned to INNO and their order of importance. This analysis was required to develop the conceptual framework for the study. In this regression analysis the dependent variable and independent variables were different. The dependent variable was INNO constructs and the independent variables were the KMC items. The data used in this analysis was similar to the data used for SEM. The data were created from ordinal Likert scale questions into continuous variables (Creswell, 2012).

In order to identify the important factors of KMC that affect INNO, regression models of INNO constructs, INNO1 to INNO11 were fitted. The results were as follows.

4.4.4.1 INNO1 Conceptualising, designing, implementing and commercialising innovation programmes

The regression results for INNO1 are shown in table 4.16. The adjusted R-square is 0.543, which implies that the model explains 54.3% of the variation in the data.

Table 4.16: INNO1 regression model

Model	Sum of Squares	df	Mean Square	F	
Regression	87.316	12	7.276	29.707	
Residual	68.093	278	.245		
Total	155.409	290			
Model	Unstandardized Coefficient (B)	Std. error	Standardised Coefficient B	t	Prob.
(Constant)	-.242	.138		-1.759	.080
KM1	.169	.058	.179	2.891	.004
KM2	.006	.063	.006	.102	.918
KM3	.019	.058	.019	.324	.747
KM4	068	.061	.066	1.123	.262
KM5	.279	.073	.260	3.850	.000
KM6	-.062	.068	-.060	-.905	.366
KM7	.110	.071	.095	1.548	.123
KM8	-.019	.057	-.019	-.341	.734
KM9	.137	.061	.129	2.249	.025
KM10	.028	.061	.026	.460	.646
KM11	.110	.083	.093	1.330	.185
KM12	.113	.067	.113	1.687	.093

The variables affecting INN01 in order of importance are:

KM5	Increasing openness, knowledge sharing and the diffusion of knowledge for innovation.
KM1	Knowledge bases, repositories, databases, content management and dashboards.
KM9	Managing Knowledge resources for transferability.

4.4.4.2 INNO2 The knowledge of competitor strategies, industry trends, and customer needs for innovation

The regression results for INNO2 are shown in table 4.17. The adjusted R-square is 0.431, which implies that the model explains 43.1% of the variation in the data.

Table 4.17: INNO2 regression model

	Sum of Squares	df	Mean Square	F	
Regression	47.515	12	3.960	19.302	
Residual	57.028	278	.205		
Total	104.543	290			
Model	Unstandardized Coefficient (B)	Std. error	Standardised Coefficient B	t	P
(Constant)	1.222	.126		9.707	.000
KM1	.121	.054	.156	2.261	.025
KM2	.030	.058	.035	.511	.610
KM3	.184	.053	.228	3.472	.001
KM4	.071	.055	.083	1.276	.203
KM5	.118	.066	.134	1.782	.076
KM6	.018	.062	.021	.285	.776
KM7	-.025	.065	-.026	-.384	.701
KM8	.103	.052	.122	1.962	.051
KM9	.030	.056	.035	.544	.587
KM10	.113	.055	.130	2.036	.043
KM11	-.241	.076	-.250	-3.196	.002
KM12	.129	.061	.157	2.106	.036

The variables affecting INN02 in order of importance are:

KM11	Coordinating expertise and pinpointing expert knowledge.
KM3	Operational command structure and leadership.
KM12	Adopting best practices, lessons learning or benchmarking.
KM1	Knowledge bases, repositories, databases, content management and dashboards.
KM10	Creating and retaining intellectual Assets.

4.4.4.3 INNO3 The knowledge of technology environment and emerging trends for innovation

The regression results for INNO3 are shown in table 4.18. The adjusted R-square is 0.667, which implies that the model explains 66.7% of the variation in the data.

Table 4.18: INNO3 regression model

Model	Sum of Squares	df	Mean Square	F	
Regression	89.930	12	7.494	49.498	
Residual	42.090	278	.151		
Total	132.021	290			
Model	Unstandardized Coefficient (B)	Std. error	Standardised Coefficient B	t	P
(Constant)	-.134	.108		-1.237	.217
KM1	.151	.046	.173	3.274	.001
KM2	.118	.050	.126	2.368	.019
KM3	.104	.045	.115	2.280	.023
KM4	.034	.048	.036	.720	.472
KM5	.139	.057	.140	2.440	.015
KM6	-.022	.053	-.024	-.419	.675
KM7	.217	.056	.203	3.892	.000
KM8	.047	.045	.050	1.043	.298
KM9	.084	.048	.085	1.745	.082
KM10	.052	.048	.053	1.098	.273
KM11	.047	.065	.043	.723	.471
KM12	.030	.052	.032	.568	.570

The variables affecting INN03 in order of importance are:

KM7	Creating valuable information from experiments, explorations or business intelligence.
KM1	Knowledge bases, repositories, databases, content management and dashboards.
KM5	Increasing openness, knowledge sharing and the diffusion of knowledge for innovation.
KM2	The structure for centre of excellence.
KM3	Operational command structure and leadership.

4.4.4.4. INNO4 Managing organisational culture, structure, resources and competences for innovation

The regression results for INNO4 are shown in table 4.19. The adjusted R-square is 0.570, which implies that the model explains 57.0% of the variation in the data.

Table 4.19: INNO4 regression model

Model	Sum of Squares	df	Mean Square	F	
Regression	81.177	12	6.765	33.024	
Residual	56.947	278	.205		
Total	138.124	290			
Model	Unstandardized Coefficient (B)	Std. error	Standardised Coefficient B	t	P
(Constant)	.327	.126		2.599	.010
KM1	.025	.053	.028	.461	.645
KM2	.122	.058	.127	2.109	.036
KM3	.027	.053	.029	.515	.607
KM4	.083	.055	.086	1.506	.133
KM5	.244	.066	.241	3.677	.000
KM6	.008	.062	.009	.133	.895
KM7	-.001	.065	-.001	-.020	.984
KM8	.208	.052	.216	3.981	.000
KM9	.063	.056	.063	1.138	.256
KM10	-.039	.055	-.039	-.699	.485
KM11	.126	.075	.114	1.675	.095
KM12	.059	.061	.062	.964	.336

The variables affecting INN04 in order of importance are:

KM5	Increasing openness, knowledge sharing and the diffusion of knowledge for innovation.
KM2	The structure for centre of excellence.
KM8	Generating knowledge based on interpretation and translation.

4.4.4.5. INNO5 Generating ideas in-house or through collaborative efforts or cross pollinating ideas or partner engagement

The regression results for INNO5 are shown in table 4.20. The adjusted R-square is 0.671, which implies that the model explains 67.1% of the variation in the data.

Table 4.20: INNO5 regression model

Model	Sum of Squares	df	Mean Square	F	
Regression	122.422	12	10.202	50.314	
Residual	56.368	278	.203		
Total	178.790	290			
Model	Unstandardized Coefficient (B)	Std. error	Standardised Coefficient B	t	P
(Constant)	-.564	.125		-4.503	.000
KM1	.086	.053	.085	1.614	.108
KM2	.176	.058	.161	3.056	.002
KM3	.082	.053	.078	1.558	.120
KM4	.135	.055	.121	2.440	.015
KM5	.098	.066	.085	1.480	.140
KM6	.247	.062	.224	3.986	.000
KM7	.038	.065	.030	.585	.559
KM8	-.037	.052	-.034	-.720	.472
KM9	.110	.055	.096	1.986	.048
KM10	-.074	.055	-.065	-1.349	.179
KM11	.170	.075	.135	2.268	.024
KM12	.090	.061	.084	1.479	.140

The variables affecting INN05 in order of importance are:

KM6	Positioning information and knowledge as a strategic resource.
KM2	The structure for centre of excellence.
KM11	Coordinating expertise and pinpointing expert knowledge.
KM4	Informal structure to enable knowledge creation, sharing, collaboration and coordination.
KM9	Managing Knowledge resources for transferability.

4.4.4.6. INNO6 Prioritising ideas and converting them into products or processes that creates value for innovation

The regression results for INNO6 are shown in table 4.21. The adjusted R-square is 0.533, which implies that the model explains 53.3% of the variation in the data.

Table 4.21: INNO6 regression model

Model	Sum of Squares	df	Mean Square	F	
Regression	80.993	12	6.749	28.574	
Residual	65.667	278	.236		
Total	146.660	290			
Model	Unstandardized Coefficient (B)	Std. error	Standardised Coefficient B	t	P
(Constant)	.242	.135		1.790	.075
KM1	.008	.057	.008	.134	.894
KM2	.039	.062	.039	.623	.534
KM3	.061	.057	.064	1.069	.286
KM4	.030	.060	.030	.507	.613
KM5	-.014	.071	-.013	-.196	.845
KM6	.106	.067	.106	1.582	.115
KM7	.074	.070	.065	1.054	.293
KM8	.189	.056	.190	3.371	.001
KM9	.061	.060	.059	1.017	.310
KM10	.113	.059	.110	1.906	.058
KM11	.031	.081	.027	.384	.701
KM12	.233	.066	.239	3.549	.000

The variables affecting INN06 in order of importance are:

KM12	Adopting best practices, lessons learning or benchmarking.
KM8	Generating knowledge based on interpretation and translation.

4.4.4.7. INNO7 Screening and performing selection process, risk management and strategic disruptive decision making for innovation

The regression results for INNO7 are shown in table 4.22. The adjusted R-square is 0.476, which implies that the model explains 47.6% of the variation in the data.

Table 4.22: INNO7 regression model

Model	Sum of Squares	df	Mean Square	F	
Regression	85.221	12	7.102	22.912	
Residual	86.167	278	.310		
Total	171.388	290			
Model	Unstandardized Coefficient (B)	Std. error	Standardised Coefficient B	t	P
(Constant)	.422	.155		2.730	.007
KM1	.009	.066	.009	.132	.895
KM2	.164	.071	.153	2.304	.022
KM3	.058	.065	.056	.888	.375
KM4	.104	.068	.096	1.525	.128
KM5	-.072	.082	-.064	-.889	.375
KM6	.164	.077	.152	2.146	.033
KM7	.086	.080	.071	1.082	.280
KM8	.085	.064	.079	1.317	.189
KM9	.077	.069	.069	1.127	.261
KM10	.206	.068	.185	3.030	.003
KM11	.021	.093	.017	.223	.824
KM12	.072	.075	.068	.954	.341

The variables affecting INN07 in order of importance are:

KM10	Creating and retaining intellectual Assets.
KM2	The structure for centre of excellence.
KM6	Positioning information and knowledge as a strategic resource.

4.4.4.8. INNO8 Undertaking new product development, customer engagement and assessing market potential for innovation

The regression results for INNO8 are shown in table 4.23. The adjusted R-square is 0.692, which implies that the model explains 69.2% of the variation in the data.

Table 4.23: INNO8 regression model

Model	Sum of Squares	df	Mean Square	F	
Regression	90.971	12	7.581	55.362	
Residual	38.067	278	.137		
Total	129.038	290			
Model	Unstandardized Coefficient (B)	Std. error	Standardised Coefficient B	t	P
(Constant)	-.050	.103		-.491	.624
KM1	.099	.044	.115	2.258	.025
KM2	.017	.047	.018	.360	.719
KM3	.107	.043	.120	2.477	.014
KM4	.029	.045	.031	.642	.521
KM5	-.048	.054	-.049	-.890	.374
KM6	.122	.051	.130	2.394	.017
KM7	.112	.053	.106	2.101	.037
KM8	.098	.043	.105	2.301	.022
KM9	.020	.046	.021	.437	.662
KM10	.044	.045	.045	.967	.334
KM11	.231	.062	.215	3.739	.000
KM12	.160	.050	.176	3.212	.001

The variables affecting INN08 in order of importance are:

KM11	Coordinating expertise and pinpointing expert knowledge.
KM12	Adopting best practices, lessons learning or benchmarking.
KM6	Positioning information and knowledge as a strategic resource.
KM3	Operational command structure and leadership.
KM1	Knowledge bases, repositories, databases, content management and dashboards.

KM7	Creating valuable information from experiments, explorations or business Intelligence.
KM8	Generating knowledge based on interpretation and translation.

4.4.4.9. INNO9 Doing new business development and partner engagement for innovation

The regression results for INNO9 are shown in table 4.24. The adjusted R-square is 0.466, which implies that the model explains 46.6% of the variation in the data.

Table 4.24: INNO9 regression model

Model	Sum of Squares	df	Mean Square	F	
Regression	48.568	12	4.047	22.131	
Residual	50.841	278	.183		
Total	99.409	290			
Model	Unstandardized Coefficient (B)	Std. error	Standardised Coefficient B	t	P
(Constant)	1.163	.119		9.782	.000
KM1	-.019	.051	-.025	-.378	.706
KM2	-.044	.055	-.054	-.805	.421
KM3	.082	.050	.105	1.650	.100
KM4	-.059	.052	-.071	-1.128	.260
KM5	.106	.063	.123	1.694	.091
KM6	.040	.059	.049	.680	.497
KM7	.140	.061	.150	2.275	.024
KM8	-.034	.049	-.041	-.683	.495
KM9	.131	.053	.154	2.487	.013
KM10	.169	.052	.199	3.232	.001
KM11	.111	.071	.118	1.554	.121
KM12	.105	.058	.131	1.820	.070

The variables affecting INN09 in order of importance are:

KM10	Creating and retaining intellectual Assets.
KM9	Managing Knowledge resources for transferability.

KM7	Creating valuable information from experiments, explorations or business Intelligence.

4.4.4.10. INNO10 Delivering value to the customer and capturing a part of that value for innovation

The regression results for INNO10 are shown in table 4.25. The adjusted R-square is 0.633, which implies that the model explains 63.3% of the variation in the data.

Table 4.25: INNO10 regression model

Model	Sum of Squares	df	Mean Square	F	
Regression	88.577	12	7.381	42.745	
Residual	48.007	278	.173		
Total	136.584	290			
Model	Unstandardized Coefficient (B)	Std. error	Standardised Coefficient B	t	P
(Constant)	.087	.116		.753	.452
KM1	.058	.049	.065	1.173	.242
KM2	.133	.053	.140	2.509	.013
KM3	.096	.049	.105	1.986	.048
KM4	.168	.051	.173	3.308	.001
KM5	-.012	.061	-.012	-.197	.844
KM6	.063	.057	.066	1.104	.270
KM7	.120	.060	.111	2.016	.045
KM8	.136	.048	.142	2.838	.005
KM9	.053	.051	.053	1.029	.305
KM10	.035	.051	.035	.695	.488
KM11	-.046	.069	-.042	-.662	.509
KM12	.171	.056	.183	3.057	.002

The variables affecting INNO10 in order of importance are:

KM12	Adopting best practices, lessons learning or benchmarking.
KM4	Informal structure to enable knowledge creation, sharing, collaboration and coordination.
KM8	Generating knowledge based on interpretation and translation.
KM2	The structure for centre of excellence.

KM7	Creating valuable information from experiments, explorations or business Intelligence.
KM3	Operational command structure and leadership.

4.4.4.11. INNO11 Penetrating multiple channels, customer groups and competitive regions with innovation

The regression results for INNO11 are shown in table 4.26. The adjusted R-square is 0.654, which implies that the model explains 65.4% of the variation in the data.

Table 4.26: INNO11 regression model

Model	Sum of Squares	df	Mean Square	F	
Regression	93.575	12	7.798	46.709	
Residual	46.411	278	.167		
Total	139.986	290			
Model	Unstandardized Coefficient (B)	Std. error	Standardised Coefficient B	t	P
(Constant)	.012	.114		.108	.914
KM1	.003	.048	.003	.055	.956
KM2	.109	.052	.112	2.078	.039
KM3	.082	.048	.088	1.709	.089
KM4	.260	.050	.265	5.202	.000
KM5	-.031	.060	-.031	-.521	.603
KM6	.163	.056	.167	2.900	.004
KM7	-.088	.059	-.080	-1.494	.136
KM8	.033	.047	.034	.692	.489
KM9	.116	.050	.115	2.300	.022
KM10	.175	.050	.173	3.492	.001
KM11	.066	.068	.059	.967	.335
KM12	.109	.055	.115	1.977	.049

The variables affecting INN011 in order of importance are:

KM4	Informal structure to enable knowledge creation, sharing, collaboration and coordination.

KM10	Creating and retaining intellectual Assets.
KM6	Positioning information and knowledge as a strategic resource.
KM9	Managing Knowledge resources for transferability.
KM12	Adopting best practices, lessons learning or benchmarking.
KM2	The structure for centre of excellence.

The regression analysis results above indicate that KMC is related to INNO. The above tables indicate the important factors of KMC that effect INNO.

4.5 Qualitative Data Analysis

The following question was asked in the questionnaire survey to obtain in-depth information on the area that was being investigated. The reason for this was to collect additional explanation for the strategic imperative relationships.

'We might have left out an important issue concerning "THE RELATIONSHIP BETWEEN THE IMPLEMENTATION OF INNOVATION AND KNOWLEDGE MANAGEMENT AND ITS LINK TO ORGANISATIONAL CAPABILITIES" Please explain'.

Innovation and knowledge management is increasingly being seen as a strategic resource and is becoming critical for achieving organisational goals. For the capabilities to work, these are the important elements:

- Top management or leadership (most important) should play a significant role to ensure that innovation is responsive to assist the employees to meet the organisational strategic goals;
- Culture - changing organisational culture is very important;
- Training and skilling people; uplifting and investment from corporate or enterprise;
- Transformation and change management – "In a highly innovative environment, effective change management strategies would go a long way in changing the mind set of existing employees", a respondent said;
- Use of qualified staff - "Having innovative people in an organisation is an asset", a

respondent commented;

- Resources - availability of funding for organisation;
- Proper costing and budgeting;
- Systems and support from ERP's or HR;
- Incentives from external parties, in particular Government; and
- Creating an environment that is conducive for innovation.

Elements that were repeatedly mentioned for innovation and knowledge management to be successful were: top management or leadership, organisational cultural change and training staff to acquire the necessary skills; transformation and change management.

Suggestions included the following:

- Aligning innovation and knowledge management strategy to the organisational strategic goals;
- Alignment of innovation and knowledge management as they "go hand-in-hand like a horse and a carriage", according to a respondent;
- The knowledge base needs to be created and built over time to ensure optimal handling of queries;
- Application of a learning cycle of planning, building, managing and reviewing is necessary;
- Modelling - to determine impact before actually going ahead, to ease the deployment;
- A solid implementation team as part of organisational capability; and
- Use of Key Performance Areas (KPA) to drive behaviours.

Challenges or issues raised included a tendency by organisations dealing with innovation and acknowledgement to treat it as part of a tick list, without making a conscientious effort to develop and implement the capabilities.

4.6 Integration of Quantitative and Qualitative results

The qualitative results support the quantitative results. The factors mentioned in the qualitative data are in line with the constructs in the fitted quantitative SEM model. Examples such as leadership (most important), culture (transformation, incentives),

learning life cycle or training and skilling people (learning capability) also feature predominately in the SEM Model.

The qualitative suggestions by the respondents support the proposed “alignment of innovation and knowledge management strategy” as constructed in the SEM model.

4.7 Chapter Summary

Most of the respondents had been involved in innovation and knowledge management for a substantial period of time and had undertaken a number of projects. The majority of the respondents, i.e. 71.1% of the respondents were involved in 6 or more innovation and/or knowledge management programmes. A large number of respondents (63.3%) had been employed 10 years or more in the area of innovation and/or knowledge management and according to the results, 96.2% had at least a degree or diploma, which indicated that the respondents who completed the questionnaire had at least a tertiary level of education.

The majority of respondents tended to agree or strongly agree as shown in Annexure I where it is evident that the mean values tended to be close to 1.

The t-test was used to compare the mean scores on the Likert scale with the undecided score of 3. As an example, for question B1 [1], the mean score was 1.79 (which was less than 3), and the t-test analysis produced the following results: $t = -24.505$ ($p=.000<.05$).

The null hypothesis that the mean score = 3 was rejected because the P – value (0.000) for probability of the t value of -24.505 to occur was less than 0.05, the level of significance, and the alternative hypothesis that the mean score was less than 3 was accepted. This implied that the respondents agreed with the statement that OCE is improved when "Conceptualising, designing, implementing and commercialising innovation programmes" is implemented in alignment with knowledge bases, repositories, databases, content management and dashboards.

Cronbach’s Alpha analysis provided the following measures of reliability for INNO:

INNO1 consisted of two factors with reliability measures of 0.869 and 0.684 respectively.

INNO2 consisted of two factors with reliability measures of 0.905 and 0.799 respectively.

INNO3 consisted of two factors with reliability measures of 0.913and 0.704 respectively.

INNO4 consisted of two factors with reliability measures of 0.867 and 0.835 respectively.

INNO5 consisted of two factors with factor 1 having the reliability measure of 0.924.

INNO6 consisted of two factors with reliability measures of 0.854 and 0.833 respectively.

INNO7 consisted of two factors with reliability measures of 0.881 and .800 respectively.

INNO8 consisted of three factors with reliability measures of 0.826, 0.771 and 0.683 respectively.

INNO9 consisted of two factors with reliability measures of .890 and 0.801 respectively.

INNO10 consisted of two factors with reliability measures of 0.876 and 0.831 respectively.

INNO11 consisted of two factors with reliability measures of 0.880 and 0.867 respectively.

Cronbach's Alpha analysis provided the following measures of reliability for KMC:

KMC had a single factor with reliability measure of 0.945.

Cronbach's Alpha analysis provided the following measures of reliability for OCE:

OCE had a single factor with reliability measure of 0.703.

From the SEM regression analysis, it has been found that INNO and KMC do not affect OCE individually. However, from the results of the study there is sufficient evidence that the effect of combining INNO with KMC is higher than the sum of the effects of the individual components of this model. Therefore, organisations that are implementing INNO and KMC on their own will not experience OCE; however, the results show that implementing INNO combined with KMC will benefit the OCE. In addition to SEM regression that was done, another regression analysis was done to determine the important KMC factors that should be combined to INNO.

The next chapter will use the results from this chapter to present the conclusion and recommendations for this research.

Chapter 5: Discussion, Conclusions and Recommendations

5.1 Introduction

The main purpose of this study was to examine if Organisational Capability Efficiency (OCE) is improved by aligning/synthesising organisational capabilities when implementing Innovation Capability (INNO) and Knowledge Management Capability (KMC) for organisations.

This chapter presents the conclusion for this study, highlighting the contributions, the limitations and making recommendations for future research based on the objectives that were set out at the beginning of the study. Significantly, the chapter also presents the conceptual framework in detail to guide organisations that want to derive benefits in implementing these homogenous strategic imperatives. These are discussed in the relevant subsection of this chapter.

5.2 Discussion of the Findings

The research findings are discussed below:

a) The relationship of Innovation Capability and Knowledge Management Capability

Knowledge management only is the creation, sharing and learning from information, experience and insight (Gold, Malhotra & Segars, 2001), whilst innovation solely is the creation, development and application of something novel in the organisation (Kör and Maden, 2013). From the results there is sufficient empirical evidence that there is a relationship between Innovation Capability (INNO) and Knowledge Management Capability (KMC). The findings of the study showed that INNO and KMC are highly correlated. This supports previous studies concluding the positive effect of knowledge management on innovation (Kör and Maden, 2013; Wuryaningrat, 2013) and the study by Slavkovic and Babic (2013) who concluded that knowledge management is positively related to the different dimensions of organisational innovation. More significantly this study has added to the body of knowledge the understanding of the relationship of Innovation Capability and Knowledge Management Capability, which seems to be limited thus far as mentioned previously in the literature in chapter 2. Additionally, the study in

focus highlights that knowledge and innovation workers and managers should be aware of many factors that are limited in previous studies that might affect the implementation of Innovation Capability and Knowledge Management Capability in organisations, especially the alignment factor. As highlighted in literature, the practice of innovation and knowledge management is complex and resource intensive (Kühl and Cunha, 2013; Aujirapongpan et al., 2010). Therefore, the results obtained in this study are likely to provide organisations with a better understanding of how they can align INNO and KMC during implementation, especially in today's growing knowledge and intellectual organisations.

b) The relationship of Innovation Capability and Organisational Capability Efficiency.

From the results there is sufficient evidence that there is no significant relationship between INNO and OCE.

c) The relationship of Knowledge Management Capability and Organisational Capability Efficiency

From the results there is sufficient evidence that there is no significant relationship between KMC and OCE.

d) The relationship of Innovation Capability, Knowledge Management Capability and Organisational Capability Efficiency

The study has closed the capability model gaps in theory and confirms the relationship between INNO and KMC, and the combination of INNO and KMC on OCE. This was derived through the Structured Equation Model (SEM) (refer figure 4.7). This is so far one of the most comprehensive framework of the relationship between Innovation Capability, Knowledge Management Capability and Organisational Capability Efficiency.

e) The significance of aligning Innovation Capability with Knowledge Management Capability

The importance of capabilities to organisations today is increasingly becoming much more significant for organisations, therefore the need to promulgate the alignment of these homogeneous strategic imperatives to capitalise on shared capability in the organisation (Teece, 2000). Although it is evident that many academics have thus far reasoned that effective management of knowledge leads to organisational innovation, there is no study that distinguishes and aligns the INNOs and KMCs (Slavkovic and Babic, 2013; Wuryaningrat, 2013; Kör and Maden, 2013). The contribution of this study proves the understanding of how the full complement of resource-based and knowledge-based capabilities of these strategic imperatives interrelate for aligned implementation and how it impacts on OCE.

However, as stated earlier, INNO on its own influences OCE negatively and KMC solely influences OCE negatively. This means that organisations implementing INNO and KMC on their own, experience a negative outcome towards the OCE. This could be contributed to employees in organisations not adapting to structural or cultural change of innovation and knowledge management initiatives. The lack of understanding of INNO and KMC in organisations could possibly be a contributing factor. This also implies that the issues of INNO and KMC and how it affects OCE in the organisations need to be investigated and addressed. From the results there is empirical evidence that the effect of combining INNO with KMC is higher than the sum of the effects of the individual components of this alignment. Moreover, Jelonek (2013) advises alignment as a concept of “synergy”, which is the creation of the whole that is greater than the sum of its parts. This confirms that an organisation that implements Innovation Capability should seriously consider aligning/synthesising Knowledge Management Capabilities to improve Organisational Capability Efficiency. This supports the alignment discussion in literature review, chapter 2.

5.3 Conclusion

This section presents a discussion of how the research objectives were achieved.

5.3.1 Main Objective

The main objective of the study was to develop a conceptual framework for the alignment of INNO and KMC that would assist managers in organisations to improve OCE.

This was achieved as discussed in this section:

As suggested by Lin et al. (2013) organisations must discover ways to combine practices and capabilities in ways that will enable the synthesis, interchange, and application of acquired knowledge transversely across people in the organisation. This might mean borrowing aspects, practices and capabilities, such as technology, structure, culture, information, expertise and learning from each of these strategic imperatives to optimise capability and reduce cost. This term borrowing as described by Lin et al. (2013) cannot merely be a sharing of meeting ideas across individuals or departments but rather it has to be a systemic and institutionalised appropriation of the organisations capabilities of technology, structure, culture, information, expertise and learning to have a sustainable and efficient outcome in managing the organisational capabilities. This approach requires a framework that will guide organisations through the complex approach and also assist in the economising and efficiency of resources and capability in the organisation.

Applicably, the following figure 5.1 shows the conceptual framework that was developed in this study. It consists of eleven INNO dimensions, twelve KMC dimensions and five OCE dimensions. Each of the INNO dimensions is split into sub-dimensions which were identified using regression analysis.

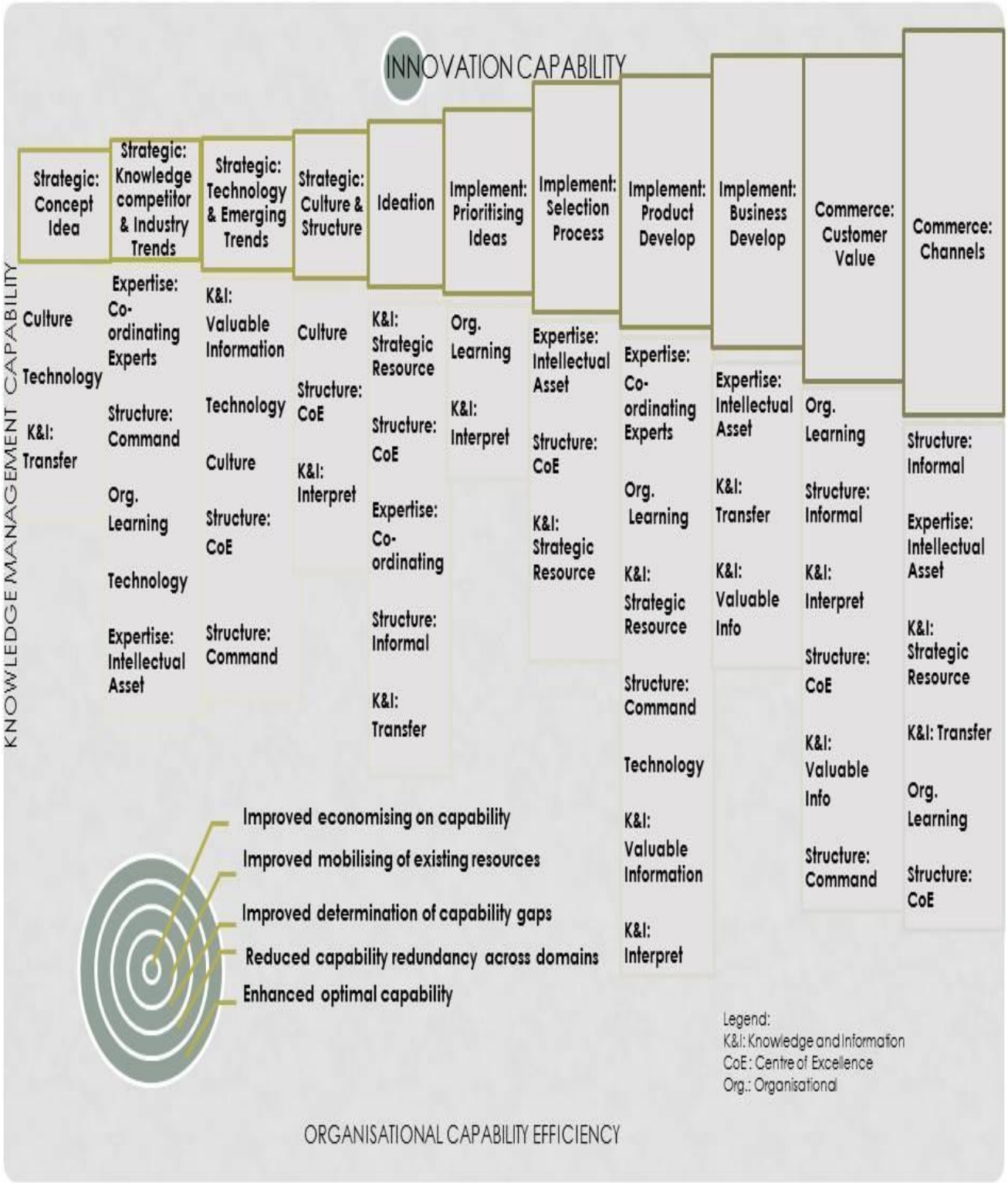

Figure 5.1: Conceptual Framework: Aligned Implementation of Innovation Capabilities and Knowledge Management Capabilities

Source: author

Understanding the implementation of the conceptual framework

The result of the study **identifies the Innovation Capability aligned (synthesised) to the applicable Knowledge Management Capabilities**. For example, Innovation Capability Group 1 which is Strategic: Conceptualising shows that when organisations are conceptualising ideas for innovation, they can synthesise with Knowledge Management Capabilities to improve culture, enable applicable technology and create information/knowledge in a form for transfer throughout the organisation.

Furthermore, the outcome of the conceptual framework (figure 5.1) has also provided the **order of importance** of the Knowledge Management Capabilities to the pertinent Innovation Capability. For instance, in the Innovation Capability Group 1, the order of importance of the Knowledge Management Capabilities to the Innovation Capability Strategic: Conceptualising is firstly, culture capability; secondly, technology capability and thirdly, information and knowledge capability. This will guide the organisation to prioritise projects during the implementation if necessary.

Benefits to the Organisation in utilising the Conceptual Framework

The conceptual framework will provide the organisation with a systemic, institutionalised and disciplined approach for an aligned/synthesised implementation of Innovation Capability and Knowledge Management Capability towards attaining Organisational Capability Efficiency.

Organisations establishing their Innovation Capabilities when performing conceptualising innovation can quite possible do this without synthesising with the Knowledge Management Capabilities and will likely suffer the consequences of an innovative idea remaining with an individual and not being shared with the organisation for retention of intellectual property and continuity. On the other hand if information is shared openly and systemically through the alignment and adoption of Knowledge Management Capabilities, mobilising of human resources and the organisations capabilities becomes more plausible and efficient even when the resource demand increases. Simply because the Innovation Capabilities are being developed while being aligned systemically with the appropriation

of Knowledge Management Capabilities of culture, technology enablement and intellectual knowledge intelligence. Given, technology enablers are expensive and organisations can suffer whereby there are disparate data sources, however if Knowledge Management Capability such as knowledge bases and repositories are systemically shared it would evidently optimise and economise on technology capability as a whole in the organisation. Typically, organisations not creating information or knowledge for transferring in the organisation can suffer the crisis of surplus or irrelevant information during their innovative projects and more pertinently the lifecycle of these projects. The information and knowledge will possible not be classified and stored for ease of use and reference. This could demand additional time and resources that are expensive and not readily accessible deeming the organisations capability inefficient and ineffective.

Using the conceptual framework, Knowledge Management Capabilities can be synthesised for **All** the Innovation Capability Groups if the organisation so desires and will benefit in Organisational Capability Efficiency. The discussion for each Innovative Capability Group follows below:

- **Aligned Implementation Group 1- Strategic: Conceptualising Idea**

When organisations are conceptualising ideas for innovation, the conceptual framework (figure 5.1) guides the organisation in managing it's organisational capabilities to align/synthesise the implementation of the following KMC: Increasing openness, knowledge sharing and the diffusion of knowledge for innovation; implementing knowledge bases, repositories, databases, content management and dashboards; and managing knowledge resources for transferability.

The organisation will benefit through optimising its organisational capabilities by creating an atmosphere and culture of knowledge creation, knowledge acquiring, knowledge sharing, knowledge coordinating and knowledge co-operating across the organisation while attempting to conceptualise innovation programmes. The alignment of social networks to the innovation programmes will encourage sharing of information, an increase of knowledge and insights to assist each other to solve problems of mutual interest, an increase in learning and sharing knowledge for the design of innovation programmes.

Moreover, the supporting infrastructure of information technology will ensure that all the organisation's intellectual knowledge ideas are centrally developed, retained and managed from an organisational memory perspective. The sharing of a common information technology platform will provide intelligent information for commercialisation and the managing of the innovation funnel at real-time. Organisations will be able to utilise the information technology and language, the knowledge network, and the capability to share and transfer knowledge and the motivation to create innovativeness. The ability to transfer knowledge within the organisation will provide a better understanding of the business environment's innovative products and services.

The variables affecting strategic: conceptualising idea in order of importance are:

Priority 1	Increasing openness, knowledge sharing and the diffusion of knowledge for innovation.
Priority 2	Knowledge bases, repositories, databases, content management and dashboards.
Priority 3	Managing Knowledge resources for transferability.

Figure 5.2 below shows all the recommended Knowledge Management Capabilities that can be considered for alignment when implementing this Innovative Capability group.

Figure 5.2: Group 1 Strategic: Conceptualising Idea

Source: author

- **Aligned Implementation Group 2 - Strategic: Knowledge of Competitor and Industry Trends**

Similarly, when organisations are considering encapsulating the management of the knowledge of competitor strategies, industry trends and customer needs during innovation programmes, guided by the conceptual framework (figure 5.1), they can align the Knowledge Management Capabilities of coordinating experts, the command structure, best practices, information technology and the retention of intellectual assets.

Organisational knowledge development and coordinating expertise of KMC will assist organisations to keep abreast with industry trends. Organisational leadership to provide operative and command structure of the organisations, both formally and informally will support the competitor strategies during innovation programmes. The Knowledge Management Capabilities of reward system, work schemes, management support policy of the administrators and rules, regulations and practices will better enable the organisation in managing competitor strategies and industry trends when implementing innovation projects.

Lessons learning capability through which the organisations gains knowledge while one works under several circumstances will assist the organisation in managing the knowledge of competitors, trends and customer needs. The captured lessons learned will improve organisational competency to share, to generate, and to integrate knowledge that will create a body of collective learning in the organisation. Knowledge management teams and innovation teams will be in sync due to the synthesis of the organisations capabilities. As supported by Esam and Salama (2017: 72) a successful organisational learning practice is contingent on knowledge management infrastructure; which are both social and technical enablers. This is required to develop the innovative knowledge base of the organisation. When adopting the state-of-the-art technologies, processes-automation, and sharing of knowledge bases, organisations can anticipate to achieve benefits such as better-quality customer service, lowered costs in human resource and infrastructure, superior management decision making, enriched corporate agility and flexibility, efficient creation of new product lines, quick problem resolution, and competent transfer of best practices.

Organisations will benefit through the knowledge discoveries, retention, and reuse of the knowledge of competitor and industry trends.

The Knowledge Management Capability variables affecting the Innovation Capability Strategic: Knowledge of Competitor and Industry Trends in order of importance are:

Priority 1	Coordinating expertise and pinpointing expert knowledge.
Priority 2	Operational command structure and leadership.
Priority 3	Adopting best practices, lessons learning or benchmarking.
Priority 4	Knowledge bases, repositories, databases, content management and dashboards.
Priority 5	Creating and retaining intellectual Assets.

The figure 5.3 below shows all the recommended Knowledge Management Capabilities that can be considered for alignment when implementing this Innovative Capability group.

Figure 5.3: Group 2 Strategic: Customer Needs

Source: author

❖ Aligned Implementation Group 3 - Strategic: Technology and Trends

When organisations are considering the implementation of the technology environment and emerging trends during innovation, they should consider aligning/synthesising creation of information and business intelligence, state-of-the-art technologies, knowledge sharing, centre of excellence and leadership capability of knowledge management programmes.

The KMC of valued and useful information, both quantitatively and qualitatively, i.e. information on effort and task reality, obtained through experimentations, investigations or technical or operational reports, including data storage can be very useful when appropriating the knowledge of the technology environment and emerging trends during innovation programmes. Furthermore, the supporting infrastructure of information technology, robust communications networks and the convergence of state-of-the-art technologies of Knowledge Management Capabilities can benefit the innovation technology environment. For instance, the Knowledge Management Capability of "knowledge and information" can categorise the organisation knowledge acquired into informed evidence and know-how proficiency which involves the capability of individuals and of the organising principles by which interactions among individuals, groups and members through a network that is structured and co-ordinated to produce the Innovation Capabilities essential to the organisation (Zander and Kogut, 1995:77). This structure and culture may not be systemically implemented without the alignment of Knowledge Management Capabilities. However, the adoption of KMC of social group set-ups to share knowledge and insights mainly to benefit each other to resolve business problems, will reduce distances between knowledge groups, and enable organisations to accomplish complete information control to determine tendencies and economies of scale when implementing the innovation technology environment. More importantly synthesising the Knowledge Management Capability with Innovation Capability would assist the organisation to stay competitive, through the distribution and partaking of information with external partners and be eloquent by knowing their competitors' products, services, plans and best adopted practices (Kyobe, 2010: 161-173). Furthermore, aligning the centre of excellence towards knowledge management and innovation will benefit the organisation with prevailing practices and routines, while the leadership capability of knowledge

management can also provide management support policy, regulations and practices for the technology environment during innovation.

The Knowledge Management Capability variables affecting the Innovation Capability Strategic: Technology and Trends in order of importance are:

Priority 1	Creating valuable information from experiments, explorations or business Intelligence.
Priority 2	Knowledge bases, repositories, databases, content management and dashboards.
Priority 3	Increasing openness, knowledge sharing and the diffusion of knowledge for innovation.
Priority 4	The structure for centre of excellence.
Priority 5	Operational command structure and leadership.

Figure 5.4 below shows all the recommended Knowledge Management Capabilities that can be considered for alignment when implementing this Innovative Capability group.

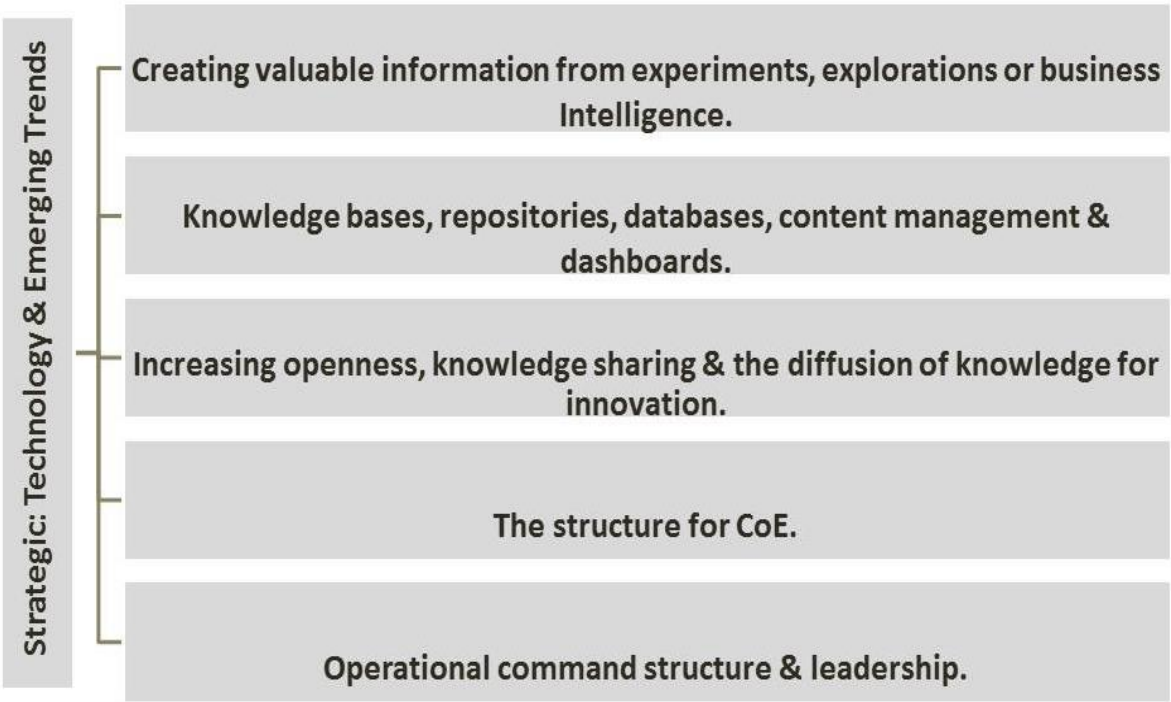

Figure 5.4: Group 3 Strategic: Strategies and Industry Trends

❖ Aligned Implementation Group 4 - Strategic: Culture and Structure

As guided by the conceptual framework (figure 5.1) when organisations are considering implementing the strategic organisational culture, structure, resources and competences of INNO, they should consider aligning/synthesising Knowledge Management Capabilities of knowledge sharing, centre of excellence and generation of knowledge in the organisation. This will increase the culture to support innovation thinking and open innovation in the organisation.

Organisations will benefit from the norms, culture, atmosphere and work practices established in knowledge management to increase knowledge sharing, harmonised efforts and integration of skills. It will benefit from the well-known corporate strategy and vision, appreciation of highly skilled individuals and experts, the personnel attitudes, teamwork, and creative innovativeness. Organisations will have a distinct advantage in knowledge organising and co-ordinating, knowledge co-operating, knowledge procuring and the perceptions to aid each other to solve problems of reciprocal interest. In addition, it will reduce detachments between knowledge groups, and enable organisations to achieve knowledge supremacy and economies of scale, especially if the established structure for centre of excellence with prevailing practices and routines are converged for innovation programmes as well. Through the alignment of capabilities, the organisation will also benefit by leveraging on knowledge, experience and skill when establishing the resource and competencies for innovation programmes.

The Knowledge Management Capability variables affecting the Innovation Capability strategic: Culture and Structure in order of importance are:

Priority 1	Increasing openness, knowledge sharing and the diffusion of knowledge for innovation.
Priority 2	The structure for centre of excellence.
Priority 3	Generating knowledge based on interpretation and translation.

Figure 5.5 below shows all the recommended Knowledge Management Capabilities that can be considered for alignment when implementing this Innovative Capability group.

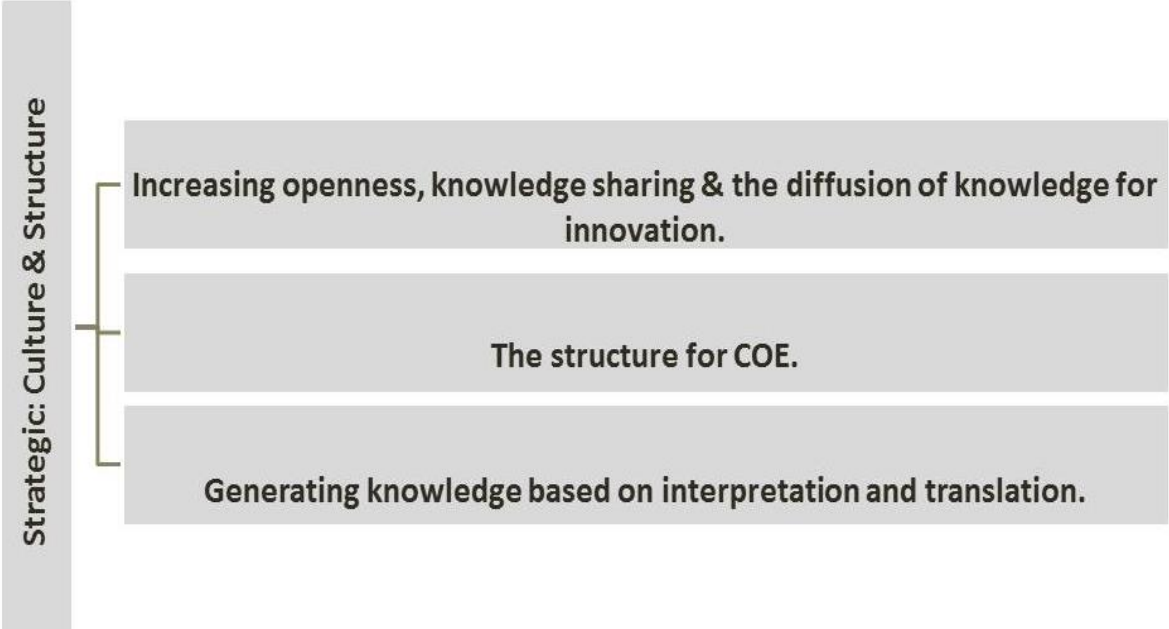

Figure 5.5: Group 4 Strategic: Technology & Emerging Trends

Source: author

- **Aligned Implementation Group 5 - Ideation**

When organisations are considering implementing Innovation Capability such as: generate ideas in-house or through collaborative efforts or external sources, the conceptual framework (figure 5.1) guides the organisation to align/synthesise the Knowledge Management Capabilities of information and knowledge as a strategic resource, the structure for centre of excellence, coordinating expertise, and informal structures to enable knowledge creation and sharing, and to manage knowledge resources for transferability.

Organisations will benefit through cross-pollination of ideas from the organisation's strategic knowledge assets, the established centre of excellence with prevailing practices and routines, the availability of experts and the ability to collaborate and transfer knowledge through open innovation. The KMC of pin-pointing expertise when generating ideas will be expedient to the organisation and would save the organisation in efforts to collaborate and coordinate experts, ultimately increasing and optimising the organisations

capability to test new ideas. Aligned organisational structures will benefit organisations towards innovativeness, improved sharing, collaboration, coordination, adaptability, flexibility and organisational agility if organisational structures and knowledge networks are aligned appropriately. It will also contribute to the development of the organisational memory as a valuable knowledge asset. The creating of channels, linking resources and activities become more meaningful towards strategic generation of ideas and objectives of the organisation. Knowledge resources will be appropriately managed and have the characteristics of "transferability", for absorption by other units. Organisations will have the capacity to discern and search for knowledge to retort on questions, the ability to utilise information technology and linguistic, the ability to exchange and transfer knowledge and the motivation to create innovativeness. Ultimately, it will enable knowledge creation and sharing by a number of experts working together to solve complex problems. As supported by Wang, Yang and Xue (2017) when organisations share knowledge, the individuals are encouraged and supported to absorb and conglomerate various categories of knowledge and consequently they could be more capable in deciphering new ideas into innovative product and services.

The Knowledge Management Capability variables affecting the Innovation Capability Ideation in order of importance are:

Priority 1	Positioning information and knowledge as a strategic resource.
Priority 2	The structure for centre of excellence.
Priority 3	Coordinating expertise and pin-pointing expert knowledge.
Priority 4	Informal structure to enable knowledge creation, sharing, collaboration and coordination.
Priority 5	Managing Knowledge resources for transferability.

Figure 5.6 below shows all the recommended Knowledge Management Capabilities that can be considered for alignment when implementing this Innovative Capability group.

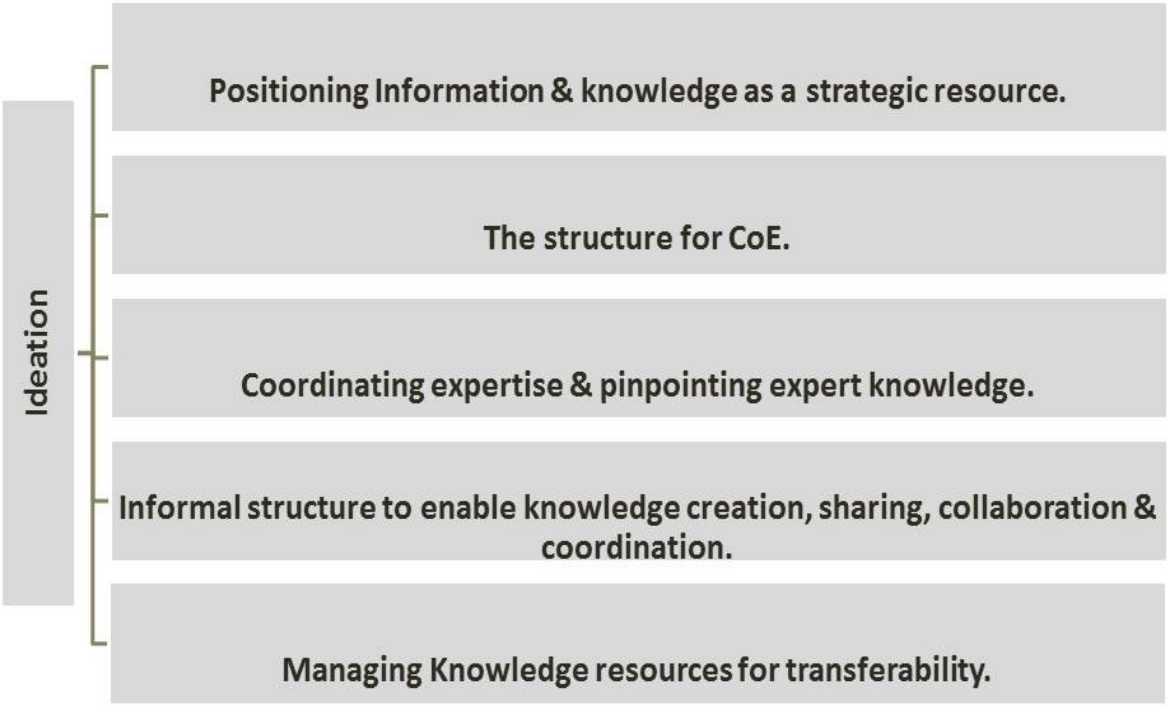

Figure 5.6: Group 5 Strategic: Culture & Structure

Source: author

- **Aligned Implementation Group 6 - Implementation: Prioritising Ideas**

As guided by the conceptual framework developed in this research (figure 5.1) when organisations are "Prioritising Ideas" and converting them into products or processes that create value during the implementation phase of innovation, they should consider aligning/synthesising the KMC of adopting of best practices, lessons learning, benchmarking and generating knowledge based on interpretation and translation. The synthesis of Innovation Capability and Knowledge Management Capability would provide the organisation with the ability to pivot quickly when prioritising ideas during innovation, utilising the Knowledge Management Capability of information and knowledge that has been generated and interpreted by the organisation.

The combination of practices promotes organisational learning among workers and partnerships with other organisations that support the spread of learning within the value chain. Lessons learned could be the adoption of best practice methods and even benchmarking, which are decent usages in knowledge management. The organisation will

benefit from learning from several lessons that can be made accessible both from within and outside the organisations. The intensive use of knowledge which is a result of a learning process can lead to prioritising ideas and creating new products and services. The learning capability includes collaboration, promoting learning, facilitating knowledge transfer and knowledge development, which involves learning new ways. In addition, the KMC to generate knowledge based on interpretation and translation will assist organisations to leverage on this knowledge development to create new products and services.

The Knowledge Management Capability variables affecting the Innovation Capability implementation: prioritising ideas in order of importance are:

Priority 1	Adopting best practices, lessons learning or benchmarking.
Priority 2	Generating knowledge based on interpretation and translation.

Figure 5.7 below shows all the recommended Knowledge Management Capabilities that can be considered for alignment when implementing this Innovative Capability group.

Figure 5.7: Group 6 Implementation: Prioritising Ideas

Source: author

- **Aligned Implementation Group 7 - Implementation: Selection Process**

When organisations are implementing the selection process, i.e. effectiveness of screening, selecting, risk management and strategic disruptive decision making during innovation projects, the organisation as guided by the conceptual framework (figure 5.1) should

contemplate aligning/synthesising the following Knowledge Management Capabilities: creating and retaining intellectual assets, the centre of excellence and the positioning of information and knowledge as a strategic resource.

Organisations will benefit through discovering new knowledge, building an intellectual asset and retaining the intellectual capital that would assist the organisation in selecting the appropriate innovative product for development. This retained knowledge can be used by any worker in the organisation to a definite business problem without rescinding the capability to reuse. Organisations will also be able to build a superior kind of knowledge which emanates from organisational co-operation, experience and practice that would give the organisation a competitive edge. The ability to retain and reuse the intellectual knowledge will ensure that the risk in selecting and retaining the know-how in the organisation is being managed. Positioning information and knowledge as a strategic resource and asset will support the screening and strategic disruptive decision making process through informed decision making in the organisation. In addition, the selection will be supported by established structures for centre of excellence with prevailing practices and routines.

The Knowledge Management Capability variables affecting the Innovation Capability the implementation selection process in order of importance are:

Priority 1	Creating and retaining intellectual Assets.
Priority 2	The structure for centre of excellence.
Priority 3	Positioning information and knowledge as a strategic resource.

Figure 5.8 below shows all the recommended Knowledge Management Capabilities that can be considered for alignment when implementing this Innovative Capability group.

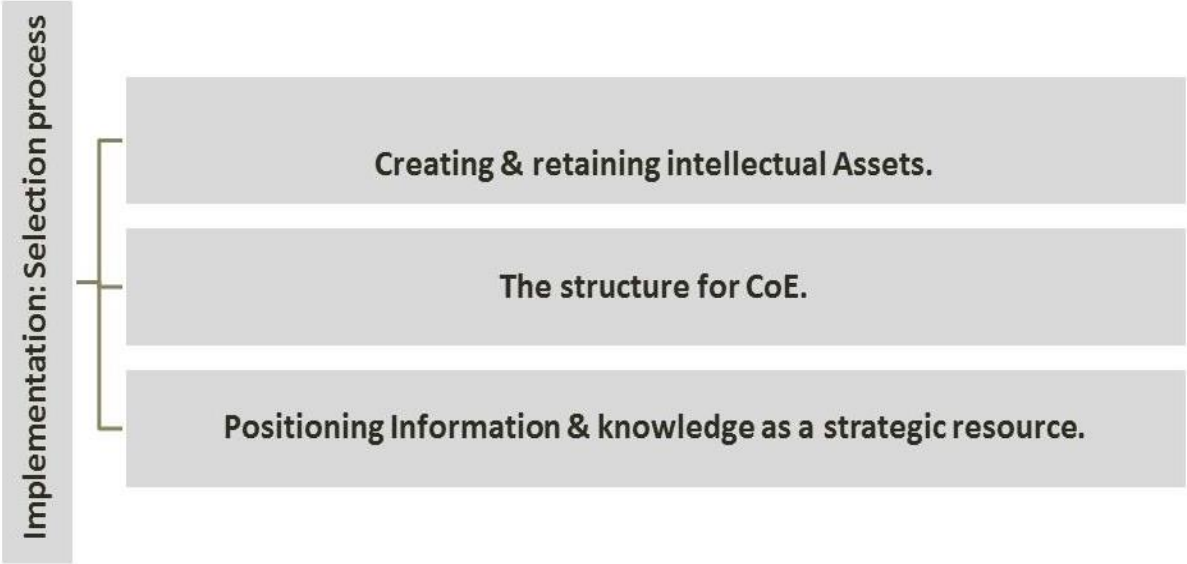

Figure 5.8: Group 7 Implementation: Selection Process

Source: author

- **Aligned Implementation Group 8 - Implementation: Product Development**

Similarly, when organisations are creating the new product development innovative implementation capability, as guided by the conceptual framework (figure 5.1) they should consider aligning/synthesising the following Knowledge Management Capabilities: Coordinating expertise and pin-pointing expert knowledge; adopting best practices, lessons learning or benchmarking; positioning information and knowledge as a strategic resource; operational command structure and leadership; knowledge bases, repositories, databases, content management and dashboards; creating valuable information from experiments, explorations or business intelligence and generating knowledge based on interpretation and translation. Although knowledge management systems could possibly be in place for innovation, the systemic synthesising of Knowledge Management Capability with Innovation Capability will provide full life cycle and retention of intellectual property and enable dissemination of information and knowledge of relevant innovative programmes.

Organisations will benefit from knowing and coordinating their expertise. Organisations knowing who their experts and knowledge champions are of importance for organisational knowledge development and play a pivotal role in knowledge transferring or knowledge

sharing inside the organisation during new product development process. The KMC will support the new product development with lessons learning, using a combination of practices, benchmarking and best practices which are beneficial in knowledge creation and acquisition, knowledge storing and dissemination of that knowledge to the right place in the organisation. This is supported by theory that organisations spend in building learning proficiencies that allow them to access, arrange and leverage resources and knowledge in order to capacitate to create innovations (Barney, 1991:99-120). The organisation will attain value from the intensive use of information and knowledge as a strategic resource through collaboration, learning new ways and capturing lessons learned, to improve organisational competency, to share, to generate, and to integrate knowledge that will create a body of collective learning, which will ultimately improve the innovative product being developed by the organisation. The informal and formal command structure of the organisations, which includes incentive schemes, task design, management policies, will provide the organisational leadership during the new product development. Organisations will benefit from the shared knowledge databases and repositories, using robust communications networks and state-of-the-art technologies to accumulate knowledge to develop the innovative product. The knowledge stored in the organisation's database could encompass information storage, individual skills, previous project experiences and employee memories. Therefore, the databases, knowledge repositories, knowledge solutions, and collaborative solutions that promote communities of practice are important knowledge management instruments, especially if they were aligned to Innovation Capabilities since it could also benefit the organisation in an entirely new product development process of innovation, thus optimising and economising on costly organisational capabilities. In addition, the KMC in the organisation that generates knowledge established on explanation and transformation of the meaning will benefit organisations to leverage such knowledge during innovation programmes.

The Knowledge Management Capability variables affecting the Innovation Capability implementation of product development in order of importance are:

Priority 1	Coordinating expertise and pin-pointing expert knowledge.
Priority 2	Adopting best practices, lessons learning or benchmarking.
Priority 3	Positioning information and knowledge as a strategic

	resource.
Priority 4	Operational command structure and leadership.
Priority 5	Knowledge bases, repositories, databases, content management and dashboards.
Priority 6	Creating valuable information from experiments, explorations or business Intelligence.
Priority 7	Generating knowledge based on interpretation and translation.

Figure 5.9 below shows all the recommended Knowledge Management Capabilities that can be considered for alignment when implementing this Innovative Capability group.

Figure 5.9: Group 8 Implementation: Product Development

Source: author

- **Aligned Implementation Group 9 - Implementation: Business Development**

When organisations are creating the business development of the implementation Innovation Capability, which are customer engagement and assessing market potential; new business development, partner engagement and platform management; effective product launch, roll-out, ramp-up and scaling-up of resources, as guided by the conceptual framework (figure 5.1) they should contemplate aligning/synthesising the following Knowledge Management Capabilities: creating and retaining intellectual assets; managing knowledge resources for transferability and creating valuable information from experiments, explorations or business intelligence.

Organisations will benefit from managing their intellectual assets appropriately to perform knowledge transfer in the scaling up of resources for the new product launch. Sáenz, Aramburu and Blanco (2012: 919-933) proved that the workers' knowledge sharing tools such as communities of practice, personal mentoring and worker functional rotations are the fundamental capability to augment and apply a positive influence on Innovation Capability. The insightful market information obtained, shared and retained during product development can now be re-used to engage the customer and create an intelligent platform for business development. The superior knowledge that was derived from previous project experience, repetition and teamwork can be re-used to gain a competitive edge. The knowledge obtained of the market place will assist to create strategic partnerships and customer engagements. Organisations will benefit by quickly and appropriately responding to the market potential, using the aligned KMC of knowledge transfer and absorption. Organisations will have the capability to acquire knowledge to provide answers to the questions, the ability to use information technology, the ability to build knowledge system, the ability to exchange knowledge when engaging the customer in the business development process. The valuable and beneficial information obtained through business intelligence will derive customer satisfaction using the predicted market behaviour information. The retrieval, examination and screening of the importance of the knowledge would create a platform management for effective product launch, roll-out, ramp-up and scaling-up of resources.

The Knowledge Management Capability variables affecting the Innovation Capability implementation of business development in order of importance are:

Priority 1	Creating and retaining intellectual Assets.
Priority 2	Managing knowledge resources for transferability.
Priority 3	Creating valuable information from experiments, explorations or business Intelligence.

Figure 5.10 below shows all the recommended Knowledge Management Capabilities that can be considered for alignment when implementing this Innovative Capability group.

Figure 5.10: Group 9 Implementation: Business Development

Source: author

- **Aligned Implementation Group 10 - Commercialisation: Customer Value**

As guided by the conceptual framework (figure 5.1) when organisations are creating the customer value of commercialisation Innovation Capability that are essential to deliver value to the customer and capturing a part of that value, they should consider aligning/synthesising Knowledge Management Capabilities. They are adopting best practices; lessons learning or benchmarking; informal structure to enable knowledge creation; sharing; collaboration and coordination; generating knowledge based on interpretation and translation; the structure for centre of excellence; creating valuable

information from experiments; explorations or business intelligence and operational command structure and leadership.

Organisations will benefit by promoting intra-organisational learning and knowledge sharing among employees about the customer's likes and dislikes. The various circumstances could be used to derive what the customer sees as value. Systemic learning from various organisations projects can be made throughout the organisations. The ability to learn the customer's experiences and working process and the intensive use of knowledge capability which includes collaboration, facilitating knowledge transfer and capturing the knowledge, will benefit the organisation by creating a body of collective learning about what is valuable to the customer. The informal structure to enable knowledge creation and sharing for knowledge management will form a solid basis for building organisational memory of customers' expectations and values as a knowledge asset. This will shape the organisation to be adaptable, flexible and agile to respond to customers' needs. Moreover, the KMC of generating knowledge based on explanation and transformation of the meaning will enable the organisation to leverage on such knowledge that demonstrates customer value expectations. The centre of excellence with prevailing practices and routines could be used to capture and manage the customer's value experience over time and to respond to changing customer circumstances. In addition, the KMC to create valuable information, derived from experiments and explorations, including information found on reports and raw data storage, can be considered valuable business intelligence of the customer experience. Information storage and dashboards are important instruments that can enable the process of capturing and producing customer value. In addition, operational and command structure will provide the leadership and management support policy to advocate customer value.

The Knowledge Management Capability variables affecting the Innovation Capability the customer value commercialisation in order of importance are:

Priority 1	Adopting best practices, lessons learning or benchmarking.
Priority 2	Informal structure to enable knowledge creation, sharing, collaboration and coordination.
Priority 3	Generating knowledge based on interpretation and

	translation.
Priority 4	The structure for centre of excellence.
Priority 5	Creating valuable information from experiments, explorations or business Intelligence.
Priority 6	Operational command structure and leadership.

Figure 5.11 below shows all the recommended Knowledge Management Capabilities that can be considered for alignment when implementing this Innovative Capability group.

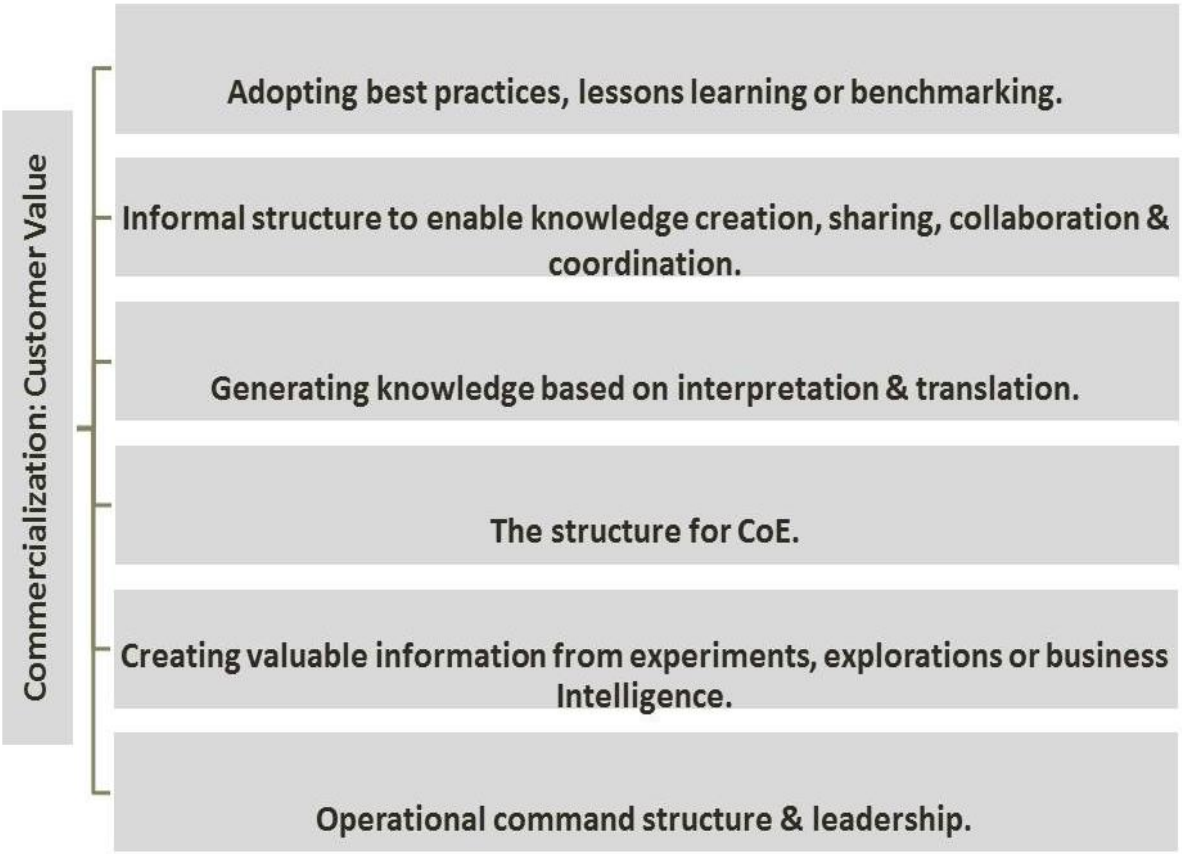

Figure 5.11: Group 10 Commercialisation: Customer Value

Source: author

- **Aligned Implementation Group 11 - Commercialisation: Channels**

When organisations are creating the channels of commercialisation Innovation Capability, which is to access and penetrate multiple channels, customer groups and regions ahead of competition, as guided by the conceptual framework (figure 5.1) they should consider

aligning/synthesising the following Knowledge Management Capabilities: informal structure to enable knowledge creation, sharing, collaboration and coordination; creating and retaining intellectual assets; positioning information and knowledge as a strategic resource; managing knowledge resources for transferability; adopting best practices, lessons learning or benchmarking and centre of excellence.

Organisations will benefit by utilising the organisation's social capital comprising of network links and network structures to form a firm foundation for creating organisational memory as an organisational knowledge asset to penetrate the multiple channels using the organisations shared knowledge of the market and the intelligence derived from the market information. The social organisational structures improves sharing, collaboration, coordination, adaptability, flexibility and organisational agility, which are important features to understand the market dynamics and market politics when creating channels, linking resources and activities. The knowledge retention acquired from proficient experience, will provide the organisation with a competitive edge when penetrating various channels. In addition, the KMC of information and knowledge as a strategic resource and asset in the organisation will ensure that the market channel information is transferred throughout the organisation. This will facilitate the ability to build knowledge networks of a wide variety of experts working in collaboration to solve complex business problems, to exchange and transfer pertinent knowledge and to motivate the penetration of the innovative product or service.

Moreover, the lessons learnt while employee's work under various circumstances will augment the organisations learning capability by individuals and experts learning new ways, capturing lessons learned, improving organisational competency and integrating ideas with both the innovative and knowledge management teams to penetrate the market channels. The centre of excellence with prevailing practices and routines will assist the organisation to mobilise and centrally co-ordinate the market intelligence. With the alignment of Innovation Capability and Knowledge Management Capability organisations can propagate their organisational capability through a robust customer emphasis and external interactions that indicate an open approach to innovation across their activities and operations (Samson, Gloet & Singh, 2017). For instance, the Knowledge Management

Capabilities will encourage a systemic and formal structure for collaboration across the organisations operations to manage the information whereby the marketing team share openly with the customer as directed by the innovation team and intellectual information being managed by the knowledge management team of the organisation. The Knowledge Management Capability will enable the determining of customer value information and the strategic positioning of that particular information to attain competitive advantage. Conversely, if there is no alignment of Knowledge Management Capability, such valuable information will be possible obtained during the innovation process for a particular isolated process or event however, the knowledge assets would not be managed efficiently and stored for transferability, collaboration, learning and upkeep with the constant change that a Knowledge Management Capability can enable.

The Knowledge Management Capability variables affecting the Innovation Capability commercialisation: channels in order of importance are:

Priority 1	Informal structure to enable knowledge creation, sharing, collaboration and coordination.
Priority 2	Creating and retaining intellectual Assets.
Priority 3	Positioning information and knowledge as a strategic resource.
Priority 4	Managing knowledge resources for transferability.
Priority 5	Adopting best practices, lessons learning or benchmarking.
Priority 6	The structure for centre of excellence.

Figure 5.12 below shows all the recommended Knowledge Management Capabilities that can be considered for alignment when implementing this Innovative Capability group.

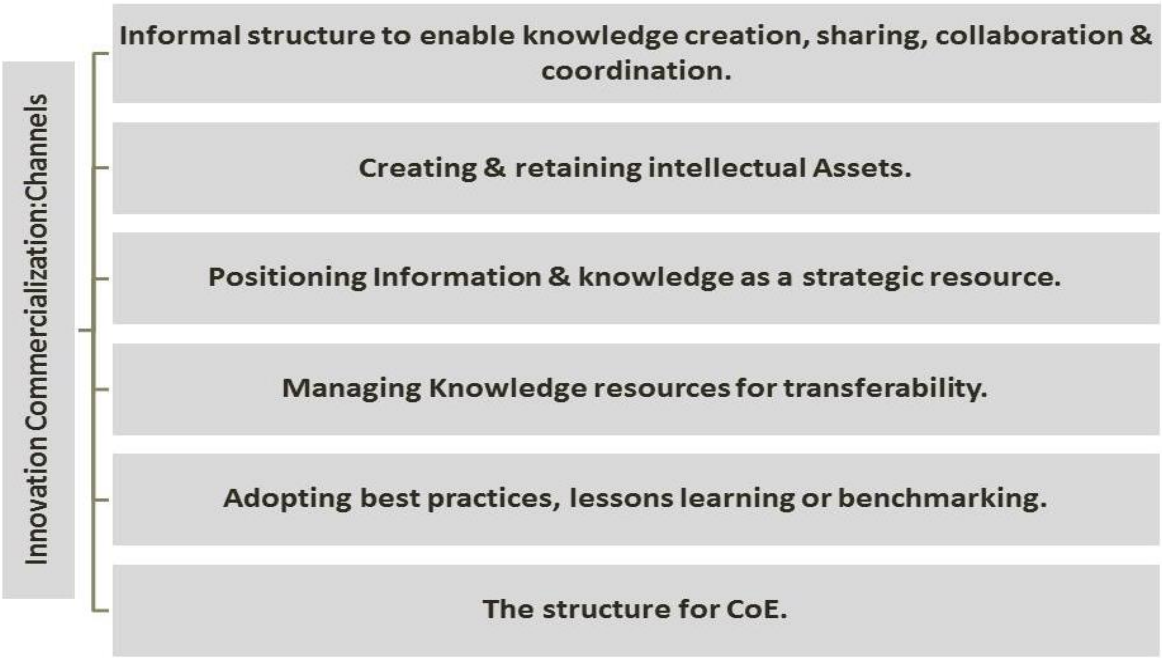

Figure 5.12: Group 11 Commercialisation: Channels

Source: Author

❖ **Principles for the Implementation of the Conceptual Framework**

- The conceptual framework does not represent a sequential implementation. However, organisations can focus on a specific implementation group or groups depending on the maturity and appropriateness of Innovation Capability and Knowledge Management Capability to the organisation.
- It is not necessary to select all capability at once. Organisations should select capability according to the focus of the organisational needs, priorities and affordability.
- Certain capability is duplicated across the Implementation Groups. This does not mean redundancy, but rather that organisations should systemically implement those KMC in the context of the innovative phase.
- Capabilities that are developed should be flexible, adaptable and reused wherever possible.

5.3.2 Specific objectives

Literature objectives

1. To examine the factors that affect INNO.

This was achieved in the literature review as discussed in chapter 2 (section 2.10.1). According Kumar et al. (2013:40) the four INNO groups are:

- Strategic capability;
- Ideation capability;
- Implementation capability; and
- Commercialisation capability.

2. To examine the factors that affect KMC.

This was achieved in the literature review as discussed in chapter 2 (section 2.10.2).

A resource-based capability encompassing: technology, structure and organisational culture, and a knowledge-based capability containing: expertise, learning and information (Aujirapongpan et al. (2010: 186).

3. To examine the factors that affect OCE.

This was achieved in the literature review as discussed in chapter 2 (section 2.10.3).

The criteria to measure OCE were adopted from Itami and Noto (2007:132) as well as Hamel and Prahalad (1992: 79-91). OCE was defined by the following five observable variables:

- Improved economising on capability;
- Improved mobilising of capability;
- Improved determination of capability gaps;
- Reduced capability redundancy across domains; and
- Enhanced optimal capability.

Empirical objectives

4. To investigate the relationships between INNO, KMC, OCE.

The study confirms the relationship between KMC and INNO, and the “combined effect of INNO and KMC” on OCE.

This was achieved and is discussed in section 5.2 above.

5. To evaluate the important factors of KMC that affect INNO.

This was achieved through regression analysis as discussed in chapter 4 (section 4.4.4).

5.4 Original contribution to the body of knowledge

The following are the significant findings in the study and are considered to be original contributions to the body of knowledge:

a) The study confirmed that INNO does not affect OCE and KMC does not affect OCE solely. Organisations that are implementing INNO and KMC on their own will not experience OCE. However, the results show that implementing INNO combined with KMC will benefit the OCE.

b) The study has highlighted "**in order of importance"** which factors of KMC to align with each individual INNO to achieve OCE.

c) The study has closed the gaps in terms of the lack of models and made advances in the study of the relationship between KMC, INNO and OCE and the importance of their underlying constructs. The researcher has not come across any theory that shows the interrelationships of Innovation Capability, Knowledge Management Capability and Organisational Capability Efficiency. Therefore, the Structured Equation Model derived in Chapter 4 (figure 4.7) is considered to be an original contribution to the body of knowledge.

d) Finally, the conceptual framework (figure 5.1) that was developed through factorial analysis and regression analysis will be highly beneficial to organisations. Currently there does not seem to be a framework that offers insight into the aligned/synthesised implementation of Innovation Capability and Knowledge Management Capability. Hence, this conceptual framework as described in section 5.3.1 is considered to be the original contribution to the body of knowledge.

5.5 Benefits of the Study

a) The study has shown that implementing INNO and KMC on its own will not positively affect OCE of the organisation. However, the study shows that organisations will benefit by combining and implementing INNO and KMC together.
b) The conceptual framework in this study provides a detailed implementation guide to organisations on which KMC should be aligned to which INNO.
c) Organisations can now make use of the outcome of this research and the conceptual framework as described in section 5.3.1 to implement KMC and INNO in a manner that will attain OCE, i.e. using the existing resources to support the larger volume of business, mobilising resources effectively, converging capability on focused effort and utilising organisational capabilities to the fullest by co-opting resources through systemic and collaborative arrangements.
d) Innovation Capability and Knowledge Management Capability being coherently aligned, will allow managers and practitioners to have cohesive strategies, optimised utilisation of resources, avoidance of redundancy of effort, improved investments, and improved accessibility of highly scarce and skilled resources.
e) The study has provided a greater understanding of the relationship between Innovation Capability, Knowledge Management Capability and Organisational Capability Efficiency and will inform business managers, knowledge managers, innovators and project managers on the appropriate investment for an aligned/synthesised implementation of Innovation Capability and Knowledge Management Capability for the organisation.

5.6 Limitations

The following were limitations of the study:

a) The data were collected from SA organisations; however the characteristics of the organisations surveyed may be quite different from organisations in other countries. Hence, its generalisability is limited to other similar contexts.
b) The use of a questionnaire was a possible limitation, as it did not allow for observation and rapport with respondents.
c) Cost and time constraints limited the research design options. Due to the limited time and scope of the study not all of the organisations in South Africa could be researched.

However, valid and reliable data was obtained – considering the fact that most of the large organisations in SA were included in the study sample.

d) There might have been non-coverage of the target population which may have affected the validity and reliability of the study negatively.
e) Using Principal Component Analysis method in factor analysis might have biased the results, since some of the variables were not normally distributed.

Despite the above-mentioned limitations, the researcher attempted to minimise the impact of the limitations.

5.7 Recommendations

The following are recommendations for the study:

a) The research suggests that organisations implementing INNO and KMC on its own, poses the risk of inefficiency of organisational capability. It is recommended that when implementing Innovation Capability at the organisation, Knowledge Management Capability concepts should be considered and where applicable align/synthesis them with the appropriate Innovation Capability, using their order of importance to prioritise implementation for the organisation.
b) It is highly suggested that organisations implementing Innovation Capability and Knowledge Management Capability consider aligning their capabilities to attain Organisational Capability Efficiency and to overcome the grappling of multiple influences and depleted organisational capability.
c) The most important things that are needed for Innovation Capability and Knowledge Management Capability to happen are: top management or leadership, organisational cultural change and training staff to acquire the necessary skills; and transformation and change management.

5.8 Suggestions for Further Research

The results obtained in this study are likely to provide researchers with a better understanding of Innovation Capability, Knowledge Management Capability and Organisational Capability

Efficiency and to provide a basis for further research into this important aspect of today's knowledge and intellectual organisations.

The following are suggestions for further research:

a) The insight into the INNO, KMC and OCE conceptual framework can be used as a basis to explore other areas of interest in the wide area of innovation and knowledge management.
b) From the results there is empirical evidence that INNO influences OCE negatively and KMC influences OCE negatively. Further studies should be undertaken to examine why INNO and KMC when implemented on their own negatively affects OCE.
c) The homogenous nature of INNO and KMC was interestingly brought out in this study, especially the shared benefits. Further research can be done to see how other homogenous strategic imperatives such as centre of excellence align: Questions to consider include: How do the alignment of Centre of Excellence Capability and Innovation Capability and/or alignment of Centre of Excellence Capability with Knowledge Management Capability affect organisations?
d) The developed conceptual framework (section 5.3.1 above) should be tested in organisations for validity. This will not only check the authenticity but also its usefulness and challenges and will contribute to understanding and aligning the complex building blocks of Innovation Capability and Knowledge Management Capability.
e) The study was undertaken in the South African context. A global study can be undertaken of a similar nature.
f) The study results can be possibly improved in future research if it is undertaken using a more focused/expert group. For future research, it would be useful to repeat the study's methodology by collecting data from a focused or expert group , this could be achieved through qualitative method of data collection such as interviews to add further interpretation and meaning to the quantitative findings.

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ANNEXURE A: Ethical Clearance

Graduate School of Business Leadership, University of South Africa, PO Box 392, Unisa, 0003, South Africa
Cnr Janadel and Alexandra Avenues, Midrand, 1685. Tel: +27 11 652 0000. Fax: +27 11 652 0299
E-mail: sbl@unisa.ac.za Website: www.unisa.ac.za/sbl

SCHOOL OF BUSINESS LEADERSHIP
RESEARCH ETHICS REVIEW COMMITTEE (GSBL CRERC)

31 July 2017

Ref #: 2017_SBL_DBL_014_FA
Name of applicant: Mr J Travern
Student #: 6027024

Dear Mr Travern

Decision: Ethics Approval

Student: Mr J Travern, Jeremiah.Travern@sita.co.za, 081 423 4223

Supervisor: Prof V Makin, makinv@hotmail.com, 082 416 6535

Project Title: A conceptual framework for the relationship between the implementation of innovation and knowledge management and its link to organisational capabilities.

Qualification: Doctorate in Business Leadership (DBL)

Expiry Date: July 2021

Thank you for applying for research ethics clearance, SBL Research Ethics Review Committee reviewed your application in compliance with the Unisa Policy on Research Ethics.

Outcome of the SBL Research Committee:
Approval is granted for the duration of the Project

The application was reviewed in compliance with the Unisa Policy on Research Ethics by the SBL Research Ethics Review Committee on the 25/07/2017.

The proposed research may now commence with the proviso that:

1) The researcher/s will ensure that the research project adheres to the values and principles expressed in the UNISA Policy on Research Ethics.
2) Any adverse circumstance arising in the undertaking of the research project that is

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SBL GRADUATE SCHOOL OF BUSINESS LEADERSHIP UNISA

Graduate School of Business Leadership, University of South Africa, PO Box 392, Unisa, 0003, South Africa
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relevant to the ethicality of the study, as well as changes in the methodology, should be communicated in writing to the SBL Research Ethics Review Committee.

3) An amended application could be requested if there are substantial changes from the existing proposal, especially if those changes affect any of the study-related risks for the research participants.
4) The researcher will ensure that the research project adheres to any applicable national legislation, professional codes of conduct, institutional guidelines and scientific standards relevant to the specific field of study.

Kind regards,

Prof R Ramphal
Chairperson: SBL Research Ethics Committee
011 – 652 0363 or ramphrr@unisa.ac.za

4/8/2017
Dr R Mokate
CEO and Executive Director: Graduate School of Business Leadership
011- 652 0256/mokatrd@unisa.ac.za

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ANNEXURE B: Sample of Research Questionnaire

SURVEY: Innovation, Knowledge Management and Organisational Capability

Jeremiah Travern
Telephone: 012 6721468
Cell: 0796230339
E-mail: Jeremiah.Travern@sita.co.za

A conceptual framework for the relationship between the implementation of innovation and knowledge management and its link to organisational capabilities

Dear Sir / Madam

As fulfilment of my doctoral degree (DBL) studies at UNISA, I am busy with a research project titled: *"A conceptual framework for the relationship between the implementation of innovation and knowledge management and its link to organisational capabilities"*

The purpose of this study is to examine if organisational capability efficiency is improved by aligning organisational capabilities when implementing innovation and knowledge management strategic imperatives in parallel in organisations.

Please complete the following questionnaire based on your experience and expert opinion being involved with Innovation and Knowledge Management programmes at your organisation. Your input is of vital importance and you are assured of complete anonymity. I have formulated the questionnaire in a user-friendly presentation which will only take between 20-30 minutes of your time and please do not hesitate to contact me should you require any assistance.

This study has been approved by the UNISA Ethics Committee 2017_SBL_DBL_014_FA and should you have any concerns regarding this data collection please contact me using the contact details above.

By you completing this questionnaire indicates that you have voluntarily accepted to participate in this study. I sincerely thank you for your participation in this research and for your much valued contribution.

Kind Regards
Jeremiah Travern

ADDITIONAL BACKGROUND INFORMATION

The information is provided as additional information to the respondent to clarify key terms that are used in this survey.

INNOVATION is the generation, development and implementation of something new in the organisation as well as the expansion of new products, services, processes, technologies, administrative systems or structures; it transforms knowledge into new products and services.

KNOWLEDGE MANAGEMENT has been defined as a challenging process of identifying and leveraging individual and collective organisational knowledge in such a way that organisations can compete more effectively over time; it involves knowledge sharing, knowledge creation, or improvement of intellectual assets within an organisation; it provides easy access to knowledge, know-how, experience, and expertise that relates to creating new knowledge and ensuring usage of knowledge within organisation.

KNOWLEDGE MANAGEMENT CAPABILITY has derived from theory, can be a resource-based capability comprising of technology, structure and organisational culture, and a knowledge-based capability comprising of expertise, learning and information are required by organisations implementing knowledge management.

INNOVATION CAPABILITY are those capabilities that are required to conceptualize, implement and commercialize products and services; required to manage the innovation funnel, to understand the business environment and to plan, and design innovation programs; generate ideas in-house or through collaborative efforts or external sources; prioritize ideas and convert them into products or processes that create value to the customer.

ORGANISATIONAL CAPABILITY is inclusive of resource based and knowledge based capability. The resource based capability emphasizes the resources of organisations which infer tangible and intangible assets, i.e. land, buildings, instruments, organisational management structuring system and organisational culture. Knowledge Base capability is the combination of practices that are relied upon need to enable the acquisition, dissemination, integration, and development of knowledge over time.

ORGANISATIONAL CAPABILITY EFFICIENCY is when organisations benefit in economizing on capability, mobilizing existing resources appropriately, determining resource gaps and redundancies across domains and building an optimal capability by sharing, Integrating and co-ordinating capability.

ALIGNMENT OR IMPLEMENTING IN PARALLEL in the context of the study is implementing the specific innovation capability **CONCURRENTLY or AT THE SAME TIME** with the knowledge capability to share and optimize organisational capability, resource and budget ensuring efficiency.

RESEARCH QUESTIONNAIRE FOR INNOVATION AND KNOWLEDGE MANAGEMENT WORKERS, MANAGERS AND CONSULTANT SPECIALISTS.

(The questionnaire is to be answered by organisational members managing or working in the Innovation or Knowledge Management Environment)

Name of Participant (Optional): _____

Name of Organisation employed with (Optional): _____

Designation/Role in Organisation: _____

Date of Participation: _____

This questionnaire contains 6 Sections (A, B, C, D, E and F). You are kindly requested to complete all sections fully.

SECTION A – BACKGROUND INFORMATION – INFORMATION IN THIS SECTION IS FOR ACADEMIC PURPOSES ONLY

Please select the appropriate statement

1. Involvement in innovation and/or knowledge management programmes:

Less than two years	
2 – 5 years	
6 – 9 years	
10 years or more	
State number of years if more than 10	

2. Type of position held in your organisation:

Top Management (Board member, Executive level)	
Senior/Middle Management (Departmental Head, Business Unit Head level)	
Technical Consultant, Technical Lead, Senior Specialist	
Specialist, Innovation or Knowledge Worker	
Other (Specify)	

3. Highest education qualification obtained:

Matric	
Diploma	
Degree (undergraduate)	
Degree (honours)	
Degree (masters)	
Degree (doctorate)	

4. Core responsibilities to the organisation (could be more than one):

To sponsor Innovation and/or Knowledge Management programmes	
To manage Innovation and/or Knowledge Management programmes	
To Lead Innovation and/or Knowledge Management programmes	
To perform Innovation and/or Knowledge Management related tasks	
Other responsibilities (Please specify)	

5. How many Innovation and/or Knowledge Management programmes you were/are involved in?

< 5	
< 10	
< 50	
<100	

SECTION B – INNOVATION STRATEGIC CAPABILITY

Section B1

Please answer the questions in the table below by marking an 'X' in the appropriate column. **STRONGLY AGREE (1), AGREE (2), UNDECIDED (3), DISAGREE (4), STRONGLY DISAGREE (5))** for each of the following:

	ORGANISATIONAL CAPABILITY EFFICIENCY is improved when "Conceptualizing, designing, implementing and commercializing innovation programmes" is implemented in parallel with:	1	2	3	4	5
1	Knowledge bases, repositories, databases, content management and dashboards.					
2	The structure for centre of excellence.					
3	Operational command structure and leadership.					
4	Informal structure to enable knowledge creation, sharing, collaboration and coordination.					
5	Increasing openness, knowledge sharing and the diffusion of knowledge for innovation.					
6	Positioning Information and knowledge as a strategic resource.					
7	Creating valuable information from experiments, explorations or business Intelligence.					
8	Generating knowledge based on interpretation and translation.					
9	Managing Knowledge resources for transferability.					
10	Creating and retaining intellectual Assets.					
11	Coordinating expertise and pinpointing expert knowledge.					
12	Adopting best practices, lessons learning or benchmarking.					

Section B2

Please answer the questions in the table below by marking an 'X' in the appropriate column (MARK either **STRONGLY AGREE (1), AGREE (2), UNDECIDED (3), DISAGREE (4), STRONGLY DISAGREE (5)**) for each of the following:

	ORGANISATIONAL CAPABILITY EFFICIENCY is improved when "The knowledge of competitor strategies, industry trends, and customer needs for innovation" is implemented in parallel with:	1	2	3	4	5
1	Knowledge bases, repositories, databases, content management and dashboards.					
2	The structure for centre of excellence.					
3	Operational command structure and leadership.					
4	Informal structure to enable knowledge creation, sharing, collaboration and coordination.					
5	Increasing openness, knowledge sharing and the diffusion of knowledge for innovation.					
6	Positioning Information and knowledge as a strategic resource.					
7	Creating valuable information from experiments, explorations or business Intelligence.					
8	Generating knowledge based on interpretation and translation.					
9	Managing Knowledge resources for transferability.					
10	Creating and retaining intellectual Assets.					
11	Coordinating expertise and pinpointing expert knowledge.					
12	Adopting best practices, lessons learning or benchmarking.					

Section B3

Please answer the questions in the table below by marking an 'X' in the appropriate column. **STRONGLY AGREE (1), AGREE (2), UNDECIDED (3), DISAGREE (4), STRONGLY DISAGREE (5))** for each of the following:

ORGANISATIONAL CAPABILITY EFFICIENCY is improved when " The knowledge of technology environment and emerging trends for innovation" is implemented in parallel with:	1	2	3	4	5

1	Knowledge bases, repositories, databases, content management and dashboards.					
2	The structure for centre of excellence.					
3	Operational command structure and leadership.					
4	Informal structure to enable knowledge creation, sharing, collaboration and coordination.					
5	Increasing openness, knowledge sharing and the diffusion of knowledge for innovation.					
6	Positioning Information and knowledge as a strategic resource.					
7	Creating valuable information from experiments, explorations or business Intelligence.					
8	Generating knowledge based on interpretation and translation.					
9	Managing Knowledge resources for transferability.					
10	Creating and retaining intellectual Assets.					
11	Coordinating expertise and pinpointing expert knowledge.					
12	Adopting best practices, lessons learning or benchmarking.					

Section B4

Please answer the questions in the table below by marking an 'X' in the appropriate column. **STRONGLY AGREE (1), AGREE (2), UNDECIDED (3), DISAGREE (4), STRONGLY DISAGREE (5))** for each of the following:

	ORGANISATIONAL CAPABILITY EFFICIENCY is improved when "Managing organisational culture, structure, resources and competences for innovation" is implemented in parallel with:	1	2	3	4	5
1	Knowledge bases, repositories, databases, content management and dashboards.					
2	The structure for centre of excellence.					
3	Operational command structure and leadership.					
4	Informal structure to enable knowledge creation, sharing, collaboration and coordination.					
5	Increasing openness, knowledge sharing and the diffusion of knowledge for innovation.					
6	Positioning Information and knowledge as a strategic resource.					
7	Creating valuable information from experiments, explorations or business Intelligence.					
8	Generating knowledge based on interpretation and translation.					
9	Managing Knowledge resources for transferability.					
10	Creating and retaining intellectual Assets.					
11	Coordinating expertise and pinpointing expert knowledge.					
12	Adopting best practices, lessons learning or benchmarking.					

SECTION C – INNOVATION IDEATION CAPABILITY

Section C1

Please answer the questions in the table below by marking an 'X' in the appropriate column. **STRONGLY AGREE (1), AGREE (2), UNDECIDED (3), DISAGREE (4), STRONGLY DISAGREE (5))** for each of the following:

	ORGANISATIONAL CAPABILITY EFFICIENCY is improved when "Generating ideas in-house or through collaborative efforts or cross pollinating ideas or partner engagement" is implemented in parallel with:	1	2	3	4	5
1	Knowledge bases, repositories, databases, content management and dashboards.					
2	The structure for centre of excellence.					
3	Operational command structure and leadership.					
4	Informal structure to enable knowledge creation, sharing, collaboration and coordination.					
5	Increasing openness, knowledge sharing and the diffusion of knowledge for innovation.					
6	Positioning Information and knowledge as a strategic resource.					

7	Creating valuable information from experiments, explorations or business Intelligence.					
8	Generating knowledge based on interpretation and translation.					
9	Managing Knowledge resources for transferability.					
10	Creating and retaining intellectual Assets.					
11	Coordinating expertise and pinpointing expert knowledge.					
12	Adopting best practices, lessons learning or benchmarking.					

SECTION D – INNOVATION IMPLEMENTATION CAPABILITY

Section D1

Please answer the questions in the table below by marking an 'X' in the appropriate column. **STRONGLY AGREE (1), AGREE (2), UNDECIDED (3), DISAGREE (4), STRONGLY DISAGREE (5))** for each of the following:

	ORGANISATIONAL CAPABILITY EFFICIENCY is improved when "Prioritizing ideas and converting them into products or processes that create value for innovation" is implemented in parallel with:	1	2	3	4	5
1	Knowledge bases, repositories, databases, content management and dashboards.					
2	The structure for centre of excellence.					
3	Operational command structure and leadership.					
4	Informal structure to enable knowledge creation, sharing, collaboration and coordination.					
5	Increasing openness, knowledge sharing and the diffusion of knowledge for innovation.					
6	Positioning Information and knowledge as a strategic resource.					
7	Creating valuable information from experiments, explorations or business Intelligence.					
8	Generating knowledge based on interpretation and translation.					
9	Managing Knowledge resources for transferability.					
10	Creating and retaining intellectual Assets.					
11	Coordinating expertise and pinpointing expert knowledge.					
12	Adopting best practices, lessons learning or benchmarking.					

Section D2

Please answer the questions in the table below by marking an 'X' in the appropriate column. **STRONGLY AGREE (1), AGREE (2), UNDECIDED (3), DISAGREE (4), STRONGLY DISAGREE (5))** for each of the following:

	ORGANISATIONAL CAPABILITY EFFICIENCY is improved when "Screening and performing selection process, risk management and strategic disruptive decision making for innovation " is implemented in parallel with:	1	2	3	4	5
1	Knowledge bases, repositories, databases, content management and dashboards.					
2	The structure for centre of excellence.					
3	Operational command structure and leadership.					
4	Informal structure to enable knowledge creation, sharing, collaboration and coordination.					
5	Increasing openness, knowledge sharing and the diffusion of knowledge for innovation.					
6	Positioning Information and knowledge as a strategic resource.					
7	Creating valuable information from experiments, explorations or business Intelligence.					
8	Generating knowledge based on interpretation and translation.					
9	Managing Knowledge resources for transferability.					
10	Creating and retaining intellectual Assets.					

11	Coordinating expertise and pinpointing expert knowledge.					
12	Adopting best practices, lessons learning or benchmarking.					

Section D3

Please answer the questions in the table below by marking an 'X' in the appropriate column. **STRONGLY AGREE (1), AGREE (2), UNDECIDED (3), DISAGREE (4), STRONGLY DISAGREE (5))** for each of the following:

	ORGANISATIONAL CAPABILITY EFFICIENCY is improved when "Undertaking new product development, customer engagement and assessing market potential for innovation" is implemented in parallel with:	1	2	3	4	5
1	Knowledge bases, repositories, databases, content management and dashboards.					
2	The structure for centre of excellence.					
3	Operational command structure and leadership.					
4	Informal structure to enable knowledge creation, sharing, collaboration and coordination.					
5	Increasing openness, knowledge sharing and the diffusion of knowledge for innovation.					
6	Positioning Information and knowledge as a strategic resource.					
7	Creating valuable information from experiments, explorations or business Intelligence.					
8	Generating knowledge based on interpretation and translation.					
9	Managing Knowledge resources for transferability.					
10	Creating and retaining intellectual Assets.					
11	Coordinating expertise and pinpointing expert knowledge.					
12	Adopting best practices, lessons learning or benchmarking.					

Section D4

Please answer the questions in the table below by marking an 'X' in the appropriate column. **STRONGLY AGREE (1), AGREE (2), UNDECIDED (3), DISAGREE (4), STRONGLY DISAGREE (5))** for each of the following:

	ORGANISATIONAL CAPABILITY EFFICIENCY is improved when the INNOVATION CAPABILITY of "Doing new business development and partner engagement for innovation" is implemented in parallel with:	1	2	3	4	5
1	Knowledge bases, repositories, databases, content management and dashboards.					
2	The structure for centre of excellence.					
3	Operational command structure and leadership.					
4	Informal structure to enable knowledge creation, sharing, collaboration and coordination.					
5	Increasing openness, knowledge sharing and the diffusion of knowledge for innovation.					
6	Positioning Information and knowledge as a strategic resource.					
7	Creating valuable information from experiments, explorations or business Intelligence.					
8	Generating knowledge based on interpretation and translation.					
9	Managing Knowledge resources for transferability.					
10	Creating and retaining intellectual Assets.					
11	Coordinating expertise and pinpointing expert knowledge.					
12	Adopting best practices, lessons learning or benchmarking.					

SECTION E– INNOVATION COMMERCIALIZATION CAPABILITY

Section E1

Please answer the questions in the table below by marking an 'X' in the appropriate column. **STRONGLY AGREE (1), AGREE (2), UNDECIDED (3), DISAGREE (4), STRONGLY DISAGREE (5))** for each of the following:

	ORGANISATIONAL CAPABILITY EFFICIENCY is improved when "Delivering value to the customer and capturing a part of that value for innovation" is implemented in parallel with:	1	2	3	4	5
1	Knowledge bases, repositories, databases, content management and dashboards.					
2	The structure for centre of excellence.					
3	Operational command structure and leadership.					
4	Informal structure to enable knowledge creation, sharing, collaboration and coordination.					
5	Increasing openness, knowledge sharing and the diffusion of knowledge for innovation.					
6	Positioning Information and knowledge as a strategic resource.					
7	Creating valuable information from experiments, explorations or business Intelligence.					
8	Generating knowledge based on interpretation and translation.					
9	Managing Knowledge resources for transferability.					
10	Creating and retaining intellectual Assets.					
11	Coordinating expertise and pinpointing expert knowledge.					
12	Adopting best practices, lessons learning or benchmarking.					

Section E2

Please answer the questions in the table below by marking an 'X' in the appropriate column. **STRONGLY AGREE (1), AGREE (2), UNDECIDED (3), DISAGREE (4), STRONGLY DISAGREE (5))** for each of the following:

	ORGANISATIONAL CAPABILITY EFFICIENCY is improved when "Penetrating multiple channels, customer groups and competitive regions with innovation " is implemented in parallel with:	1	2	3	4	5
1	Knowledge bases, repositories, databases, content management and dashboards.					
2	The structure for centre of excellence.					
3	Operational command structure and leadership.					
4	Informal structure to enable knowledge creation, sharing, collaboration and coordination.					
5	Increasing openness, knowledge sharing and the diffusion of knowledge for innovation.					
6	Positioning Information and knowledge as a strategic resource.					
7	Creating valuable information from experiments, explorations or business Intelligence.					
8	Generating knowledge based on interpretation and translation.					
9	Managing Knowledge resources for transferability.					
10	Creating and retaining intellectual Assets.					
11	Coordinating expertise and pinpointing expert knowledge.					
12	Adopting best practices, lessons learning or benchmarking.					

SECTION F – ORGANISATIONAL CAPABILITY EFFICIENCY

Please answer the questions in the table below by marking an 'X' in the appropriate column. **STRONGLY AGREE (1), AGREE (2), UNDECIDED (3), DISAGREE (4), STRONGLY DISAGREE (5))** for each of the following:

	Questions:	1	2	3	4	5
1	Using fewer resources to support the same level of business or using the existing resources to support the larger volume of business improves Organisational Capability Efficiency?					
2	Leveraging and mobilizing its resources improves Organisational Capability Efficiency?					

3	Performing resource analysis, filling those gaps and building capability for the future improves Organisational Capability Efficiency?					
4	Converging capability on clear goals and focused efforts improves Organisational Capability Efficiency?					
5	Conserving and utilizing resources and capabilities to the fullest by co-opting resources through collaborative arrangements improves Organisational Capability Efficiency?					

SECTION H – OTHER INFORMATION

We might have left out an important issue concerning "THE RELATIONSHIP BETWEEN THE IMPLEMENTATION OF INNOVATION AND KNOWLEDGE MANAGEMENT AND ITS LINK TO ORGANISATIONAL CAPABILITIES". Please write it below:

_____
_____
_____
_____
_____
_____

If there are any additional comments: Please write it below:

_____
_____
_____
_____
_____

THANK YOU FOR YOUR VALUED TIME AND SUPPORT!!!

ANNEXURE C: The survey questions

ORGANISATIONAL CAPABILITY EFFICIENCY is improved when "Conceptualising, designing, implementing and commercializing innovation programmes" is implemented in parallel with:	
1	Knowledge bases, repositories, databases, content management and dashboards.
2	The structure for centre of excellence.
3	Operational command structure and leadership.
4	Informal structure to enable knowledge creation, sharing, collaboration and coordination.
5	Increasing openness, knowledge sharing and the diffusion of knowledge for innovation.
6	Positioning Information and knowledge as a strategic resource.
8	Creating valuable information from experiments, explorations or business Intelligence.
9	Generating knowledge based on interpretation and translation.
10	Managing Knowledge resources for transferability.
11	Creating and retaining intellectual Assets.
12	Coordinating expertise and pin-pointing expert knowledge.
ORGANISATIONAL CAPABILITY EFFICIENCY is improved when "The knowledge of competitor strategies, industry trends, and customer needs for innovation" is implemented in parallel with:	
1	Knowledge bases, repositories, databases, content management and dashboards.
2	The structure for centre of excellence.
3	Operational command structure and leadership.
4	Informal structure to enable knowledge creation, sharing, collaboration and coordination.
5	Increasing openness, knowledge sharing and the diffusion of knowledge for innovation.
6	Positioning Information and knowledge as a strategic resource.
8	Creating valuable information from experiments, explorations or business Intelligence.
9	Generating knowledge based on interpretation and translation.
10	Managing Knowledge resources for transferability.
11	Creating and retaining intellectual Assets.
12	Coordinating expertise and pin-pointing expert knowledge.
ORGANISATIONAL CAPABILITY EFFICIENCY is improved when " The knowledge of technology environment and emerging trends for innovation" is implemented in parallel with:	
1	Knowledge bases, repositories, databases, content management and dashboards.
2	The structure for centre of excellence.
3	Operational command structure and leadership.
4	Informal structure to enable knowledge creation, sharing, collaboration and coordination.
5	Increasing openness, knowledge sharing and the diffusion of knowledge for innovation.
6	Positioning Information and knowledge as a strategic resource.
8	Creating valuable information from experiments, explorations or business Intelligence.

9	Generating knowledge based on interpretation and translation.
10	Managing Knowledge resources for transferability.
11	Creating and retaining intellectual Assets.
12	Coordinating expertise and pin-pointing expert knowledge.
ORGANISATIONAL CAPABILITY EFFICIENCY is improved when "Managing organisational culture, structure, resources and competences for innovation" is implemented in parallel with:	
1	Knowledge bases, repositories, databases, content management and dashboards.
2	The structure for centre of excellence.
3	Operational command structure and leadership.
4	Informal structure to enable knowledge creation, sharing, collaboration and coordination.
5	Increasing openness, knowledge sharing and the diffusion of knowledge for innovation.
6	Positioning Information and knowledge as a strategic resource.
8	Creating valuable information from experiments, explorations or business Intelligence.
9	Generating knowledge based on interpretation and translation.
10	Managing Knowledge resources for transferability.
11	Creating and retaining intellectual Assets.
12	Coordinating expertise and pin-pointing expert knowledge.
ORGANISATIONAL CAPABILITY EFFICIENCY is improved when "Generating ideas in-house or through collaborative efforts or external sources for innovation" is implemented in parallel with:	
1	Knowledge bases, repositories, databases, content management and dashboards.
2	The structure for centre of excellence.
3	Operational command structure and leadership.
4	Informal structure to enable knowledge creation, sharing, collaboration and coordination.
5	Increasing openness, knowledge sharing and the diffusion of knowledge for innovation.
6	Positioning Information and knowledge as a strategic resource.
8	Creating valuable information from experiments, explorations or business Intelligence.
9	Generating knowledge based on interpretation and translation.
10	Managing Knowledge resources for transferability.
11	Creating and retaining intellectual Assets.
12	Coordinating expertise and pin-pointing expert knowledge.
ORGANISATIONAL CAPABILITY EFFICIENCY is improved when "Prioritizing ideas and converting them into products or processes that create value for innovation" is implemented in parallel with:	
1	Knowledge bases, repositories, databases, content management and dashboards.
2	The structure for centre of excellence.
3	Operational command structure and leadership.
4	Informal structure to enable knowledge creation, sharing, collaboration and coordination.
5	Increasing openness, knowledge sharing and the diffusion of knowledge for innovation.

6	Positioning Information and knowledge as a strategic resource.
8	Creating valuable information from experiments, explorations or business Intelligence.
9	Generating knowledge based on interpretation and translation.
10	Managing Knowledge resources for transferability.
11	Creating and retaining intellectual Assets.
12	Coordinating expertise and pin-pointing expert knowledge.
ORGANISATIONAL CAPABILITY EFFICIENCY is improved when "Screening and performing selection process, risk management and strategic disruptive decision making for innovation " is implemented in parallel with:	
1	Knowledge bases, repositories, databases, content management and dashboards.
2	The structure for centre of excellence.
3	Operational command structure and leadership.
4	Informal structure to enable knowledge creation, sharing, collaboration and coordination.
5	Increasing openness, knowledge sharing and the diffusion of knowledge for innovation.
6	Positioning Information and knowledge as a strategic resource.
8	Creating valuable information from experiments, explorations or business Intelligence.
9	Generating knowledge based on interpretation and translation.
10	Managing Knowledge resources for transferability.
11	Creating and retaining intellectual Assets.
12	Coordinating expertise and pin-pointing expert knowledge.
ORGANISATIONAL CAPABILITY EFFICIENCY is improved when "Undertaking new product development, customer engagement and assessing market potential for innovation" is implemented in parallel with:	
1	Knowledge bases, repositories, databases, content management and dashboards.
2	The structure for centre of excellence.
3	Operational command structure and leadership.
4	Informal structure to enable knowledge creation, sharing, collaboration and coordination.
5	Increasing openness, knowledge sharing and the diffusion of knowledge for innovation.
6	Positioning Information and knowledge as a strategic resource.
8	Creating valuable information from experiments, explorations or business Intelligence.
9	Generating knowledge based on interpretation and translation.
10	Managing Knowledge resources for transferability.
11	Creating and retaining intellectual Assets.
12	Coordinating expertise and pin-pointing expert knowledge.
ORGANISATIONAL CAPABILITY EFFICIENCY is improved when the INNOVATION CAPABILITY of "Doing new business development and partner engagement for innovation" is implemented in parallel with:	
1	Knowledge bases, repositories, databases, content management and dashboards.
2	The structure for centre of excellence.

3	Operational command structure and leadership.
4	Informal structure to enable knowledge creation, sharing, collaboration and coordination.
5	Increasing openness, knowledge sharing and the diffusion of knowledge for innovation.
6	Positioning Information and knowledge as a strategic resource.
8	Creating valuable information from experiments, explorations or business Intelligence.
9	Generating knowledge based on interpretation and translation.
10	Managing Knowledge resources for transferability.
11	Creating and retaining intellectual Assets.
12	Coordinating expertise and pin-pointing expert knowledge.
ORGANISATIONAL CAPABILITY EFFICIENCY is improved when "Delivering value to the customer and capturing a part of that value for innovation" is implemented in parallel with:	
1	Knowledge bases, repositories, databases, content management and dashboards.
2	The structure for centre of excellence.
3	Operational command structure and leadership.
4	Informal structure to enable knowledge creation, sharing, collaboration and coordination.
5	Increasing openness, knowledge sharing and the diffusion of knowledge for innovation.
6	Positioning Information and knowledge as a strategic resource.
8	Creating valuable information from experiments, explorations or business Intelligence.
9	Generating knowledge based on interpretation and translation.
10	Managing Knowledge resources for transferability.
11	Creating and retaining intellectual Assets.
12	Coordinating expertise and pin-pointing expert knowledge.
ORGANISATIONAL CAPABILITY EFFICIENCY is improved when "Penetrating multiple channels, customer groups and competitive regions with innovation " is implemented in parallel with:	
1	Knowledge bases, repositories, databases, content management and dashboards.
2	The structure for centre of excellence.
3	Operational command structure and leadership.
4	Informal structure to enable knowledge creation, sharing, collaboration and coordination.
5	Increasing openness, knowledge sharing and the diffusion of knowledge for innovation.
6	Positioning Information and knowledge as a strategic resource.
8	Creating valuable information from experiments, explorations or business Intelligence.
9	Generating knowledge based on interpretation and translation.
10	Managing Knowledge resources for transferability.
11	Creating and retaining intellectual Assets.
12	Coordinating expertise and pin-pointing expert knowledge.
Organisational Capability Questions:	
1	Using fewer resources to support the same level of business or using the existing resources to support the larger volume of business improves Organisational Capability Efficiency?

2	Leveraging and mobilising its resources improves Organisational Capability Efficiency?
3	Performing resource analysis, filling those gaps and building capability for the future improves Organisational Capability Efficiency?
4	Converging capability on clear goals and focused efforts improves Organisational Capability Efficiency?
5	Conserving and utilizing resources and capabilities to the fullest by co-opting resources through collaborative arrangements improves Organisational Capability Efficiency?

ANNEXURE D: List of SA National Government Departments and SA State-Owned Enterprises

National Government Departments (46)

Department of Agriculture, Forestry and Fisheries

Department of Arts and Culture

Department of Basic Education

Department of Civilian Secretariat for Police

Department of Communications

Department of Cooperative Governance

Department of Correctional Services

Department of Defence

Department of Economic Development

Department of Energy

Department of Environmental Affairs

Department of Government Communication and Information System

Department of Health

Department of Higher Education and Training

Department of Home Affairs

Department of Human Settlements

Department of Independent Police Investigative Directorate (IPID)

Department of International Relations and Cooperation

Department of Justice and Constitutional Development

Department of Labour

Department of Military Veteran

Department of Mineral Resources

National School of Government

National Treasury

Office of Chief Justice

Department of Planning, Monitoring and Evaluation

Department of Presidency

Department of Public Enterprises

Department of Public Service and Administration

Department of Public Works

Department of Rural Development and Land Reform

Department of Science and Technology

Department of Small Business Development

Department of Social Development

South African Police Service (SAPS)

South African Revenue Service (SARS)

Sport and Recreation South Africa (SRSA)

State Security [Department of]

Statistics South Africa [Stats SA]

Department of Telecommunications and Postal Services

Department of Tourism

Department of Trade and Industry (the dti)

Department of Traditional Affairs

Department of Transport

Department of Water and Sanitation

Department of Women

State-Owned Enterprises (SOEs) (126)

Accounting Standards Board

Agricultural Research Council (ARC)

Air Traffic and Navigation Services Company

Airports Company South Africa (ACSA)

Alexkor Limited

Blind SA

Brand South Africa

Breede-Overberg CMA (BOCMA)

Broadband Infraco

Cape Town International Airport

Central Energy Fund (CEF)

Centre for Public Service Innovation

Children's Rights and Responsibilities Branch

Commission for Conciliation, Mediation and Arbitration

Companies and Intellectual Property Commission (CIPC)

Compensation Fund

Competition Commission

Competition Tribunal

Council for Geoscience

Council for Medical Schemes

Council for Mineral Technology (Mintek)

Council for Scientific and Industrial Research (CSIR)

Council on Higher Education

Denel (Pty) Ltd

Development Bank of Southern Africa (DBSA)

Electricity Distribution Industry Holdings (EDI)

Eskom

Estate Agency Affairs Board (The)

Export Credit Insurance Corporation of South Africa (Ltd.)

Film and Publication Board (FPB)

Financial Services Board (FSB)

Forest Industries Education and Training Authority

Free State Development Corporation

Freedom Park

Government Employees Medical Scheme (GEMS)

Government Employees Pension Fund (GEPF)

Government Pensions Administration Agency (GPAA)

Government Printing Works (GPW)

Health Professions Council of South Africa (HPCSA)

Health and Welfare Sector Education and Training Authority (HWSETA)

Human Sciences Research Council (HSRC)

Independent Development Trust

Industrial Development Corporation [Ltd] (IDC)

Ingonyama Trust Board

Institute of People Management (IPM)

Invest North West (INW)

Ithala Development Finance Corporation (Ltd)

Khula Enterprise Finance (Ltd)

King Shaka International Airport

Land Bank and Agriculture Bank of South Africa [Land Bank]. .

Limpopo Economic Development Enterprise

Media Development and Diversity Agency (MDDA)

Mhlathuze Water

Mining Qualification Authority

National Advisory Council on Innovation (NACI)

National Agricultural Marketing Council

National Archives of South Africa (NASA)

National Arts Council of South Africa (NACSA)

National Consumer Commission (The) (NCC)

National Credit Regulator (NCR)

National Development Agency (NDA)

National Economic Development and Labour Council (NEDLAC)

National Electronic Media of South Africa (NEMISA)

National Empowerment Fund

National Energy Regulator (NERSA)

National Film and Video Foundation

National Gambling Board of South Africa

National Home Builders Registration Council (NHBRC)

National House of Traditional Leaders

National Housing Finance Corporation (NHFC)

National Lotteries Board

National Nuclear Regulator (NNR)

National Peace Accord Trust (NPAT)

National Ports Authority (NPA)

National Student Financial Aid Scheme (NSFAS)

National Youth Development Agency (NYDA)

Nelson Mandela Museum

OR Tambo International Airport

Passenger Rail Agency of South African (PRASA)

Pebble Bed Modular Reactor (Pty) Limited (PBMR)

Perishable Products Export Control Board

PetroSA (Pty) Ltd

Private Security Industry Regulatory Authority (PSIRA

Public Investment Corporation (PIC)

Rand Water

Refugee Appeal Board

Road Accident Fund (RAF)

Road Traffic Infringement Agency (RTIA)

Road Traffic Management Corporation (RTMC)

Robben Island Museum

Safety and Security, Sector Education & Training Authority (SASSETA)

Small Enterprise Development Agency (SEDA)

Small Enterprise Finance Agency (SEFA)

South African Airways (SAA)

South African Broadcasting Corporation (SABC)

South African Bureau of Standards (SABS)

South African Civil Aviation Authority

South African Council for Educators (SACE)

South African Council for Social Service Professions (SACSSP)

South African Diamond and Precious Metals Regulator

South African Express

South African Forestry Company (Ltd) (SAFCOL)

South African Heritage Resources Agency

South African Institute for Drug-Free Sport

South African Library for the Blind

South African Local Government Association (SALGA)

South African National Accreditation System

South African National Council for the Blind

South African National Parks (SANParks)

South African National Road Agency

South African Nuclear Energy Corporation SOC Ltd (NECSA)

South African Post Office (SAPO)

South African Qualifications Authority (SAQA)

South African Reserve Bank (SARB)

South African Social Security Agency (SASSA)

South African Special Risk Insurance Association (SASRIA)

South African State Theatre - Pretoria

South African Tourism

South African Veterinary Council

South African Weather Service (SAWS)

Special Investigating Unit (SIU)

State Information Technology Agency (SITA)

Tax Ombud: South Africa

Technology Innovation Agency Telkom SA (Ltd)

Trade and Investment South Africa (TISA)

Transnet (Ltd)

Universal Service Agency and Access of South Africa

Water Research Commission (WRC)

(National Government Directory, 2015)

ANNEXURE E: Listed SA Companies (271)

JSE Organisations	
Organisation	Link to Contact Details
ABSA Bank Limited	absa.co.za
ABSA Capital	absacapital.com
ABSA Group Limited	absacapital.com
Accentuate Limited	accentuateltd.co.za
Acucap Properties Limited	acucap.co.za
adaptIT Holdings Limited	adaptit.co.za
Adcock Ingram Holdings Ltd	adcock.co.za
Adcorp Holdings Limited	adcorp.co.za
Advtech Limited	advtech.co.za
AECI Limited	aeci.co.za
Afgri Limited	afgri.co.za
African & Overseas Enterprises Limited	rextrueform.com
African Bank Investments Limited	africanbank.co.za
African Dawn Capital Limited	africandawncapital.co.za
African Eagle Resources Plc	africaeagle.co.uk
African Media Entertainment Limited	ame.co.za
African Oxygen Limited	afrox.com
African Rainbow Minerals	arm.co.za
Afrimat Limited	afrimat.co.za.investosite
Afrocentric Investment Corporation Limited	afrocentric.za.com
AG Industries Limited	ag-industries.com
AGRA Limited	agra.com.na
Ah-Vest Limited	alljoy.co.za
Alert Steel	alertsteel.co.za
Alexander Forbes Group Holdings	alexanderforbes.com
Alliance Mining Corporation Limited	fin24.com
Allied Electronics Corporation Limited	Altron.com
Allied Technologies Limited	altech.co.za
Amalgamated Appliance Holdings Limited	amapholdings.co.za
Amalgamated Electronics Corporation Limited	amecor.com
Andulela Investment Holdings Ltd	andulelaholdings.com
Anglo America Platinum Ltd	angloamericanplatinum.com
Anglo American plc	angloamerican.com
Anglogold Ashanti Limited	anglogoldashanti.com
Anheuser-Busch InBev	ab-inbev.com
Annuity Properties Ltd	annuityproperties.co.za
Ansys Limited	ansys.co.za
Aquarius Platinum Limited	aquariusplatinum.com

ARB Holdings Limited	arbhold.co.za
Arcelormittal South Africa Limited	arcelormittalsa.com
Ardor SA Limited	ardorsa.co.za
Argent Industrial Limited	argent.co.za
Arrowhead Properties Limited	arrowheadproperties.co.za
Ascension Properties Limited	ascensionproperties.co.za
Aspen Pharmacare Holdings Limited	aspenpharma.com
Assore Limited	assore.com
Astral Foods Limited	astralfoods.com
Astrapak Limited	astrapak.co.za
Atlatsa Resources Corporation	atlatsaresources.co.za
Austro Group Limited	austrogrouplimited.com
Aveng Limited	aveng.co.za
AVI Limited	avi.co.za
B&W Instrumentation & Electrical Ltd	bwie.co.za
B2Gold Corportation	b2gold.com
Bannerman Resources Limited	bannermanresources.com
Barloworld Limited	barloworld.com
Basil Read Holdings Limited	basilread.co.za
Bauba Platinum Limited	baubaplatinum.co.za
Beige Holdings Limited	beige-holdings.com
Bell Equipment Limited	bellequipment.com
Best Cut Limited	bestcut.co.za
BHP Billiton plc	bhpbilliton.com
The Bidvest Group Ltd	www.bidvest.com
Bidvest Namibia Limited	bidvest.co.za
Bioscience Brands Limited	bioscience.co.za
BK One Limited	bkone.co.za
Blackstar Group SE	blackstar.lu
Blue Financial Services Limited	blue.co.za
Blue Label Telecoms Limited	bluelabeltelecoms.co.za
Bonatla Property Holdings Limited	bonatla.com
Bowler Metcalf Limited	bowler.co.za
Brait S.A.	brait.com
Brikor Limited	brikor.net
Brimstone Investment Corporation Limited	brimstone.co.za
British American Tobacco PLC	bat.com
BSI Steel Limited	bsisteel.com
Buildmax Limited	buildmax.co.za
Business Connexion Group Limited	bcx.co.za
Calgro M3 Holdings	http://www.calgrom3.com
Cape Empowerment Trust Limited	capemp.co.za

Capital Property Fund	capitalproperty.co.za
Capital & Counties Properties	capitalandcounties.com
Capitec Bank Holdings Limited	capitecbank.co.za
Cargo Carriers Limited	cargocarriers.co.za
Cashbuild Limited	cashbuild.co.za
Caxton and CTP Publishers and Printers Limited	caxton.co.za
CBS Property Portfolio Limited	cbs.co.za
Cadiz Holdings Limited	cadiz.co.za
Ceramic Industries Limited	ceramic.co.za
Chrometco Limited	chrometco.co.za
City Lodge Hotels Limited	citylodge.co.za
Clientele Life Assurance Company Limited	clientelelife.com
Clover Industries Ltd	clover.co.za
Comair Limited	comair.co.za
Combined Motor Holdings Limited	cmh.co.za
Command Holdings Limited	command.co.za
Compu Clearing Outsourcing Limited	compu-clearing.co.za
Concor Limited	concor.co.za
Conduit Capital Limited	conduitcap.com
Control Instruments Group Limited	ci.co.za
Coronation Fund Managers Limited	coronation.com
Corvus Capital (SA) Holdings Limited	corvuscapital.com
Crookes Brothers Limited	cbl.co.za
Cullinan Holdings Limited	cullinan.co.za
Datacentrix Holdings Limited	datacentrix.co.za
DataPro Group Limited	datapro.co.za
Datatec Limited	datatec.co.za
Digicore Holdings Limited	digicore.com
Dimension Data Holdings	dimensiondata.com
Discovery Holdings Limited	discovery.co.za
Distell Group Limited	distell.co.za
Distribution and Warehousing Network Limited	dawnltd.co.za
The Don Group Limited	don.co.za
Dorbyl Limited	dorbyl.co.za
DRDGold Limited	drd.co.za
Edgars Consolidated Stores Limited	edgars.co.za
Eland Platinum Holdings Limited	elandplatinum.com
ELB Group Limited	elb.co.za
Ellerine Holdings Limited	ellerines.co.za
Emira Property Fund	emira.co.za
Enaleni Pharmaceuticals Limited	enaleni.com
Enviroserv Holdings Limited	enviroserv.co.za

EOH Holdings Limited	eoh.co.za
Esor Limited	esor.co.za
Excellerate Holdings Limited	excellerate.co.za
Exxaro Resources Limited	exxaro.com
Famous Brands Limited	famousbrands.co.za
Faritec Holdings Limited	faritec.com
Firstrand Limited	firstrand.co.za
First Uranium Corporation	firsturanium.com
Foord Compass Limited-Debentures	foordcompass.co.za
Foschini Group	foschini.co.za
Foschini Group	tfg.co.za
Glenrand M.I.B. Limited	glenrandmib.co.za
Global Village Holdings Limited	glovill.co.za
Gold Reef Casino Resorts Limited	grcresorts.co.za
Great Basin Gold Limited	greatbasingold.com
Grindrod Limited	grindrod.co.za
Group Five Limited	g5.co.za
Growthpoint Properties Limited	growthpoint.co.za
GVM Metals Limited	coalofafrica.com
Halogen Holdings Societe Anonyme	Halogen-hired web page service
Harmony Gold Mining Company Limited	harmony.co.za
Highveld Steel and Vanadium Corporation Limited	highveldsteel.co.za
Hosken Consolidated Investments Limited	hci.co.za
Hospitality Property Fund Limited	hpf.co.za
The House of Busby Limited	busbyhouse.com
Howden Africa Holdings Limited	HowdenAfrica/
Hudaco Industries Limited	hudaco.co.za
Hwange Colliery Company Limited	hwangecolliery.co.zw
Hyprop Investments Limited	hyprop.co.za
Iliad Africa Limited	iliadafrica.co.za
Illovo Sugar Limited	illovo.co.za
Impala Platinum Holdings Limited, 'Implats'	implats.co.za
Imperial Holdings Limited	imperial.co.za
Imuniti Holdings	imuniti.co.za
Infowave Holdings Limited	infowave.co.za/
Investec Bank Limited - Preference Share	investec.com
Investec Limited	investec.com
Investec	investec.com
Invicta Holdings Limited	invictaholdings.co.za
IPSA Group	ipsagroup.co.uk
ISA Holdings Limited	isaholdings.co.za
Italtile Limited	italtile.com

Jasco Electronics Holdings Limited	jasco.co.za
JD Group Limited	jdgroup.co.za
John Daniel Holdings Limited	jd-h.com
Johnnic Communications Limited	avusa.co.za
Johnnic Holdings Limited	avusa.co.za
JSE Limited	jse.co.za
Jubilee Platinum plc	jubileeplatinum.com
Kagiso Media Limited	kagisomedia.co.za
Kairos Industrial Holdings Limited	kairos.co.za
KAP International Holdings Limited	kapinternational.com
Kelly Group Limited	kellygroup.co.za
King Consolidated Holdings Limited	kingco.co.za
Kumba Iron Ore Limited	exxaro.com
KWV Beleggings Beperk	kwv.co.za
Liberty Holdings Limited	liberty.co.za
Life Healthcare Group Holdings Ltd	lifehealthcare.co.za
MMI Holdings Limited	mmiholdings.co.za
MTN	
Mvelaserve Ltd	mvelaserve.co.za
Oando plc	oandoplc.com
Oasis Crescent Property Fund	oasiscrescent.com
Oceana Group Limited	oceana.co.za
Old Mutual plc	oldmutual.com
Omnia Holdings Limited	omnia.co.za
Optimum Coal Holdings Ltd	optimumcoal.com
Palabora Mining Company Limited	palabora.com
Pangbourne Properties Limited	pangbourne.co.za
Prescient Limited	prescient.co.za
Paracon Holdings Limited	paracon.co.za
Pasdec Resources SA Limited	pasdec.co.za
Peregrine Holdings Limited	peregrine.co.za
Phumelela Gaming and Leisure Limited	phumelela.com
Pick ‘n Pay Holdings Limited	picknpay.co.za
Pinnacle Point Group Limited	pinnaclepointgroup.co.za
Pinnacle Technology Holdings Limited	pinnacle.co.za
Platfields Ltd	premiumproperties.co.za
Premium Properties Limited	premiumproperties.co.za
Pretoria Portland Cement Company Limited	ppc.co.za
Primedia Limited	primedia.co.za
Primeserv Group Limited	primeserv.co.za
PSG Financial Services Limited - Preference Shares	psggroup.co.za
PSG Group Limited	psggroup.co.za

Purple Capital Limited	purplecapital.co.za
Quantum Property Group Ltd	quantumprops.co.za
Quyn Holdings Limited	quyn.co.za
RECM & Calibre Ltd	recm.co.za
Rainbow Chicken Limited	rainbowchickens.co.za
Rand Merchant Investment Holdings	rminsurance.co.za
Raubex Group Ltd	raubex.co.za
Redefine Income Fund Limited	redefine.co.za
Redefine Properties International Ltd	redefineinternational.com
Remgro Limited	remgro.com
Resilient Property Income Fund Limited	resilient.co.za
Resource Generation Ltd	resgen.com.au
Reunert Limited	reunert.co.za/2008/
Rex Trueform Clothing Company Limited	rextrueform.com
Richemont Securities AG	richemont.com
RMB Holdings Limited	rmbh.co.za
Royal Bafokeng Platinum Ltd	bafokengplatinum.co.za
SABMiller Plc	sabmiller.com
Sabvest Limited	sabvest.com
Sanlam Limited	sanlam.co.za
Santam Limited	santam.co.za
Santova Logistics (Pty) Limited	santova.co.za
Sappi Limited	sappi.com
Sasfin Holdings Limited	sasfin.com
Sasol Limited	sasol.com/sasol_internet/
Seardel Investment Corporation	seardel.co.za
SecureData	securedata.co.za
Sekunjalo Investments Limited	sekunjalo.com
Sentula Mining	sentula.co.za
Sephaku Holdings	www.sephakuholdings.co.za
Set Point Technology Holdings Limited	setpoint.co.za
Shoprite Holdings Limited	shoprite.co.za
Simeka BSG Limited	simekabusinessgroup.co.za
Simmer & Jack Mines Ltd	simmers.co.za
Southern Electricity Company Limited	selco.co.za
Sovereign Food Investments Limited	sovfoods.co.za
Spanjaard Limited	spanjaardltd.com
The SPAR Group Ltd	spar.co.za
Spescom Limited	spescom.co.za
Spur Corporation Limited	spur.co.za
Square One Solutions Group Limited	squareonegroup.co.za
Standard Bank Group Limited	standardbank.co.za

Steinhoff International Holdings	steinhoffinternational.com
Stella Vista Technologies Ltd	stellavista.com
Stratcorp Limited	stratcorp.co.za
Super Group Limited	supergroup.co.za
Sycom Property Fund Managers Limited	sycom.co.za
Taste Holdings Ltd	tasteholdings.co.za
Tawana Resources NL	tawana.com.au
Telkom SA Limited	telkom.co.za
Thabex Exploration Limited	thabex.com
Tiger Brands Limited	tigerbrands.co.za
Tongaat Hulett Sugar	tongaat.co.za
Transpaco Limited	transpaco.co.za
Trencor Limited	trencor.net
Trustco Group Holdings Ltd	tgi.na
Truworths International Limited	truworths.co.za
UCS Group Limited	ucs.co.za
Unitrans Limited	um.co.za
Virtual Hub Publications (Virtual Hub Solutions)	veehub.co.za
Vividend Income Fund Ltd	vividend.co.za
Vodacom Group Limited	vodacom.com
Vunani Ltd	vunanilimited.co.za
Vunani Property Investment Fund	vpif.co.za
Woolworths Holdings Limited	woolworthsholdings.co.za
https://en.wikipedia.org/wiki/List_of_companies_traded_on_the_JSE	

ANNEXURE F: t-test results

Serial No.	Construct	Sample size	Mean score	Std.dev.	t-value	P-value	Decision
B1	**Strategic: Conceptualising Idea**						
B1[1]	Technology	291	1.79	.844	-24.505	.000	reject
B1[2]	Structure: COE	291	1.61	.942	-25.152	.000	reject
B1[3]	Structure: Command	291	1.93	.867	-20.971	.000	reject
B1[4]	Structure: Informal	291	1.70	1.028	-21.494	.000	reject
B1[5]	Culture	291	1.80	.886	-23.016	.000	reject
B1[6]	K&I: Strategic Resource	291	1.82	.824	-24.414	.000	reject
B1[7]	K&I: Valuable Information	291	1.54	.848	-29.397	.000	reject
B1[8]	K&I: Interpretation	291	1.80	.949	-21.626	.000	reject
B1[9]	K&I: Transferability	291	1.95	.859	-20.778	.000	reject
B1[10]	Expertise: Intellectual Asset	291	1.55	.939	-26.271	.000	reject
B1[11]	Expertise: Pointers to Expert	291	1.48	.844	-30.695	.000	reject
B1[12]	Learning	291	1.51	.892	-28.523	.000	reject
B2	**Strategic: Knowledge of Competitor & Industry Trends**						
B2[1]	Technology	291	1.96	.868	-20.534	.000	reject
B2[2]	Structure: COE	291	2.42	.984	-10.005	.000	reject
B2[3]	Structure: Command	291	2.10	.920	-16.763	.000	reject
B2[4]	Structure: Informal	291	1.80	1.059	-19.380	.000	reject
B2[5]	Culture	291	1.59	.954	-25.122	.000	reject
B2[6]	K&I: Strategic Resource	291	1.56	.878	-27.966	.000	reject
B2[7]	K&I: Valuable Information	291	2.33	1.022	-11.132	.000	reject
B2[8]	K&I: Interpretation	291	2.03	.824	-20.071	.000	reject
B2[9]	K&I: Transferability	291	2.75	1.271	-3.366	.001	reject
B2[10]	Expertise: Intellectual Asset	291	2.62	1.309	-5.016	.000	reject
B2[11]	Expertise: Pointers to Expert	291	2.65	1.295	-4.662	.000	reject
B2[12]	Learning	291	1.92	.908	-20.268	.000	reject
B3	**Strategic: Technology & Emerging Trends**						
B3[1]	Technology	291	1.50	.970	-26.415	.000	reject
B3[2]	Structure: COE	291	1.73	1.019	-21.229	.000	reject
B3[3]	Structure: Command	291	2.72	1.325	-3.629	.000	reject
B3[4]	Structure: Informal	291	1.79	1.114	-18.477	.000	reject
B3[5]	Culture	291	1.60	1.006	-23.656	.000	reject
B3[6]	K&I: Strategic Resource	291	1.54	.965	-25.806	.000	reject
B3[7]	K&I: Valuable Information	291	1.60	.925	-25.866	.000	reject
B3[8]	K&I: Interpretation	291	2.38	1.008	-10.406	.000	reject
B3[9]	K&I: Transferability	291	2.02	.904	-18.549	.000	reject

B3[10]	Expertise: Intellectual Asset	291	1.65	.991	-23.317	.000	reject
B3[11]	Expertise: Pointers to Expert	291	1.60	.939	-25.353	.000	reject
B3[12]	Learning	291	1.60	.999	-23.818	.000	reject
before	**Strategic: Culture & Structure**						
B4[1]	Technology	291	2.31	1.095	-10.813	.000	reject
B4[2]	Structure: COE	291	1.69	1.068	-20.975	.000	reject
B4[3]	Structure: Command	291	1.95	.964	-18.553	.000	reject
B4[4]	Structure: Informal	291	2.37	1.114	-9.686	.000	reject
B4[5]	Culture	291	2.19	1.083	-12.831	.000	reject
B4[6]	K&I: Strategic Resource	291	1.82	.859	-23.335	.000	reject
B4[7]	K&I: Valuable Information	291	2.36	1.019	-10.638	.000	reject
B4[8]	K&I: Interpretation	291	2.35	.994	-11.152	.000	reject
B4[9]	K&I: Transferability	291	1.67	.925	-24.516	.000	reject
B4[10]	Expertise: Intellectual Asset	291	1.61	.924	-25.708	.000	reject
B4[11]	Expertise: Pointers to Expert	291	1.59	.883	-27.150	.000	reject
B4[12]	Learning	291	2.26	1.076	-11.769	.000	reject
C	**Ideation**						
C1[1]	Technology	291	1.55	.965	-25.693	.000	reject
C1[2]	Structure: COE	291	1.67	.983	-23.029	.000	reject
C1[3]	Structure: Command	291	2.40	1.054	-9.681	.000	reject
C1[4]	Structure: Informal	291	1.68	.964	-23.361	.000	reject
C1[5]	Culture	291	1.53	.990	-25.275	.000	reject
C1[6]	K&I: Strategic Resource	291	1.77	.853	-24.533	.000	reject
C1[7]	K&I: Valuable Information	291	1.57	.878	-27.790	.000	reject
C1[8]	K&I: Interpretation	291	1.70	.927	-23.958	.000	reject
C1[9]	K&I: Transferability	291	1.70	.992	-22.396	.000	reject
C1[10]	Expertise: Intellectual Asset	291	1.64	.912	-25.459	.000	reject
C1[11]	Expertise: Pointers to Expert	291	1.67	.958	-23.673	.000	reject
C1[12]	Learning	291	1.64	.981	-23.662	.000	reject
D1	Implementation: Prioritising Ideas						
D1[1]	Technology	291	1.55	.929	-26.642	.000	reject
D1[2]	Structure: COE	291	2.25	1.052	-12.088	.000	reject
D1[3]	Structure: Command	291	1.94	.883	-20.452	.000	reject
D1[4]	Structure: Informal	291	2.06	.871	-18.441	.000	reject
D1[5]	Culture	291	1.85	.825	-23.806	.000	reject
D1[6]	K&I: Strategic Resource	291	2.23	1.029	-12.819	.000	reject
D1[7]	K&I: Valuable Information	291	2.20	1.049	-12.966	.000	reject
D1[8]	K&I: Interpretation	291	2.38	.976	-10.868	.000	reject
D1[9]	K&I: Transferability	291	2.25	.958	-13.400	.000	reject
D1[10]	Expertise: Intellectual Asset	291	1.93	.846	-21.470	.000	reject
D1[11]	Expertise: Pointers	291	1.60	.894	-26.743	.000	reject

	to Expert						
D1[12]	Learning	291	1.62	.941	-25.050	.000	reject
D2	**Implementation: Selection process**						
D2[1]	Technology	291	1.93	.905	-20.211	.000	reject
D2[2]	Structure: COE	291	2.33	.973	-11.753	.000	reject
D2[3]	Structure: Command	291	1.63	.968	-24.155	.000	reject
D2[4]	Structure: Informal	291	2.45	1.027	-9.189	.000	reject
D2[5]	Culture	291	2.26	1.022	-12.280	.000	reject
D2[6]	K&I: Strategic Resource	291	2.22	1.077	-12.299	.000	reject
D2[7]	K&I: Valuable Information	291	1.96	.911	-19.437	.000	reject
D2[8]	K&I: Interpretation	291	2.37	1.000	-10.729	.000	reject
D2[9]	K&I: Transferability	291	1.98	.861	-20.296	.000	reject
D2[10]	Expertise: Intellectual Asset	291	2.24	.982	-13.132	.000	reject
D2[11]	Expertise: Pointers to Expert	291	2.23	1.032	-12.777	.000	reject
D2[12]	Learning	291	1.59	.966	-24.893	.000	reject
D3	Implementation: Product Development						
D3[1]	Technology	291	1.59	1.011	-23.827	.000	reject
D3[2]	Structure: COE	291	2.35	1.007	-11.063	.000	reject
D3[3]	Structure: Command	291	2.33	1.018	-11.233	.000	reject
D3[4]	Structure: Informal	291	1.76	1.050	-20.212	.000	reject
D3[5]	Culture	291	1.64	.966	-23.961	.000	reject
D3[6]	K&I: Strategic Resource	291	1.62	.899	-26.146	.000	reject
D3[7]	K&I: Valuable Information	291	1.56	.913	-26.905	.000	reject
D3[8]	K&I: Interpretation	291	1.96	.852	-20.921	.000	reject
D3[9]	K&I: Transferability	291	1.93	.813	-22.348	.000	reject
D3[10]	Expertise: Intellectual Asset	291	2.27	1.007	-12.284	.000	reject
D3[11]	Expertise: Pointers to Expert	291	1.58	.904	-26.789	.000	reject
D3[12]	Learning	291	1.59	.944	-25.518	.000	reject
D4	**Implementation: Business Development**						
D4[1]	Technology	291	2.26	1.033	-12.253	.000	reject
D4[2]	Structure: COE	291	2.34	.975	-11.485	.000	reject
D4[3]	Structure: Command	291	1.70	1.016	-21.866	.000	reject
D4[4]	Structure: Informal	291	2.43	1.023	-9.456	.000	reject
D4[5]	Culture	291	2.26	1.000	-12.600	.000	reject
D4[6]	K&I: Strategic Resource	291	1.61	.942	-25.152	.000	reject
D4[7]	K&I: Valuable Information	291	2.21	1.005	-13.360	.000	reject
D4[8]	K&I: Interpretation	291	2.37	.978	-11.023	.000	reject
D4[9]	K&I: Transferability	291	2.27	.983	-12.588	.000	reject
D4[10]	Expertise: Intellectual Asset	291	2.33	.970	-11.728	.000	reject
D4[11]	Expertise: Pointers	291	1.89	.793	-23.870	.000	reject

	to Expert						
D4[12]	Learning	291	1.93	.921	-19.741	.000	reject
E1	**Commercialisation: Customer Value**						
E1[1]	Technology	291	1.98	.919	-18.882	.000	reject
E1[2]	Structure: COE	291	1.77	1.026	-20.406	.000	reject
E1[3]	Structure: Command	287	1.75	1.020	-20.722	.000	reject
E1[4]	Structure: Informal	291	2.40	1.010	-10.220	.000	reject
E1[5]	Culture	291	2.35	.991	-11.126	.000	reject
E1[6]	K&I: Strategic Resource	291	1.61	.931	-25.450	.000	reject
E1[7]	K&I: Valuable Information	291	1.73	1.010	-21.485	.000	reject
E1[8]	K&I: Interpretation	291	1.80	1.027	-19.865	.000	reject
E1[9]	K&I: Transferability	291	2.30	.973	-12.350	.000	reject
E1[10]	Expertise: Intellectual Asset	291	2.31	.975	-12.143	.000	reject
E1[11]	Expertise: Pointers to Expert	291	1.92	.833	-22.100	.000	reject
E1[12]	Learning	291	1.66	.981	-23.295	.000	reject
E2	**Commercialisation: Channels**						
E2[1]	Technology	291	1.64	1.029	-22.511	.000	reject
E2[2]	Structure: COE	291	1.73	1.007	-21.600	.000	reject
E2[3]	Structure: Command	291	1.73	1.012	-21.371	.000	reject
E2[4]	Structure: Informal	291	1.81	1.028	-19.726	.000	reject
E2[5]	Culture	291	1.65	.941	-24.557	.000	reject
E2[6]	K&I: Strategic Resource	291	2.30	.991	-12.063	.000	reject
E2[7]	K&I: Valuable Information	291	1.56	.943	-26.056	.000	reject
E2[8]	K&I: Interpretation	291	2.34	.974	-11.618	.000	reject
E2[9]	K&I: Transferability	291	1.97	.817	-21.593	.000	reject
E2[10]	Expertise: Intellectual Asset	291	2.31	.976	-12.074	.000	reject
E2[11]	Expertise: Pointers to Expert	291	2.25	.997	-12.878	.000	reject
E2[12]	Learning	291	2.33	1.000	-11.490	.000	reject
F	**Organisation Capability Efficiency**						
F1	Optimise Resources	291	2.35	1.077	-10.230	.000	reject
F2	Mobilising Resources	291	1.52	.844	-29.998	.000	reject
F3	Resource Analysis	291	1.81	.819	-24.760	.000	reject
F4	Converging Resource Capability	291	1.48	.856	-30.258	.000	reject
F5	Collaboration of Resource	291	1.80	.840	-24.367	.000	reject

Source: author

ANNEXURE G: Communalities

Communalities

	Initial	Extraction
KMC1	1.000	.634
KMC2	1.000	.636
KMC3	1.000	.593
KMC4	1.000	.577
KMC5	1.000	.697
KMC6	1.000	.666
KMC7	1.000	.614
KMC8	1.000	.555
KMC9	1.000	.573
KMC10	1.000	.549
KMC11	1.000	.726
KMC12	1.000	.685

ANNEXURE H: Total Variance Explained

		Initial Eigenvalues		Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Extraction Sums of Squared Loadings (Cumulative %)
1	7.506	62.551	62.551	7.506	62.551	62.551
2	.615	5.121	67.672			
3	.572	4.768	72.441			
4	.496	4.131	76.571			
5	.471	3.927	80.498			
6	.435	3.622	84.120			
7	.401	3.342	87.462			
8	.373	3.109	90.571			
9	.330	2.748	93.319			
10	.275	2.291	95.611			
11	.266	2.219	97.830			
12	.260	2.170	100.000			

ANNEXURE I: Frequencies mean scores and reliability

B1	**Innovation Strategic Conceptualising**				
		Likert Scale Frequencies		**Reliability = 0.884**	
Ser. No.	Item	Agree	Not Agree	Mean	Std.Dev.
1	Knowledge bases, repositories, databases, content management and dashboards.	262(90.0)	29(10.0)	1.79	.844
2	The structure for centre of excellence.	249(85.6)	42(14.4)	1.61	.942
3	Operational command structure and leadership.	248(85.2)	43(14.8)	1.93	.867
4	Informal structure to enable knowledge creation, sharing, collaboration and coordination.	240(82.5)	51(17.5)	1.70	1.028
5	Increasing openness, knowledge sharing and the diffusion of knowledge for innovation.	264(90.7)	27(9.3)	1.80	.886
6	Positioning Information and knowledge as a strategic resource.	259(89.0)	32(11.0)	1.82	.824
7	Creating valuable information from experiments, explorations or business Intelligence.	263(90.4)	28(9.6)	1.54	.848

8	Generating knowledge based on interpretation and translation.	230(79.0)	61(21.0)	1.80	.949
9	Managing Knowledge resources for transferability.	247(85.2)	43(14.8)	1.95	.859
10	Creating and retaining intellectual Assets.	251(86.3)	40(13.7)	1.55	.939
11	Coordinating expertise and pinpointing expert knowledge.	258(88.7)	33(11.3)	1.48	.844
12	Adopting best practices, lessons learning or benchmarking.	262(90.0)	29(10.0)	1.51	.892
B2	**Innovation Strategic: Knowledge of Competitor & Industry Trends**				
		Likert Scale Responses		**Reliability = 0.822**	
Ser. No.	Item	Agree	Not agree	Mean	Std.Dev.
1	Knowledge bases, repositories, databases, content management and dashboards.	248(85.2)	43(14.8)	1.96	.868
2	The structure for centre of excellence.	135(46.4)	156(53.6)	2.42	.984
3	Operational command structure and leadership.	235(80.8)	56(19.2)	2.10	.920
4	Informal structure to enable knowledge creation, sharing, collaboration and coordination.	231(79.4)	60(20.6)	1.80	1.059
5	Increasing openness, knowledge sharing and the diffusion of knowledge for innovation.	253(86.9)	38(13.1)	1.59	.954
6	Positioning Information and knowledge as a strategic resource.	256(88.0)	35(12.0)	1.56	.878
7	Creating valuable information from experiments, explorations or business Intelligence.	150(51.5)	141(48.5)	2.33	1.022
8	Generating knowledge based on interpretation and translation.	249(85.6)	42(14.4)	2.03	.824
9	Managing Knowledge resources for transferability.	144(49.5)	147(50.5)	2.75	1.271
10	Creating and retaining intellectual Assets.	153(52.6)	138(47.4)	2.62	1.309
11	Coordinating expertise and pinpointing expert knowledge.	150(51.5)	141(48.5)	2.65	1.295
12	Adopting best practices, lessons learning or benchmarking.	248(85.2)	43(14.8)	1.92	.908
B3	**Innovation Strategic: Technology & Emerging Trends**				
		Likert Scale Responses		**Reliability = 0.855**	
Ser. No.	Item	Agree	Not Agree	Mean	Std.Dev.
1	Knowledge bases, repositories, databases, content management and dashboards.	255(87.6)	36(12.47)	1.50	.970
2	The structure for centre of excellence.	241(82.9)	50(17.2)	1.73	1.019
3	Operational command structure and leadership.	142(48.8)	149(57.2)	2.72	1.325
4	Informal structure to enable knowledge creation, sharing, collaboration and coordination.	227(78.0)	64(22.0)	1.79	1.114

5	Increasing openness, knowledge sharing and the diffusion of knowledge for innovation.	247(84.9)	44(15.1)	1.60	1.006
6	Positioning Information and knowledge as a strategic resource.	255(87.6)	36(12.4)	1.54	.965
7	Creating valuable information from experiments, explorations or business Intelligence.	252(86.6)	39(13.4)	1.60	.925
8	Generating knowledge based on interpretation and translation.	147(50.5)	144(49.5)	2.38	1.008
9	Managing Knowledge resources for transferability.	244(83.8)	47(16.2)	2.02	.904
10	Creating and retaining intellectual Assets.	247(84.9)	44(15.1)	1.65	.991
11	Coordinating expertise and pinpointing expert knowledge.	248(85.2)	43(14.8)	1.60	.939
12	Adopting best practices, lessons learning or benchmarking.	251(86.3)	40(13.7)	1.60	.999
B4	**Innovation Strategic: Culture & Structure**				
		Likert Scale Responses		**Reliability = 0.883**	
Ser. No.	Item	Agree	Not Agree	Mean	Std.Dev.
1	Knowledge bases, repositories, databases, content management and dashboards.	151(51.9)	140(48.1)	2.31	1.095
2	The structure for centre of excellence.	241(82.8)	50(17.2)	1.69	1.068
3	Operational command structure and leadership.	242(83.2)	49(16.8)	1.95	.964
4	Informal structure to enable knowledge creation, sharing, collaboration and coordination.	151(51.9)	140(48.1)	2.37	1.114
5	Increasing openness, knowledge sharing and the diffusion of knowledge for innovation.	165(56.7)	126(43.3)	2.19	1.083
6	Positioning Information and knowledge as a strategic resource.	252(86.6)	39(13.4)	1.82	.859
7	Creating valuable information from experiments, explorations or business Intelligence.	151(51.9)	140(48.1)	2.36	1.019
8	Generating knowledge based on interpretation and translation.	152(52.2)	139(47.8)	2.35	.994
9	Managing Knowledge resources for transferability.	250(85.9)	41(14.1)	1.67	.925
10	Creating and retaining intellectual Assets.	255(87.6)	36(12.4)	1.61	.924
11	Coordinating expertise and pinpointing expert knowledge.	257(88.3)	34(11.7)	1.59	.883
12	Adopting best practices, lessons learning or benchmarking.	157(54.0)	134(46.0)	2.26	1.076
C1	**Innovation Ideation**				
		Likert Scale Responses		**Reliability = 0.918**	
Ser.	Item	Agree	Not Agree	Mean	Std.Dev.

No.					
1	Knowledge bases, repositories, databases, content management and dashboards.	256(88.0)	35(12.0)	1.55	.965
2	The structure for centre of excellence.	243(83.5)	48(16.5)	1.67	.983
3	Operational command structure and leadership.	141(48.5)	150(51.5)	2.40	1.054
4	Informal structure to enable knowledge creation, sharing, collaboration and coordination.	238(81.8)	53(18.2)	1.68	.964
5	Increasing openness, knowledge sharing and the diffusion of knowledge for innovation.	249(85.6)	42(14.4)	1.53	.990
6	Positioning Information and knowledge as a strategic resource.	257(88.3)	34(11.7)	1.77	.853
7	Creating valuable information from experiments, explorations or business Intelligence.	254(87.3)	37(12.7)	1.57	.878
8	Generating knowledge based on interpretation and translation.	240(82.5)	51(17.5)	1.70	.927
9	Managing Knowledge resources for transferability.	244(83.8)	47(16.2)	1.70	.992
10	Creating and retaining intellectual Assets.	251(86.3)	40(13.7)	1.64	.912
11	Coordinating expertise and pinpointing expert knowledge.	246(84.5)	45(15.5)	1.67	.958
12	Adopting best practices, lessons learning or benchmarking.	246(84.5)	45(15.5)	1.64	.981

D1	**Innovation Implementation: Prioritising Ideas**				
		Likert Scale Responses		**Reliability = 0.877**	
Ser. No.	Item	Agree	Not Agree	Mean	Std.Dev.
1	Knowledge bases, repositories, databases, content management and dashboards.	246(84.5)	42(14.4)	1.55	.929
2	The structure for centre of excellence.	158(54.3)	133(45.7)	2.25	1.052
3	Operational command structure and leadership.	239(82.1)	52 (17.9)	1.94	.883
4	Informal structure to enable knowledge creation, sharing, collaboration and coordination.	231(79.4)	60(20.6)	2.06	.871
5	Increasing openness, knowledge sharing and the diffusion of knowledge for innovation.	251(86.3)	40(13.7)	1.85	.825
6	Positioning Information and knowledge as a strategic resource.	163(56.0)	128(44.0)	2.23	1.029
7	Creating valuable information from experiments, explorations or business Intelligence.	164(56.4)	127(43.6)	2.20	1.049
8	Generating knowledge based on interpretation and translation.	150(51.5)	141(48.5)	2.38	.976
9	Managing Knowledge resources for transferability.	170(58.4)	121(41.6)	2.25	.958
10	Creating and retaining intellectual Assets.	249(85.6)	42 (14.4)	1.93	.846

11	Coordinating expertise and pinpointing expert knowledge.	253(86.9)	38 (13.1)	1.60	.894
12	Adopting best practices, lessons learning or benchmarking.	251(86.3)	40 (13.7)	1.62	.941
D2	**Innovation Implementation: Selection process**				
		Likert Scale Responses		**Reliability = 0.886**	
Ser. No.	Item	Agree	Not Agree	Mean	Std.Dev.
1	Knowledge bases, repositories, databases, content management and dashboards.	241(82.8)	50(17.2)	1.93	.905
2	The structure for centre of excellence.	152(52.2)	139(47.8)	2.33	.973
3	Operational command structure and leadership.	247(84.9)	44(15.1)	1.63	.968
4	Informal structure to enable knowledge creation, sharing, collaboration and coordination.	138(47.4)	153(52.6)	2.45	1.027
5	Increasing openness, knowledge sharing and the diffusion of knowledge for innovation.	156(53.6)	135(46.4)	2.26	1.022
6	Positioning Information and knowledge as a strategic resource.	165(56.7)	126(43.3)	2.22	1.077
7	Creating valuable information from experiments, explorations or business Intelligence.	239(82.1)	52(17.9)	1.96	.911
8	Generating knowledge based on interpretation and translation.	146(50.2)	145(49.8)	2.37	1.000
9	Managing Knowledge resources for transferability.	240(82.5)	51(17.5)	1.98	.861
10	Creating and retaining intellectual Assets.	164(56.4)	127(43.6)	2.24	.982
11	Coordinating expertise and pinpointing expert knowledge.	163(56.4)	128(44.0)	2.23	1.032
12	Adopting best practices, lessons learning or benchmarking.	247(84.9)	44(15.1)	1.59	.966
D3	**Innovation Implementation: Product Development**				
		Likert Scale Responses		**Reliability = 0.872**	
Ser. No.	Item	Agree	Not Agree	Mean	Std.Dev.
1	Knowledge bases, repositories, databases, content management and dashboards.	250(85.9)	41(14.1)	1.59	1.011
2	The structure for centre of excellence.	152(52.2)	139(47.8)	2.35	1.007
3	Operational command structure and leadership.	151(51.9)	140(48.1)	2.33	1.018
4	Informal structure to enable knowledge creation, sharing, collaboration and coordination.	231(79.4)	60(20.6)	1.76	1.050
5	Increasing openness, knowledge sharing and the diffusion of	252(86.6)	39(13.4)	1.64	.966

	knowledge for innovation.				
6	Positioning Information and knowledge as a strategic resource.	257(88.3)	34(11.7)	1.62	.899
7	Creating valuable information from experiments, explorations or business Intelligence.	260(89.3)	31(10.7)	1.56	.913
8	Generating knowledge based on interpretation and translation.	242(83.2)	49(16.8)	1.96	.852
9	Managing Knowledge resources for transferability.	249(85.6)	42(14.4)	1.93	.813
10	Creating and retaining intellectual Assets.	157(54.0)	134(46.0)	2.27	1.007
11	Coordinating expertise and pinpointing expert knowledge.	252(86.6)	39(13.4)	1.58	.904
12	Adopting best practices, lessons learning or benchmarking.	253(86.9)	38(13.1)	1.59	.944

D4	**Innovation Implementation: Business Development**				
		Likert Scale Responses		**Reliability = 0.894**	
Ser. No.	Item	Agree	Not Agree	Mean	Standard deviation
1	Knowledge bases, repositories, databases, content management and dashboards.	153(52.6)	138(47.4)	2.26	1.033
2	The structure for centre of excellence.	158(54.3)	133(45.7)	2.34	.975
3	Operational command structure and leadership.	240(82.5)	51(17.5)	1.70	1.016
4	Informal structure to enable knowledge creation, sharing, collaboration and coordination.	137(47.1)	154(52.9)	2.43	1.023
5	Increasing openness, knowledge sharing and the diffusion of knowledge for innovation.	152(52.2)	139(47.8)	2.26	1.000
6	Positioning Information and knowledge as a strategic resource.	247(84.9)	44(15.1)	1.61	.942
7	Creating valuable information from experiments, explorations or business Intelligence.	168(57.7)	123(42.3)	2.21	1.005
8	Generating knowledge based on interpretation and translation.	154(52.9)	137(47.1)	2.37	.978
9	Managing Knowledge resources for transferability.	162(55.7)	129(44.3)	2.27	.983
10	Creating and retaining intellectual Assets.	161(55.3)	130(44.7)	2.33	.970
11	Coordinating expertise and pinpointing expert knowledge.	259(89.0)	32(11.0)	1.89	.793
12	Adopting best practices, lessons learning or benchmarking.	241(82.8)	50(17.2)	1.93	.921

E1	**Innovation Commercialisation: Customer Value**				
		Likert Scale Responses		**Reliability =0.890**	
Ser. No.	Item	Agree	Not Agree	Mean	Std.Dev.

1	Knowledge bases, repositories, databases, content management and dashboards.	233(80.1)	58(19.9)	1.98	.919
2	The structure for centre of excellence.	228(978.4)	63(21.6)	1.77	1.026
3	Operational command structure and leadership.	236(82.2)	51(17.8)	1.75	1.020
4	Informal structure to enable knowledge creation, sharing, collaboration and coordination.	140(48.1)	151(51.9)	2.40	1.010
5	Increasing openness, knowledge sharing and the diffusion of knowledge for innovation.	149(51.2)	142(48.8)	2.35	.991
6	Positioning Information and knowledge as a strategic resource.	248(85.2)	43(14.8)	1.61	.931
7	Creating valuable information from experiments, explorations or business Intelligence.	234(80.4)	57(19.6)	1.73	1.010
8	Generating knowledge based on interpretation and translation.	227(78.0)	64(22.0)	1.80	1.027
9	Managing Knowledge resources for transferability.	156(53.6)	135(46.4)	2.30	.973
10	Creating and retaining intellectual Assets.	163(56.0)	128(44.0)	2.31	.975
11	Coordinating expertise and pinpointing expert knowledge.	250(85.9)	41(14.1)	1.92	.833
12	Adopting best practices, lessons learning or benchmarking.	245(84.2)	46(15.8)	1.66	.981

E2	**Innovation Commercialisation: Channels**				
		Likert Scale Responses		**Reliability = 0.898**	
Ser. No.	Item	Agree	Not Agree	Mean	Standard deviation
1	Knowledge bases, repositories, databases, content management and dashboards.	246(84.5)	45(15.5)	1.64	1.029
2	The structure for centre of excellence.	237(81.4)	54(18.6)	1.73	1.007
3	Operational command structure and leadership.	241(82.8)	50(17.2)	1.73	1.012
4	Informal structure to enable knowledge creation, sharing, collaboration and coordination.	227(78.0)	64(22.0)	1.81	1.028
5	Increasing openness, knowledge sharing and the diffusion of knowledge for innovation.	247(84.9)	44(15.1)	1.65	.941
6	Positioning Information and knowledge as a strategic resource.	159(54.6)	132(45.4)	2.30	.991
7	Creating valuable information from experiments, explorations or business Intelligence.	250(85.9)	41(14.1)	1.56	.943

8	Generating knowledge based on interpretation and translation.	156(53.6)	135(46.4)	2.34	.974
9	Managing Knowledge resources for transferability.	241(82.8)	50(17.2)	1.97	.817
10	Creating and retaining intellectual Assets.	152(52.2)	139(47.8)	2.31	.976
11	Coordinating expertise and pinpointing expert knowledge.	164(56.4)	127(43.6)	2.25	.997
12	Adopting best practices, lessons learning or benchmarking.	156(53.6)	135(46.4)	2.33	1.000

F	**Organisation Capability Efficiency**				
		Likert Scale Responses		**Reliability = 0.639**	
Ser. No.	Item	Agree	Not Agree	Mean	Std.Dev.
1	Using fewer resources to support the same level of business or using the existing resources to support the larger volume of business improves Organisational Capability Efficiency?	200(68.7)	91 (31.3)	2.35	1.077
2	Leveraging and mobilising its resources improves Organisational Capability Efficiency?	263(90.4)	28 (9.6)	1.52	.844
3	Performing resource analysis, filling those gaps and building capability for the future improves Organisational Capability Efficiency?	265(91.1)	26 (8.9)	1.81	.819
4	Converging capability on clear goals and focused efforts improves Organisational Capability Efficiency?	263(90.4)	28 (9.6)	1.48	.856
5	Conserving and utilizing resources and capabilities to the fullest by co-opting resources through collaborative arrangements improves Organisational Capability Efficiency?	257(88.3)	34 (11.7)	1.80	.840