STRATEGIC CLOUD COMPUTING FRAMEWORK IN THE CONTEXT OF SOUTH AFRICAN INFORMATION TECHNOLOGY PROFESSIONALS

by

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submitted in accordance with the requirements
for the degree of

DOCTOR OF BUSINESS LEADERSHIP

at the

Graduate School of Business Leadership
UNIVERSITY OF SOUTH AFRICA

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DATE SUBMITTED:

March 2021

THESIS ABSTRACT

South African organisations are faced with the challenge of rising costs for deploying and maintaining information technology infrastructure, platforms, and software's. With the introduction of cloud computing, organisations can now shift from investing internally in information technology resources into where resources are consumed, doing this via the Internet. The business leadership research problem is that individuals and organizations often lack the know what and know how of cloud computing. This is because the existing frameworks are not always applicable to certain South African contexts. To address this problem, the present study sought to explore and describe how cloud computing could be strategically adopted and used. This is done through the views and perspectives of South African information technology professionals. Cloud computing organisational adoption and use may be well studied in the literature but there are no known studies, which address the adoption and use from the individual IT, professionals' point of view. This has left some knowledge gaps, which the present study sought to address.

The Technology-organization-environment framework, the Contingency theory and the Stakeholder theory were adopted as the research lenses to empirically understand and subsequently determine how cloud computing may be strategically adopted and used, from the IT professional's perspective. The study followed an interpretive philosophy stance and adopted a qualitative research approach and a case study strategy involving semi-structured interviews with purposively selected IT professionals as participants.

The theoretical, practical, methodological and contextual contributions of the thesis are in the strategic cloud computing framework for South African organizations. This framework shows the theoretical and practical elements necessary for the improved adoption and use of cloud computing, from the IT professional's perspective.

Keywords:

Cloud Computing, Contingency Theory, IT professionals, Stakeholder Theory, Technology Organization and Environment framework, South Africa, Strategic framework.

DECLARATION

Student number: 7177-381-9

I declare that this research entitled **"Strategic Cloud Computing Framework in the context of South African Information Technology Professionals"** is to the best of my knowledge and understanding original, except as acknowledged in the text. The material has not been submitted, either in whole or in part, for a degree at UNISA or any other university. I also certify that, to the best of my knowledge, any assistance received in preparing this thesis, and all sources used, have been acknowledged.

SIGNATURE:

10/11/2020
DATE

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PEER-REVIEWED PUBLICATIONS FROM THIS STUDY

The following publications arising from this study

Journal Article

Andrian Wilby Twala; Ray M Kekwaletswe. (Volume. 5 Issue. 8, August - 2020), "Strategic Cloud Computing Framework: A Case Study of South African IT Professionals", International Journal of Innovative Science and Research Technology (IJISRT), www.ijisrt.com. ISSN - 2456-2165, PP: - 375-386.

Conference Papers

Twala, A. W., & Kekwaletswe, R. M. (2019). Towards a strategic cloud computing framework: A South African context. In *Proceedings of the 12th IADIS International Conference Information Systems 2019, IS 2019* (pp. 225–231). IADIS Press. https://doi.org/10.33965/is2019_201905l028

Twala, A., & Kekwaletswe, R. (2019). Strategic Cloud Computing Framework: South African Context (Vol. 12, pp. 372–361). EasyChair. https://doi.org/10.29007/p7br

ACKNOWLEDGEMENTS

I would like to thank and appreciate my supervisor, Prof, Ray Kekwaletswe, who is always available for guidance and advice throughout this research journey.

I wish to thank my wife, Zondi for encouraging and supporting me to pursue my studies. My heartfelt thanks go to Atlegang, my daughter for financial help and support when submitting conferences papers. Special thanks go to Ipeleng for encouraging me to finish my studies and my sincere thanks go to Njabulo, for believing in me.

To all my participants for their participation in this study and my fellow doctoral candidates, Tshego, Million, Frans and Kate for your support am forever thankful.

Last, but no means the least, my late grandparents (Mr and Mrs Letlhage) and my late parents (Mr and Mrs Twala).

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LIST OF ACRONYMS AND ABBREVIATIONS

AWS	Amazon Web Services
DOI	Diffusion of Innovation Theory
IAAS	Infrastructure as a Service
IS	Information System
IT	Information Technology
NIST	National Institution of Standards and Technology
PAAS	Platform as a Service
SAAS	Software as a Service
SLA	Service Level Agreement
TAM	Technology Acceptance Model
TAM2	Extended Technology Acceptance Model
TOE	Technology Organization Environment Framework
TRA	Theory of Reasoned Action
TPB	Theory of Planned Behaviour
UTAUT	Unified Theory of Acceptance and Use of Technology

CHAPTER 1: INTRODUCTION AND BACKGROUND

This thesis is about the adoption and use of cloud computing from the information technology professionals perspective. The thesis addresses the research question "*How should cloud computing be strategically adopted and used, sensitive to the South African context*". The research argument driving this thesis is that cloud computing may be well adopted and used strategically if IT professionals voices as individuals are heard. Moreover, this is what has not yet been adequately addressed in the literature. That is, there are no known studies conducted in South Africa that looks at cloud computing adoption and use from the context and perspectives of IT professionals. Most studies reviewed address the organizational views, not the individual's views, and their experiences. This thesis explores and describes the South African cloud computing phenomenon from the individual's outlook.

This introductory chapter is outlined as follows: the background of the study is discussed in section 1.1; this is followed by an introduction to the field of study in section 1.2, background to the research problem in section 1.3, research problem statement in section 1. 4. The purpose and goal of the study are discussed in section 1. 5. Sections 1.6 and 1.7 respectively address the research objectives and research questions and, finally, the significance of the study is given in section 1.8.

1.1Introduction

Cloud computing is a method of delivering information technology (IT) services via the Internet (Mell and Grance, 2011). Cloud computing is said to be at its infancy, in South Africa, even though it has been around longer in other parts of the world. The reason is that South African organisations are still facing challenges and issues regarding decisions to go cloud or not, notably with the increasing capital expenditure in paying for information technology infrastructure, platforms and software licenses, IT professionals, often at a low return on investment (Erdogmus, 2009). Cloud computing is said to be one of the ways through which increasing IT costs within an organisation can be reduced (Voas and Zhang, 2009). However, how it is supposed to be strategically adopted and used is still an ongoing information technology business leadership key issue.

1.1.1 Defining the thesis title

This section briefly discusses the key concepts that make up the thesis topic. It is not the intention of this section to explain all the main concepts of the study. This is to help the reader grasp the study undertaken and the subsequent thesis. In chapter two, a survey of scholarship and theoretical foundations, the same main concepts are thoroughly discussed: and in chapter three: theoretical frameworks.

Strategy

A strategy is described as future-oriented strategies to engage with the competitive environment in order to achieve business objectives and goals (Pearce and Robinson 2009). In this thesis, strategy refers to what information technology professionals deem as the best way to achieving an improved adoption and long term use of cloud computing.

Cloud computing

The National Institute of Standard and Technology (NIST) defines cloud computing as a model that enables convenient, on-demand network access to configurable computing resources which are shared (e.g., networks, servers, storage, software, and services) that can be easily provided and released with minimal management effort or interaction with service providers (Mell and Grance, 2011; Snaith, Hardy and Walker, 2011).

The definition by NIST (Mell and Grance, 2011) was selected for this study because it covers the deployment models, service models and essential characteristics. This study explores and describes the South African cloud computing phenomena from the perspective of individuals.

Strategic Cloud Computing

In this thesis, strategic cloud computing refers to the best ideal way to adopt and use IT infrastructure, platform and software services to achieve long term business objectives and goals, from the IT professionals' perspective.

Framework

A framework refers to an abstract of interlinked components that support a particular cloud computing approach. A framework can be formulated from practical concepts or theories. There are two types of frameworks namely theoretical and conceptual frameworks (Bassett and Bassett 2003). A theoretical framework is based on the support of theory and while a conceptual framework is based on the related concepts and the practical operation of theories concepts(Robson 2002).

South Africa

The Republic of South Africa is a country that is situated in the southern tip of Africa. South African coastline stretching along the Atlantic and Indian oceans bound it. South Africa is bordered by Mozambique, Botswana, Lesotho, Swaziland and Namibia. According to Statistics South Africa, the population is estimated to be 56 million in 2017. South Africa is a multi-ethnic group with different cultures, language, and religions. South Africa has 11 official languages with nine national provinces covering an area of 1,221,037 square kilometres.

Professional

The profession is defined as an occupation in which a professed knowledge of some subject, field or science is applied; a vocation or career, especially one that involves prolonged training and a formal qualification(Oxford English Dictionary, 2020). The term professional refers to anyone who earns their living from performing an activity that requires a certain level of education, skill, or training.

Information Technology Professionals

IT professionals are classified as software or hardware engineers who run, manage, handle systems, server hardware or software in a computing environment. The environment of an IT professional can consist of IT management, support, consulting, resourcing, development, software, networking and operations software, networking and operations (*Information Technology Professional Definition - Law Insider*, 2020).

This study sought to conceptualise a strategic cloud computing framework in the context of South African Information Technology Professionals. The present study context is in two folds, the individual's and that of South Africa. The next section discusses the background of the field of study.

1.2Background to the field of study

In today's digitized environment, organisations are finding a new approach to the use of technology to operate efficiently and to reduce operational costs. However, organisations tend to fail to maintain their hardware and software to meet their core business due to, among other things, high costs and revolving IT personnel. Cloud computing is a method of delivering different IT services through the Internet. Cloud computing is seen as an innovation that would lower the cost of hardware and software by providing access to hardware and software resources without capital investment in an organization (Miller, 2009). An alternative solution such as cloud computing offers significant benefits such as access to improved computer resources, improve services to customers, improved operational efficiency, enabling faster deployment of technology (Nair et al., 2010). The present study, thus, sought to describe the cloud computing activities and subsequently how cloud computing could be strategically adopted and used sensitive to the South African and IT professional's context.

1.2.1 Cloud computing trends

Over time, the number of organisations searching for cloud computing solutions has grown. Cloud computing is transforming the way organisations work. Several pieces of study have been discussed at worldwide conferences.

According to a Cisco report (Cisco, 2014), compared to existing in-house data centres, there is an increased usage of cloud data centres. According to Gartner, more than $1 trillion has been invested directly or indirectly in cloud computing worldwide in the last five years, from 2014 to 2019. Cloud computing technology is seen as a disruptive force for IT spending. The growth of the market requires IT managers and directors to explore how they could benefit from cloud computing while also weighing the related risks. The decision to migrate workloads to cloud providers is a strategic step that could potentially save the expense of maintaining the current system and provide pay flexibility when you use the computing resources.

According to Gartner, the cloud computing market is massive with IT spending of $3.79 trillion in 2019 as Table 1.1. Illustrates below.

Table 1.1: Worldwide IT spending forecast (STAMFORD 2019b).

Details	2018 Spending (Billions)	2018 Growth(%)	2019 Spending (Billions)	2019 Growth(%)	2020 Spending	2020 Growth(%)
Data Centre Systems	$210	15.5	$204	-2.8	$207	1.7
Enterprise software	$399	9.3	$427	7.1	$462	8.2
Devices	$667	0.3	$655	-1.9	$677	3.5
IT Services	$982	5.5	$1,016	3.5	$1,065	4.8
Communications Services	$1,489	2.1	$1,487	-0.1	$1,513	1.7
Total	**$3,747**	**4.0**	**$3,790**	**1.1**	**$3,925**	**3.6**

According to Table 1.1, the IT spending in 2019 reached $3, 79 Trillion, with an increase of one point one percent (1.1%) from the 2018 amount and most of the spending were on cloud software applications. Gartner predicts the growth spending on infrastructure as a service in the near future.

Gartner further predicted that South Africa IT spending would have reached R303 billion in 2019 as Table 1.2 illustrates.

Table 1.2: South Africa IT spending forecast (STAMFORD 2019a)

Details	2018 Spending (Millions)	2018 Growth (%)	2019 Spending (Millions)	2019 Growth(%)	2020 Spending (Millions)	2020 Growth (%)
Communication services	R 129,837	3.2	R 132,852	2.3	R 133,572	0.5
Data Centre Systems	R 9,053	16.1	R 8,598	-5.0	R 8,898	3.5
Devices	R 44,615	7.5	R 45,966	3.0	R 40,328	-12.3
IT Services	R 79,685	4.9	R 83,897	5.3	R 87,996	4.9
Software	R 28,849	12.9	R 32,147	11.4	R 35,850	11.5
Total	**R 292,040**	5.6	**R 303,460**	3.9	**R 306,644**	1.0

According to Table 1.2, the IT spending in South Africa in 2019 reached R303.5 billion, with an increase of three-point nine percent (3.9%) from the 2018 amount. The software spending in South Africa in 2019 reached R32 billion, with an increase of eleven point four percent (11.4%) from the 2018 amount. In South Africa, cloud computing has become a new reality, and the most consumed cloud services by South African organizations include Platform as a Service, Infrastructure as a Service and Software as a Service.

1.2.2 Cloud computing attraction

Cloud computing allows organisations to reduce the investment costs, lower upfront costs of hardware, increased agility by increasing or decreasing computing power when is needed. Cloud computing offers flexibility by offering the option to work at any time, from any location, measures services and flexible resources that can be increased or decreased based on the demands. These are some of the cloud computing attractions for organisations.

Varia (2010), agrees that cloud computing offers organisations many benefits such as the faster provision of IT resources, visualization, shared resources, pay as you use to model and data protection. Cloud computing can offer many potential benefits that will make it seem very appealing, and by utilizing cloud computing, there are benefits such as reduce investment costs, a pay for use model for resources and costs savings (Marston et al., 2011).

In addition, cloud computing enables fast implementation of business services, remote access and mobility, flexibility, scalability and reduction in costs (Hayes, 2008). Cloud computing services enable organisations to concentrate on their core business by relinquishing concerns around hardware and software infrastructure. Cloud computing creates business value by cost reduction, improve agility, flexibility no large investment in infrastructure (Buyya et., 2010).

1.2.3 Cloud computing related studies

Studies such as Modisane et al. (2021); Alsharari (2020); Odeh et al. (2017) and Jianwen and Wakil (2019) analysed cloud computing factors that influence cloud computing adoption and usage. These studies show that factors, which are significant in cloud computing use and adoption, are complex and varied.

Modisane et al. (2021) researched the advantages of cloud computing for small, medium, and micro-sized enterprises. The study aimed to ensure that small, medium and micro-sized businesses (SMMEs) have constant access to ICT resources through the cloud without having to manage their own IT infrastructure. Using the Technology-Organization-Environment (TOE) framework, a conceptual research model was developed. The research reveals that the technological context has a positive significant influence on cloud computing adoption. The organizational context had a negative and non-significant effect on cloud computing adoption. The environmental context had a positive and significant influence on SMMEs' adoption of cloud computing services.

Alsharari (2020) researched to clarify a strategy for transforming from an in-house ERP system to a cloud-based ERP system. The transformation theory was used to explain the transformation process. The study used a case study to collect primary data. The study found that converting to cloud ERP resulted in cost savings, increased flexibility, and increased profitability. Top management, change management, and project management must also be taken into account. Concerns about data privacy in the cloud environment were among the issues raised.

Jianwen and Wakil (2019) conducted a study to better understand the factors that affect cloud computing adoption and its benefits in the service sector. A conceptual research model was developed. The human factor (personal innovativeness and knowledge), organizational factor (adequacy of resources and top management support), technical factor (compatibility and security), and environmental factor (regulatory environment, competitive pressure and trading partner) were found to be four variables in that affect cloud computing adoption in the service sector.

Odeh, Garcia-Perez and Warwick (2017) conducted a study to identify cloud computing factors in the education sector. A case study was used to gather primary data from cloud experts and professors in Jordanian universities. The study found that cloud-computing enablers are compatibility, ease of use, decentralization, and cost savings. Cloud computing risks include compatibility with in-house applications, privacy, awareness of top management, resistance to change and security.

1.2.4 Context and location

This thesis describes cloud computing and subsequently conceptualises how cloud computing could be strategically adopted and used sensitive to the South African context. The context and location of the study is in South Africa. The Republic of South Africa is a country situated in the southern part of Africa. The South African coastline is bordered by the Atlantic and Indian oceans. Botswana, Mozambique, Namibia, Swaziland and Mozambique are neighbouring countries. As shown in figure 1.1 below, South Africa consists of nine (9) provinces.

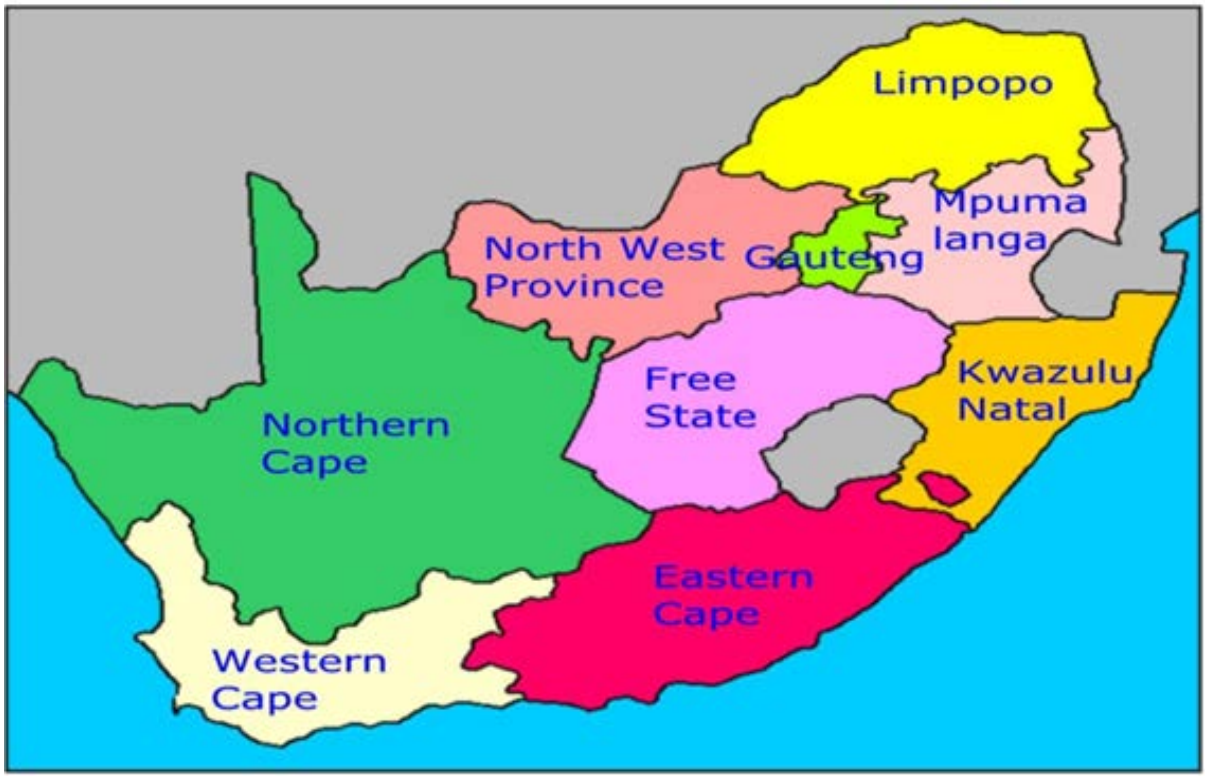

Figure 1.1: Provinces of South Africa (South African Government, 2016)

Provincial demarcations in South Africa are shown in figure 1.1. South Africa has an estimated population of 58.78 million people in 2019 (Statistics South Africa, 2019). A population breakdown per province is given in Table 1.3 below.

Table 1.3: Estimated population per province (Statistics South Africa, 2019)

Province	Population	Percentage (%)
Gauteng	15 176 116	25,8
KwaZulu-Natal	11 289 086	19,2
Western Cape	6 844 272	11,6
Eastern Cape	6 712 276	11,4
Limpopo	5 982 584	10,2
Mpumalanga	4 592 187	7.8
North West	4 027 160	6,9
Free State	2 887 465	4,9
Northern Cape	1 263 875	2,2
Total	**58 775 022**	**100**

According to Table 1.3, Gauteng province recorded the highest population in South Africa, with 15.1 million people living in the province, comprising twenty-five point eight (25.8 %) percent of the entire population. The province of KwaZulu-Natal follows this with 11.2 million people living in the province, comprising nineteen percent of the entire population (19.2 %). A small proportion of the population was registered in the Northern Cape Province, with 1.2 million people living in the province, comprising two point two percent (2.2 %) of the total population. Consequently, Gauteng province has the highest population of IT professionals. The province is where most IT trends manifest themselves.

1.2.5 Research argument

Cloud computing adoption and use is a complex phenomenon that comes with challenges and issues. The research argument is, therefore, that cloud computing needs to be studied sensitive to the context in which it takes place. The argument is that the adoption and use of cloud computing needed to be studied and understood from the context of South African information technology professionals. Additionally, the research argument was that this cloud computing phenomenon ought to be understood through the triangulated lenses of TOE framework, Contingency theory, and Stakeholder theory.

The next section discusses the background to the research problem.

1.3Background to the research problem (Motivation for the study)

This section gives the motivations for the present study and the background to the research problem by identifying the existing knowledge gaps. The existing gaps are grouped into four categories namely theoretical, methodological, practical and contextual knowledge gaps. A detailed literature review is provided in chapters two and three of this thesis. The table below provides an abridged systematic literature review on related cloud computing studies.

Table 1.4: Abridged systematic literature review on related cloud computing studies

Author(s)/Year	Nature of the study	Findings	Knowledge Gaps identified
Ghaffari and Lagzian (2018)	The study understands the participant's perceptions of using personal cloud storage services.	The study found that the most important factors are factors such as security, accessibility of data, the privacy of data and reliability of data.	❖ The three studies only looked at the user experiences in the adoption of technology. ❖ Studies only identify the drivers of cloud computing for different stakeholders ❖ The practical adoption and use of cloud computing are not discussed in the context of a developing country like South Africa. ❖ The studies do not address how different stakeholders embrace cloud computing services. ❖ This has left some knowledge gaps, which the present study sought to address.
Skafi et al. (2020)	The study conducted to investigate the adoption of Cloud Computing Services in Lebanon.	The study found technology, environment and organisation as factors are positively related to the decision to adopt cloud computing services s	
Almaiah & Al-Khasawneh (2020)	The study factors that influence whether or not a university campus should implement mobile cloud computing.	The study found factors such as quality of service, perceived usefulness, perceived ease of use, relative advantage, and trust were found to be among the most influential factors in the adoption of mobile.	

An overview of the abridged systematic literature review on related cloud computing studies was given in Table 1.4 above, indicating the knowledge gaps left by these related studies.

Almaiah & Al-Khasawneh (2020), conducted a study that aims at finding out the main factors that influence whether or not a university campus should implement mobile cloud computing. The primary data was collected from 210 academic staff members from various departments at Saudi Arabia's public universities. The study found factors such as quality of service, perceived usefulness, perceived ease of use, relative advantage, and trust were found to be among the most influential factors in the adoption of mobile. Furthermore, the research reveals that security and privacy issues continue to be a concern when adopting mobile cloud in Saudi universities.

Ghaffari and Lagzian (2018) conducted a study to understand the participant's perceptions of using personal cloud storage services. The study aimed at obtaining insights towards cloud computing adoption. The study found that it was necessary to assess cloud readiness before adoption. In addition, data availability, security issues, data privacy and data reliability have been described as the most important factors that can affect cloud computing adoption and use.

Skafi et al. (2020) conducted a study to investigate the adoption of Cloud Computing Services in Lebanon. A conceptual model was developed using the technology-organization-environment (TOE) framework and the Contextual Theory to examine the determinants of cloud computing service adoption in a developing country, namely Lebanon. Primary data was collected from 139 respondents working in SMEs in Lebanon. The study found that technological (complexity and security) and organizational (top management support and prior IT experience) factors are positively related to the decision to adopt cloud computing services.

The knowledge gaps identified from the preceding related studies are that:

- How cloud computing may be strategically adopted and use in the South African context has not yet been adequately addressed in the literature
- The importance of different stakeholders when adopting and using cloud computing is still not addressed
- There are no known studies conducted in South Africa in establishing cloud computing adoption and use from the context of IT professional's opinions and views.
- Most studies reviewed address the organizational views and not the individual's views and their experiences

1.3.1 Theoretical, Practical, Methodological and Contextual Knowledge Gaps

This section now highlights cloud computing knowledge gaps which the present study sought to address. To provide the motivation for this thesis, the knowledge gaps are addressed in four folds namely theoretical, methodological, contextual and practical.

1.3.1.1 Theoretical knowledge gap

The review of related studies on cloud computing highlighted the theoretical knowledge gaps that provided motivation for the present study. The related studies used the technology-organization-environment (TOE) framework as their theory underpinning their studies. However, the studies did not use the Stakeholder theory and Contingency theory. Studies (for example; Ahmed (2020); Adiyasa et al. (2019); Priyadarshinee *et al.*, (2017)) on adoption used the TOE framework as a research lens., the combination of Stakeholder theory, Contingency theory and TOE framework, has not yet been empirically studied in the context of South Africa and from information technology professionals perspectives. These three theories are now used as lenses in the present study to give a profound understanding of cloud computing.

1.3.1.2 Methodological knowledge gap

Most of the studies on the adoption of innovation follows a positivistic philosophy stance using a survey research strategy. This strategy does not provide thick descriptions of the phenomenon, it does not give a profound understanding and context of cloud computing. Most studies reviewed used the survey methods as a research strategy. The methodological findings indicate that there are fewer qualitative studies that have contributed to the understanding of cloud computing.

Positivistic philosophy and survey methods have weaknesses in investigating social contexts because they lack the real depth (social setting and emotions) associated with organisations and individuals. The survey methods often fail to capture participant's feelings or emotions. Nevertheless, there is still a lack of studies that are using the case study as an appropriate method, leaving this is a methodological knowledge gap that motivated the present study. The case study method allowed individual participants to give a real life perspective on the adoption and use of cloud computing.

Interpretive philosophy and a case study method were considered the most appropriate and viable for its in-depth approach. According to Yin (2016), a case study research strategy helps the researcher to understand a phenomenon in depth. In the context of the present study, it allowed participants to give a real perspective on the South African cloud computing phenomenon. The case study research strategy was found suitable to collect primary data in great depth and allowed context and real meanings to be analysed.

1.3.1.3 Practical knowledge gap

In South Africa, organisations have seen exponential growth in the usage of information technology, in particular the use of the Internet. The budget spending on IT infrastructure, software licensing, service, and maintenance costs have expanded the use of information technology in organizations (Twala and Kekwaletswe 2019).

There is a need for cost-effective alternative technologies and cloud computing can be argued as an alternative technology in view of the IT infrastructure, networks, software and maintenance cost challenges. A cost-effective strategy, such as cloud computing, is supported by South African organisations. Cloud computing provides cost-saving advantages, virtual innovation space, ease of use, access to resources, resource availability, available at anytime from anywhere (Varia, 2010).

There are no known studies that have been conducted in South Africa to determine the adoption and use of cloud computing in the views and opinions of IT professionals. The present study thus bridged the practical knowledge gap by conceptualizing a strategic cloud computing system from the point of view of individuals in the South African context.

1.3.1.4 Contextual knowledge gap

The South African climate is not the same as that of developed countries, especially with regard to educational and social backgrounds, politics and culture. The infrastructure is unique to the South African environment. The South African information technology (IT) professionals are not the same as compared to the developed countries. There are differences, for examples, in South Africa, there are scarce skills in IT, the competencies are not the same as compared to developed countries, and IT skills retention is an issue in South Africa due to scarce resource. There is a lack of individual autonomy, IT professionals feel that they are not being appreciated or valued, decisions are being made without their inputs and this leads to IT professionals being

frustrated. The study provides an overview of how South African IT professionals could be considered in the strategic adoption and use of cloud computing.

1.4Problem Statement

The reasons for organisations and individuals to adopt and use cloud computing are many and they vary. Cloud computing has become the new information technology (IT) trend because of the way IT resources are consumed with the benefits such as cost savings, ability to scale up and down resources, sharing resources, flexibility and availability realised.

The adoption and use of cloud computing is still a theoretical and practical information system business leadership key issue as organisations and individuals strive to find ways on how cloud computing could be strategically adopted and used in a uniformed and coordinated manner. However, the literature on how cloud computing may be strategically adopted and used in the South African context is scant, leaving the preceding knowledge gaps. That is, this phenomenon is inadequately addressed in the literature, with no known study that provides the South African context and the IT professionals' views, opinions and experiences. The cloud computing organisational contexts may be well studied but literature does not adequately provide the individual's point of view. To this point, there was a need to study how cloud computing could be strategically adopted and used sensitive to the South African context from the individual IT professionals' point of views and experiences.

1.5 Research Goal and Purpose

1.5.1 Research purpose

The purpose of the study was to describe cloud computing and subsequently determine how cloud computing could be strategically adopted and used sensitive to the South African context.

1.5.2 Research goal

The research goal was to conceptualise a strategic cloud computing framework in the context of South African Information Technology Professionals.

1.6 Research Objectives

The research objectives of the study were to:

- Describe how cloud computing manifests in South Africa according to South African IT professionals.
- Analyse and describe the drivers of cloud computing for different stakeholders.
- Analyse and describe the practical and theoretical contingencies for strategic cloud computing in the South African context.
- Analyse and describe factors influencing the adoption and use of cloud computing.
- Determine how cloud computing could be adopted and use strategically in the South African context.

1.7 Research Questions

This study aimed to conceptualise a strategic cloud computing framework in the context of South African Information Technology Professionals, the following questions were formulated to drive the study.

1.7.1 Primary Research Question

The primary research question that guided this study is "***How should cloud computing be strategically adopted and used sensitive to the South African context***?"

1.7.2 Secondary Research Questions

The following secondary research questions were posed to answer the complex primary research questions as follows:

1. How does cloud computing manifest in South Africa according to South African IT professionals?
2. What are the drivers of cloud computing for different stakeholders?
3. What are the practical and theoretical contingencies for strategic cloud computing in the South African context?
4. What are the factors influencing the adoption and use of cloud computing?

5. How could cloud computing be strategically adopted and used in the South African context?

The present study aimed to conceptualise a strategic cloud computing framework that will address the research problem through the process of answering the foregoing research questions. This is how the thesis contributes to the information systems business leadership body of knowledge.

1.8 Significance of the Study

The uniqueness of this study is by filling the research knowledge gaps. The significance of this study is in four folds namely theoretical, methodological, practical and contextual.

1.8.1 Theoretical contribution

Most of the studies (for example; Ahmed (2020); Adiyasa et al. (2019); Priyadarshinee *et al.*, (2017)) used the TOE framework as a research lens, there is no mention of other theories such as contingency theory and stakeholder theory. The theoretical significance of this study is that the study was underpinned by stakeholder theory, contingency theory, and TOE framework as a research lens used to develop a strategic cloud-computing framework in the South African IT professional context. This study used these theories to understand the individual perspective with regards to cloud computing adoption and use.

1.8.2 Methodological contribution

The survey method often fails to capture the respondent or participants feelings or emotions. Therefore, the case study research strategy was used to collect data that gave a profound understanding and context of cloud computing as opposed to the survey methods. The case study allowed the IT professionals to give a real perspective on the adoption and use of cloud computing. In the body of knowledge, the research contributed by extending the business leadership body of knowledge.

1.8.3 Practical contribution

The Practical contribution of this study is a strategic cloud computing framework that can be used to help strategically adopt and use cloud computing in a uniformed and coordinated manner in South Africa. The study is significant for the academic and business environments. The research has important implications for practitioners and decision-makers, as it presents

significant and reality-based information about an overview of how South African IT professionals could be considered in the strategic adoption and use of cloud computing. This framework may assist decision-makers on how to strategically position the adoption and use of cloud computing sensitive to the context in which it takes place.

1.8.4 Contextual contribution

South Africa climate is not the same as that of developed countries with regards to politics and culture. For example, the South African information technology professionals, unlike most developed countries, are faced with scarce skills, low staff retention, decisions are made without their inputs and a lack of individual autonomy. This study gave the individuals a voice, to give their opinions and views on how cloud computing should be adopted and use in the organisation. The opinions and views of the South African information technology professionals were used to conceptualise a strategic cloud computing framework.

1.9 Assumptions

The key assumptions underlying this study are that:

- This study provides an overview of how South African IT professionals could be considered in the strategic adoption and use of cloud computing.
- The study conceptualised a strategic cloud computing framework in the context of South African IT professionals
- The framework was developed based on three theories namely stakeholder theory, contingency theory and TOE framework, to highlight how cloud computing adoption and use is multifaceted and complex.
- The study gave individual IT professionals a voice, opinions and experiences on how cloud computing could be adopted and use.
- The case study research strategy gave an alternative way to understand how cloud computing can be strategically adopted and use in the context of South African IT professionals
- The proposed framework can be used as a guideline and resourceful practical tools

1.10 Delineations of the study

According to Hofstee (2006), delineation protects from criticism levied by individuals questioning the omission of specific topics. The scope of this study is focused on South African IT professionals' views, opinions and experiences on cloud computing and use, other professionals were not involved.

Cloud computing consists of four deployment model (private cloud, public cloud, community cloud and hybrid cloud) and three service model (Software as a service, platform as a service and infrastructure as a service. This study did not analyse the actual cloud computing models. It was treated as generic models. Rather, the study focused on cloud computing adoption and usage in the South African context through the views, opinions, and experiences of IT professionals.

This study does not do any technologies analysis rather, it more on the social aspects.

1.11 The thesis outline

This section provides an overview of the thesis structure. Figure 1.2 below is a graphical presentation of the thesis chapters of this thesis. This is followed by a brief content of each chapter.

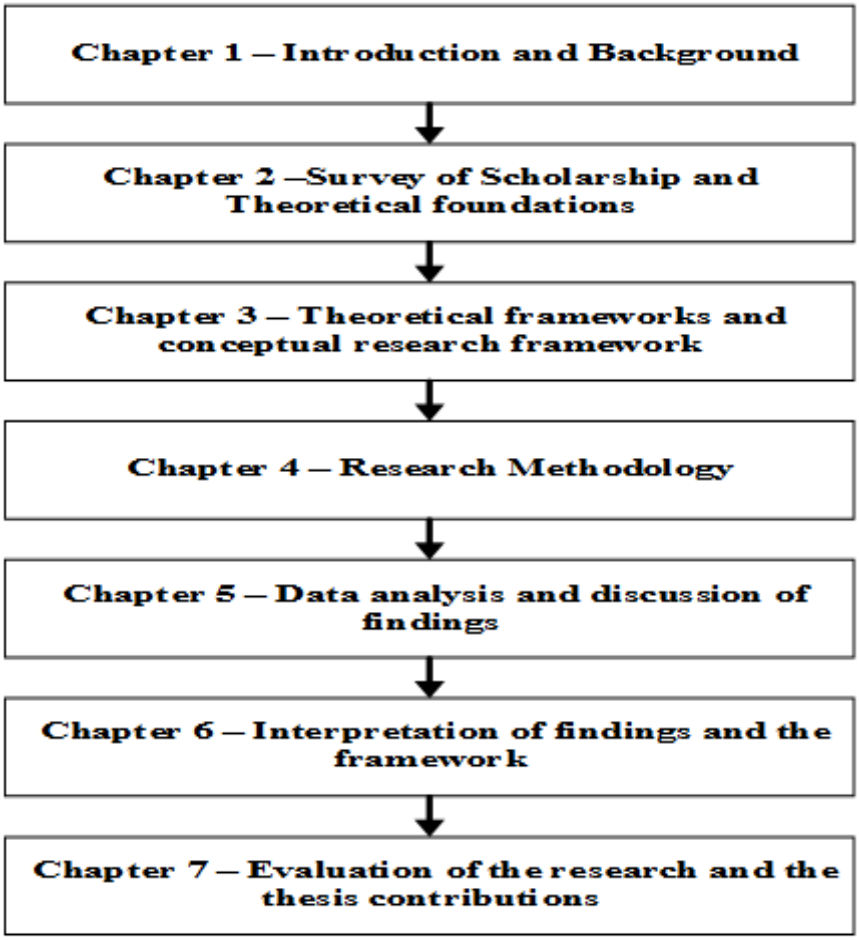

Figure 1.2: The thesis layout

1.11.1 Chapter 1: Introduction and background

This chapter introduced the study and motivation of why the research was being undertaken. The chapter provided a background to the field of study, a background to the research problem, problem statement, research purpose and goals, stated the research objectives, research questions, significance of the study, research augments and study delineation.

1.11.2 Chapter 2: Survey of scholarship and theoretical foundations

This chapter detailed a systematic literature review of the cloud computing concept. This chapter surveyed scholarship and systematically reviews relevant literature that informed and gave foundation to the study.

1.11.3 Chapter 3: Theoretical and conceptual research framework

This chapter discussed the information system theories of technology adoption and use. The theoretical framework and conceptualized research framework that guided this study are discussed.

1.11.4 Chapter 4: Research Methodology

This chapter outlines the research methodology. It discusses the interpretative research paradigm as the stance followed through the study. The research epistemological and ontological assumptions are discussed. The research strategy and research design are discussed in details and lastly, research ethics are discussed.

1.11.5 Chapter 5: Data analysis and Discussions of findings

This chapter presents and discusses the empirical evidence gathered through semi-structured interviews. Thematic data analysis approach is adopted where data is analysed according to themes, built from the research objectives.

1.11.6 Chapter 6: Interpretation of findings and the framework

This chapter interprets the research findings from chapter 5 in details. The research findings are compared with the existing literature to determine whether they support or contradict one another. The final strategic cloud computing framework in the context of information technology professionals is then presented. The strategic cloud computing framework is informed by both the literature and the empirical findings.

1.11.7 Chapter 7: Evaluation of the research and the thesis contributions

This chapter reflects on the research journey. It provides bottom lines based on the data analysis and interpretation of the data presented in the preceding chapter. This chapter provides a recapitulate of the main discussions and the essence of each chapter as presented in the thesis. The chapter summarises research findings, revisits the research objectives and research questions. It gives the contributions to the body of knowledge, recommendations from the study, suggests further research and concludes the thesis.

1.12 Summary of the chapter

This chapter highlighted that, there are still some shortcomings in realizing the value of cloud computing in the South African context. There is a lack of a theoretical framework that may help in realising the value of cloud computing, from the individual IT professionals' perspectives. The research argument and motivations for the study is provided. The chapter also discussed the potential contributions of the study by identifying the existing knowledge gaps. The next chapter reviews the literature that informed the study. This is done per the research questions

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CHAPTER 2: SURVEY OF SCHOLARSHIP AND THEORETICAL FOUNDATIONS

2.1 Introduction

The previous chapter provided the orientation of the research problem and the context of the study. This chapter surveys the scholarship by systematically reviewing the existing literature that informed and provided theoretical foundations for the thesis. Fink (2005) defines a literature review as a systematic and clear process to identify, evaluate the existing work by previous researchers and practices. According to Kitchenham and Brereton (2013), the main reason to conduct a systematic literature review is to summarise the existing empirical evidence of a particular subject, to construct a framework for research and to identify knowledge research gaps. A systematic literature review follows a predefined procedure, unlike conventional literature reviews.

The purpose of conducting a systematic review was to learn about the breadth and extend of previous researches on cloud computing adoption and usage. The systematic review includes the methodologies and the findings of the existing literature on cloud computing adoption and usage. The review method followed Webster and Watson (2002) guidelines for writing up a literature review in the field of information systems research. The systematic literature review was driven by the primary research question of this study, which is "*How should cloud computing be strategically adopted and used sensitive to South African context?"* The research question is required to be clear, brief and thoughtful (Rousseau, Manning, and Denyer 2008). The following secondary research questions guided the study towards answering the primary research questions are as follows:

- How does cloud computing manifest in South Africa according to South African IT professionals?
- What are the drivers of cloud computing for different stakeholders?
- What are the practical and theoretical contingencies for strategic cloud computing in the South African context?
- What are the factors influencing the adoption and use of cloud computing?

The literature search process involved querying available literature on cloud computing using different scholarly digital libraries such as Science Direct (Elsevier), ACM Digital Library, EBSCOhost, Emerald, IEEE Xplore and Google Scholar. The search criterion was set to English articles and studies that cover the published articles from 2010 to date, using the following search strings

(Cloud computing AND Framework and (organisation OR general*))
(Cloud computing adoption and usage and (stakeholders OR contingencies*)
"Cloud computing" AND "Technology Adoption" AND (external environment OR external factor*) AND (stakeholders OR contingencies OR general*)

The study used the following inclusion criteria:

- Date of publications: the researcher looked at articles that were published in the last ten years (2011 – 2021)
- Settings: Cloud computing in developing countries, health, education, public sector, TOE framework, Contingency theory, stakeholder theory
- Geography: all over the world
- Language: English
- Peer-reviewed articles

The exclusion criteria included

- The study was published more than 10 years ago
- The study was published in a language other than English

Any article that did not meet the above criteria was excluded

This chapter is outlined as follows: the cloud computing concept is discussed in section 2.2, this is followed by the cloud computing manifestation in general in section 2.3, section 2.4 discusses the drivers of cloud computing for different stakeholders, the contingencies of cloud computing are discussed in section 2.5. Factors influencing the adoption and use of cloud computing are discussed in section 2.6.

2.2 Cloud computing definitions

Cloud computing has multiple meanings, according to literature, and this demonstrates a broader view of the concept of cloud computing from different viewpoints.

Cloud computing is described by Vaquero et al. (2009) as "*a large pool of virtualized resources (such as hardware, development platforms and services) that are easily available and accessible.*"

Gartner (2009) describes cloud computing as "*a computing style in which scalable and elastic IT-enabled capabilities are delivered as a service using Internet technologies to external customers.*" (Plummer et al. 2009).

Armbrust et al. (2010) strengthened the concept of cloud computing as "*both Internet applications and data centre hardware and software that provide such services*".

The National Institute of Standard and Technology (NIST) defines cloud computing as a model that enables convenient, on-demand network access to configurable computing resources which are shared (e.g., networks, servers, storage, software, and services) that can be easily provided and released with minimal management effort or interaction with service providers (Mell and Grance, 2011; Snaith, Hardy and Walker, 2011).

There has been much discussion in the industry as to what cloud computing entails. The researcher has noted that meanings primarily focused on the service and technical characteristics. The term cloud computing seems to have originated from computer network diagrams that depict the internet as a cloud, such as numerous regional networks with connected computers.

Vaquero et al. (2009) provide a more technical definition, defining the hardware and development platforms required to access the internet. Armbrust et al. (2010) put a strong focus on resource sharing of remote resources in their description. The NIST definition is more comprehensive, as it requires the ability to share services over the internet. Cloud computing, according to the researchers, relates to the delivery of various resources over the Internet.

The definition by NIST (Mell and Grance, 2011) was selected for this study because it covers the deployment models, service models and essential characteristics. This study explores and describes the South African cloud computing phenomena from the perspective of individuals.

2.2.1 Cloud computing architecture

According to figure 2.1, the cloud computing architecture consists of three key elements: service models, essential characteristics and deployment models (Snaith et al., 2011).

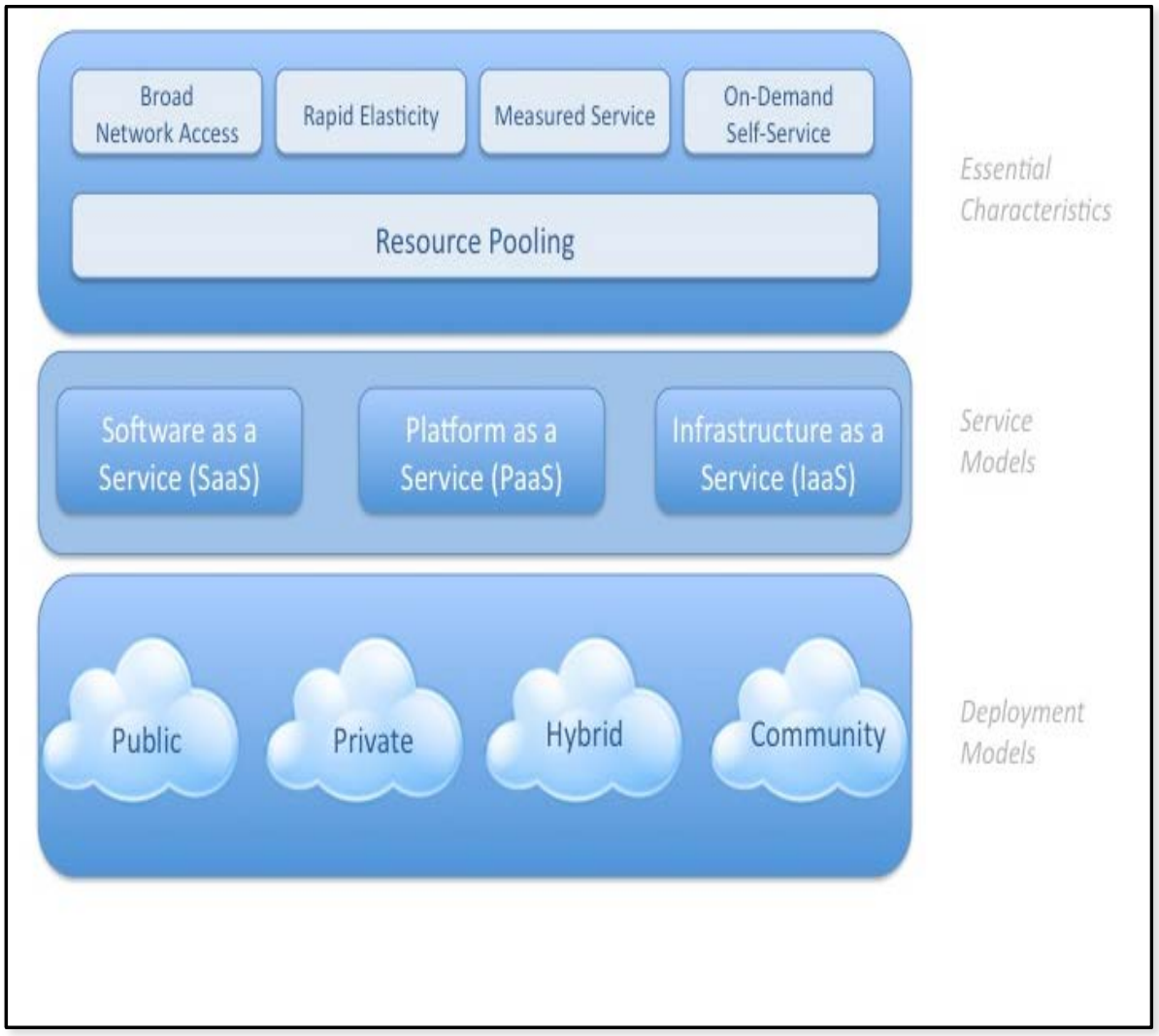

Figure 2.1: Cloud computing architecture (Mell and Grance, 2011)

2.2.2 Essential Characteristics

The characteristics of cloud computing, as shown in figure 2.1, are:

- **On-demand self-service:** The ability to acquire and use cloud services such as servers or virtual machine, network storage without help from the service provider. The user can ask for one or more services at any time without help from the service provider.
- **Rapid elasticity:** A capability to automatically adapt to customer's demand. The demand can scale up or downwards.
- **Broad network access:** The ability to access a web-based interface from the Internet using different devices such as mobile phone or laptops. The service can be accessed from a wide variety of places at any time.
- **Resource pooling:** A pool of service provider's IT resources shared among several customers using a multi-standard platform. This approach helps service providers to provide virtual resources dynamically.
- **Measured service:** Resource usage is measured or tracked for both the service provider and customer. Services are monitoring, optimization, and reporting for both vendors and consumers (Snaith et al., 2011).

The above characteristics apply to all clouds but each cloud provides users with services at a different level of abstraction.

2.2.3 Cloud service models

Figure 2.2, depicts the three cloud service models.

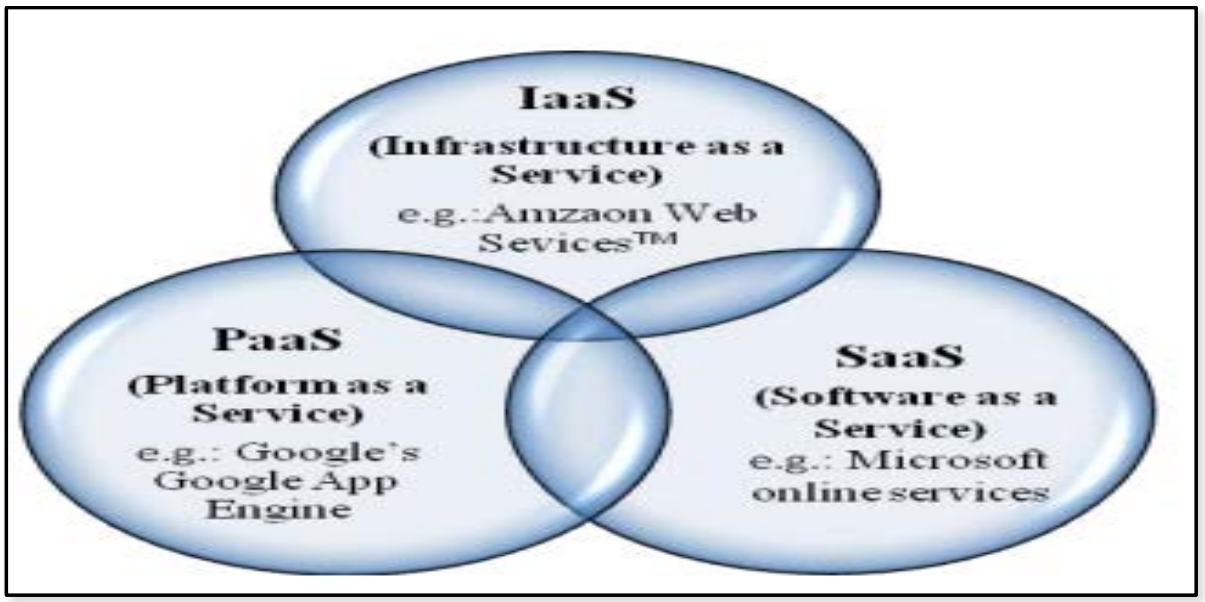

Figure 2.2: Cloud service models (Mell and Grance, 2011)

As shown in figure 2.2, service models are classified into:

- **Infrastructure as a Service**: a cloud service through the Internet provides computing resources, data storage, and networking as a service. This is a type of service in which organisations can create and manage virtual machines, storage services and backup services. The service provider manages the underlying cloud infrastructure at the IaaS level; end users have more control over the deployed application, storage, and operating systems. Microsoft Azure, IBM Cloud and Amazon Web Services are some examples of Infrastructure as a Service (Tripathi and Jigeesh, 2013).
- **Platform as a Service**: A cloud service that is the middle layer and provides the application infrastructure. The services available at the PaaS level are for software application development, management, testing and hosting. The service provider operates the platform at the PaaS level and the end user handles applications and configurations. Some examples of the Platform as a Service are Google Apps and Microsoft Azure (Tripathi and Jigeesh, 2013).
- **Software as a service**: The cloud of an application. Software products are provided as a service. They are delivered over the Internet on-demand. Emails, word processing and customer relationship software are the resources that are available at the SaaS level. The service provider manages the underlying cloud infrastructure. Microsoft Office365, Google Mail, Dropbox and Google Docs are some examples of Software as a Service (Mathew, 2012; Sharma & Banga, 2013).

The above-mentioned services models are the most referenced in the literature, however, there are other service models. The merging services include the following

- **Database as a service**: A cloud of databases. A service provider supports database access, such as SQL Server, Oracle DB and Mango DB. No hardware needs to be set up by the end-user, the facilities are accessible online.
- **Security as a service**: A cloud of security. A service provider offers controlled security with safe access. Connection to the security services is via the Internet.
- **Data storage as a service**: A cloud of storage. A service provider provides rented storage. They are available online for storage facilities (Malliga, 2012).

The three most common service models are infrastructure as a service, platform as a service and software as a service. Erdogmus (2009) describe software as a service as cloud computing's

core concept, which implies that it does not matter if the software being delivered is infrastructure, platform, or application.

2.2.4 Cloud deployment models

Organisations or individual users can choose from the following four different types of cloud deployment models:

- **Public cloud:** The public cloud is where the service provider owns and operates the cloud infrastructure. The services are open via the Internet to the public. The cloud service provider regulates the cloud infrastructure and owns it. Microsoft Azure, Oracle Cloud and IBM Cloud are some examples of public clouds (Zissis and Lekkas 2012).
- **Private cloud:** The private cloud is designed and managed inside an organization. The private cloud runs exclusively in a single organization (Dillon, Wu, and Chang 2010).
- **Community cloud**: a group of organizations with the same goals and missions runs the community cloud. Community cloud supports a mutual purpose, such as teaching and learning, or shared interest (Zissis and Lekkas 2012).
- **Hybrid cloud**: The hybrid cloud derived from the mixture of public cloud and private cloud. Standardised infrastructure ensures data transferability in a hybrid cloud (Mell & Grance, 2011; Mohlameane & Ruxwana, 2014; Marston et al., 2011)

The service models described in the NIST definition are deployed in clouds, but there are different types of clouds depending on who owns and uses them. The most common deployment model are classified into four deployment models.

2.2.5 Benefits of Cloud Computing

Cloud computing has the potential for improving the competitiveness of an organisation. To achieve a competitive edge, organisations need to consider the advantages of cloud computing and optimize its benefits. Previous studies (for example, Dhar, 2011; Wilson, 2011; Misra and Mondal, 2011) on cloud computing have identified the benefits of cloud computing as the following:

- **Cost saving**: The cost saving of cloud computing is seen as the main driver of cloud computing and many organizations are reducing their capital expenditure by adopting

and using cloud computing. No purchase of hardware or software thus no maintenance or upkeep is required. This will lead to costs savings (Dhar, 2011)

- **Minimal IT support**: The service provider including updates and maintenance handles all issues. This minimises the cost of IT support.
- **Business continuity**: Increased accessibility and reliability of the system for organisations, since disaster recovery and a high degree of redundancy can be offered by the service provider (Misra and Mondal, 2011).
- **Scalability**: As the organisation expands or if there is a shift in resource demand, upgrading or downgrading is highly scalable and versatile to satisfy business needs in turn (Wilson, 2011).
- **Improved Business Focus**: there is no longer a need for expensive IT acquisitions, maintenance and upgrades, resources will spend more time focusing on the organisation core functions.
- **Improved Mobility**: Cloud computing allows smartphone users from anywhere in the world to access corporate data or function. From any Internet-connected computer, data is accessible from anywhere and at any time.
- **Improved Technological Competence**: Cloud computing allows organisations to be competitive and to improve their market value.

2.2.6 Challenges of Cloud Computing

The challenges associated with cloud computing need to be acknowledged by organisations. The challenges with respect to cloud computing adoption and use are as follows:

- **Formalized standard**: no formalized guidelines for cloud service providers and failure to conform to cloud computing standards. This results in interoperability problems with data (Lin and Chen, 2012).
- **Over-reliance**: not all applications or programs may run on the cloud environment, over-reliance on cloud computing. This leads to technology that is complex (Marston et al., 2011).
- **Data privacy and protection**: challenges that are associated with data security, data privacy and protection of sensitive data (Kshetri, 2012).
- **Internet speed**: Lack of bandwidth and lack of Internet speed can affect workloads in the cloud-computing environment.

- **Organizational culture**: the organisation culture, can negatively affect the decision to adopt cloud computing (Low, Chen, and Wu, 2011).

The next section discusses the industry analysis for cloud computing

2.3 Industry analysis for cloud computing

2.3.1 Introduction

Cloud computing is not a one-size-fits-all solution anymore. The cloud solution has been around longer in other parts of the world influencing all industries and all sizes of organisations. Organisations and individuals can choose from the following services, Software as a service, platform as a service and infrastructure as a service (Tripathi and Jigeesh 2013).

The purpose of this section is to present an industry analysis for cloud computing. The section outlines as follows: industry profile characteristics (market size, market players and market penetration) are discussed in section 2.3.2. Section 2.3.3 will discussed Porter's Five Forces Model of Competitiveness analyses.

2.3.2 Industry profile

The industry profile includes characteristics of market size, market players and market penetration. The next subsection discusses the market size.

2.3.2.1 Market Size

The cloud computing industry's market size continues to expand at a rapid pace. According to a Gartner study (Costello 2020), the global public cloud services market will rise by 6.3 percent to $257.9 billion in 2020.

Table 2.1: Worldwide public cloud service revenue (Millions of US Dollars)

	2019	2020	2021	2022
Cloud Business Process Services (BPaaS)	45,212	43,438	46,287	49,509
Cloud Application Infrastructure Services (PaaS)	37,512	43,498	57,337	72,022
Cloud Application Services (SaaS)	102,064	104,672	120,990	140,629
Cloud Management and Security Services	12,836	14,663	16,089	18,387
Cloud System Infrastructure Services (IaaS)	44,457	50,393	64,294	80,980
Desktop as a Service (DaaS)	616	1,203	1,951	2,535
Total Market	**242,697**	**257,867**	**306,948**	**364,062**

According to table 2.1, the largest market segment is software as a service, which is expected to reach $104.7 billion in 2020. Infrastructure as a service (IaaS), the second-largest market segment, is expected to rise by 13.4% to $50.4 billion by 2020. The global economic downturn is increasing the pressure on organisations to abandon legacy infrastructure operating models. The potential future need for cloud computing, according to Gartner, illustrates the prevalence of cloud computing.

2.3.2.2 Market players

There are many cloud computing companies, and several of them have long established themselves as trusted brand names in the ICT industry.

According to the Gartner Magic Quadrant, the industry players are dominated by the likes of:

- Amazon Web Services (AWS),
- Microsoft Azure
- Google Cloud,
- IBM Cloud,
- Oracle Cloud, and

- Alibaba Cloud.

These organisations have different service offerings such as IaaS, PaaS, or SaaS.

2.3.2.3 Market penetration

According to Canalys reports (Canalys, 2020), the top four cloud infrastructure service providers in quarter 4 2020 are AWS (31 %), Microsoft Azure (20%), Google Cloud (7%), and Alibaba Cloud (6%)

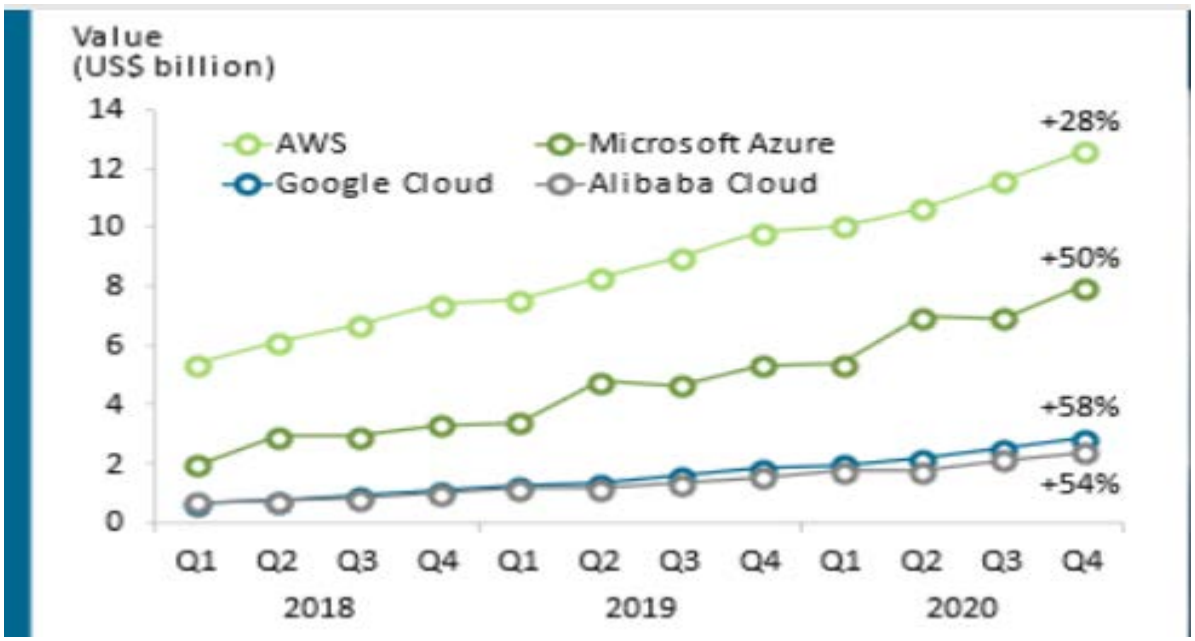

Figure 2.3: Year on year growth (Canalys, 2020)

- Amazon continue to lead the cloud computing accounting for 31 % of total spend
- Microsoft growth rate accelerated d by 50 percent accounts for 20% of the market share
- With 7% of the market, Google was the third largest cloud service provider.
- Alibaba cloud grow more rapidly to account for 6% market share

2.3.3 Porter's Five Forces Model of Competitiveness analyses.

Porter's Five Forces Model of Competitiveness(Porter 1980) is a management technique that is used to analyse the competitive forces within an industry in a systematic manner. Porter (1980) suggest that five underlying forces of completion determine an industry's attractiveness. Figure 2.4 depicts Porter's Five Forces Model

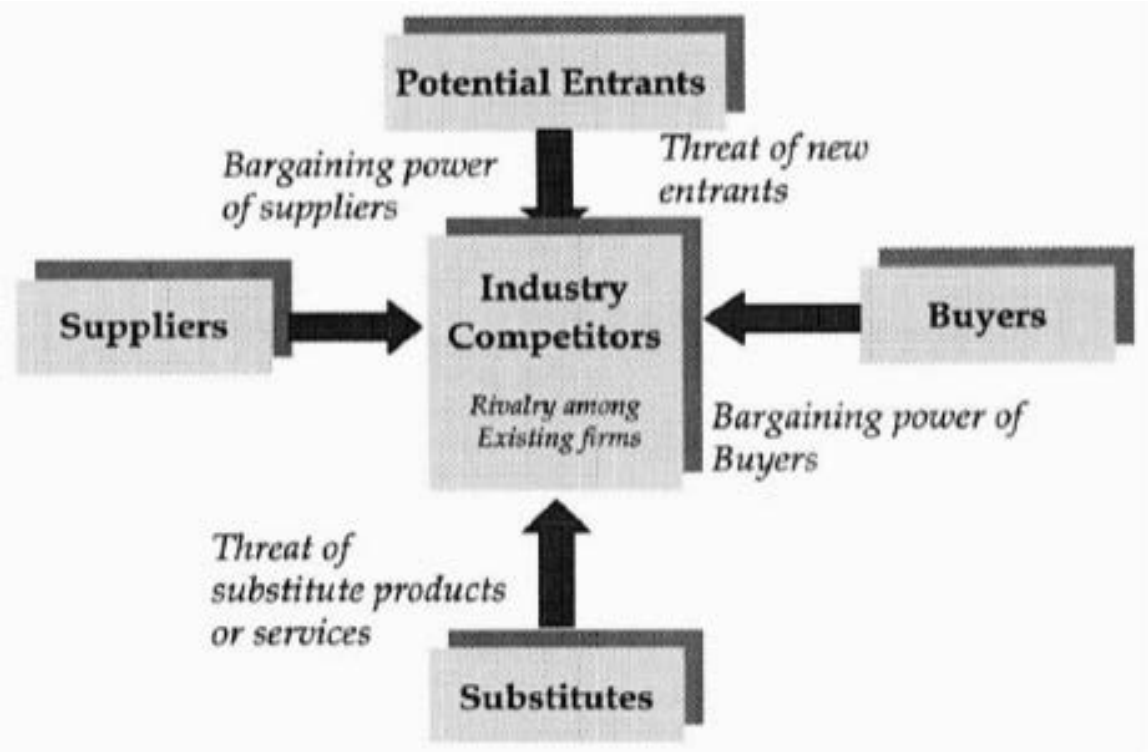

Figure 2.4: Porters Five Forces Model (Porters, 1980)

Michael Porter identifies five competitive forces that will affect an industry's profitability, which are:

- Rivalry amongst competitors in the industry;
- The threat of new entrants into the industry
- Bargaining power and leverage exercised of buyers
- Bargaining power and leverage of suppliers
- The bargaining power and advantage exercised by customers.
- The threat of substitute products or services

2.3.3.1 Rivalry amongst competitors in the industry

Competitors' rivalry is a type of pressure brought about by other cloud service providers aiming for the same customer base (Porter, 1980).

Since there are so many companies in the industry, the competition is less concentrated. A sector with such a low concentration suggests a fiercely competitive environment. The presence of almost all ICT industry powerhouses including IBM, Apple, and Google also indicates fierce competition among competitors. Because of the lack of product differentiation, the rivalry continues to remain strong.

According to Gartner Magic Quadrant 2020, Amazon Web Services (AWS), Microsoft, and Google are the industry leaders.

Figure 2.5: Magic quadrant for cloud infrastructure

From 2019 to2020, the three major vendors stayed in the Leaders Quadrant, Amazon, Microsoft, and Google are the most well known companies that provide cloud services. In the cloud computing industry, there is a lot of competition, and each company has its own unique product to attract customer.

2.3.3.2 Threat of new entrants

The threat of new entrants comes in the form of pressure from new product or service providers that can quickly enter the market and affect cloud service providers' competitiveness. (Porter, 1980).

The following factors influence the threat of new entry

- The entry of a cloud computing service provider
- The scale of investment and
- Legal obstacles

In the SaaS market, because of the low initial investment, short time to market, and low exit barrier needed in the SaaS market, new entrants pose a significant threat. The presence of industry giants like Google and Amazon creates a high barrier to entry in the PaaS market, which can be reduced by product differentiation and innovation. In the IaaS market, because of the high initial investment required and the high risk involved, the threat of new entrants in the IaaS market has been low.

2.3.3.3 Bargaining power of buyers

Cloud computing is an increasingly rising sector in the IT industry. Companies of any size may deploy a flexible cloud solution thanks to the vast number of cloud service providers. The bargaining power of buyers in the SaaS market continues to remain strong, because of the low switching cost and availability of many options. In the PaaS market, the Lack of interoperability standards and the use of proprietary development languages in the PaaS industry result in vendor lock-in, which contributes to high switching costs for buyers. Thus in the PaaS market, As a result of the high switching costs in the PaaS market, buyers' bargaining power tends to stay low. The bargaining power of buyers is high as a result of product differentiation is poor. Thus, the only way to remain competitive in this market is to build brand loyalty.

2.3.3.4 Bargaining power of suppliers

Supplier bargaining power refers to the ability of a cloud service provider's suppliers to provide raw resources such as subcontractors, services, hardware, and software (Porter, 1980).

Suppliers in the cloud computing market are cloud service providers. Supplier bargaining power can result in higher prices, lower product, or service quality.

In the SaaS market, since buyers' switching costs are low and there are many competitors in the SaaS industry, suppliers have little bargaining power. In the PaaS market, Vendor lock-in in the PaaS market gives suppliers a lot of bargaining power. In the IaaS market, the only way to remain competitive in this market is to build brand loyalty.

2.3.3.5 Threat of substitute

The threat of substitute products or services is pressure from other products or services that offer similar benefits to cloud service providers' services (Porter, 1980).

The threat of substitute for all cloud computing services has been low because the cloud computing technology itself is in the growth phase. Traditional IT and Open-Source Software are the biggest competitors in cloud computing. Because of the availability of consulting services from providers and the reduction of switching costs, small and medium businesses favour cloud computing.

2.3.4 Summary of Industry analysis.

As a result, the overall cloud market appears to be quite appealing to cloud service providers. There is enough demand in the industry, as well as supporting technologies, to achieve economies of scale. Furthermore, extensive research by academia and industry in this field, as well as enhanced cooperation between academic and corporate research and development, will lead to new technologies that will enable new entrants to differentiate their products and services in the future. Even though the scope economy is not yet possible in this industry, new technologies will make it possible in the future.

2.4 Cloud computing manifesting in general

This section answers the first research question on "*How does cloud computing manifest in South Africa according to South African IT professionals*". Cloud computing has been a strategic focal point for many organisations. Most of the studies identify the benefits that can be realised from adoption and using cloud computing. Cloud computing adoption and use also vary across various industries sectors and countries. The next sub-section discusses the manifestation in different sectors and in developing counties.

2.4.1 Cloud computing manifest in the education sector

This section reviews previous studies on cloud computing in the education sector. Table 2.2 is outlined as follows; the first column of the table mentioned the author(s) and year of publication, followed by the nature of the study and the study findings. The knowledge gaps identified are summarized in the last column.

Table 2.2: Cloud computing in education sector related studies

Author(s)/Year	Nature of the study	Findings	Knowledge Gap in the literature
Sarode and Bakal (2020)	The study conducted to review the different cloud-based mobile learning systems and their advantages.	The study found mobile learning has the following benefits: better connectivity, teamwork, portability, high versatility, increased learner motivation, higher learner engagement, and more personalized learning.	❖ The studies reviews discussed how cloud computing in the education sector manifests itself ❖ Studies Factors such as task technology fit, performance expectancy, effort expectancy, social influence, self-efficacy, collaboration technology are influencing the adoption and use of cloud computing. ❖ A study by Sarode and Bakal (2020) found that Universities are designing and researching the ability of mobile devices and the cloud to expand teaching and learning opportunities ❖ Almajalid (2017) found that educational institutions embracing cloud technology as a solution to the numerous technical challenges they face on a daily basis.
Yadegaridehkordi et al. (2020)	A study was conducted to look at the factors that influence higher education students' adoption of cloud computing.	The study found factors such as task technology fit, performance expectancy, effort expectancy, social influence, self-efficacy, collaboration technology are influencing the adoption and use of cloud computing.	
Almajalid (2017)	The study determined the advantages of cloud computing in educational institutions.	The study found that this has led to a number of educational institutions embracing cloud technology as a solution to the numerous technical challenges they face on a daily basis.	
Islam (2019))	A study was conducted to better understand how people think about the cloud and how they use it in their academic lives.	The study found that faculty members are generally aware of cloud computing, and they are using some of the cloud technologies for teaching and learning	

		purposes. In addition, the study found cloud computing advantages such as mobility, large storage facilities and simple way of communications of the cloud.	❖ Studies also identified factors that hinder cloud computing adoption such as restricted wireless access or internet facilities, lack of ICT infrastructure and lack of cloud training and awareness

In Table 2.2 above, previous studies related to cloud computing in the education sector were analysed and the knowledge gaps pursued by this study were established.

Yadegaridehkordi et al. (2020), conducted a study to look at the factors that influence higher education students' adoption of cloud computing. The primary data was collected from 418 students in Malaysian universities using a survey questionnaire. The findings show that factors such as task technology fit, performance expectancy, effort expectancy, social influence, self-efficacy, collaboration technology are influencing the adoption and use of cloud computing.

Almajalid (2017) conducted a study to determine the advantages of cloud computing in educational institutions. Educational institutions are taking cloud-based software to ensure that their students can perform academic tasks. The study found that this has led to a number of educational institutions embracing cloud technology as a solution to the numerous technical challenges they face on a daily basis.

Sarode and Bakal (2020), conducted a study to review the different cloud-based mobile learning systems and their advantages. Universities are designing and researching the ability of mobile devices and cloud to expand teaching and learning opportunities, according to the study, and making efforts to make it accessible to students. The study found mobile learning has the following benefits: better connectivity, teamwork, portability, high versatility, increased learner motivation, higher learner engagement, and more personalized learning. The limitations and challenges of mobile learning are limited battery life, memory space, computing power, and bandwidth, continuous internet readiness, multiple screen sizes and operating systems and file format mobile device compatibility for mobile learning.

Islam (2019)conducted a study to better understand how people think about the cloud and how they use it in their academic lives. The primary data was collected using a survey method from the 125 respondents who took part in the survey. The findings from the study showed that faculty members are generally aware of cloud computing, and they are using some of the cloud technologies for teaching and learning purposes. In addition, the study found cloud computing advantages such as mobility, large storage facilities and simple way of communications of the cloud. Cloud-based apps such as Gmail, Google Drive and Dropbox largely used applications for teaching and learning purposes. They described restricted wireless access or internet facilities, lack of ICT infrastructure and lack of cloud training and awareness as major constraints.

2.4.2 Cloud computing manifest in public sector

This section reviews previous studies on cloud computing in the public sector. Table 2.3 is outlined as follows; the first column of the table mentioned the author(s) and year of publication, followed by the nature of the study and the study findings. The knowledge gaps identified are summarized in the last column.

Table 2.3: Cloud computing manifest in public sector related studies

Author(s)/Year	Nature of the study	Findings	Knowledge Gap in the literature
Sallehudin et al. (2020)	The study was undertaken in the public sector to better understand and identify factors that influence cloud computing adoption.	The study found factors such as relative advantage, compatibility, perceived risks, top management support, and organizational readiness all play a significant role in public sector cloud computing adoption.	❖ The three studies looked at cloud computing manifestation in the public sector. ❖ Studies identified factors such The study found that relative advantage, compatibility, perceived risks, top management support, and organizational readiness all play a significant role in public sector cloud computing adoption ❖ Furthermore, other advantages included increased usability, reliability, and productivity, as well as improved financial performance.
Talmizie, Ibrahim and Chuprat (2018)	The study reviewed the factors of cloud computing in three sectors namely the education sector, health sector and the public sector.	The study found factors for cloud computing are organisation support, human readiness, environment, technology readiness, privacy and security.	
Alsharari (2020)	The study was undertaken to review the move from a conventional enterprise resource planning (ERP) system to a cloud-based ERP system in the UAE public sector.	The study found The study found that transitioning to a cloud-based ERP system strengthens an organization's control system, decreases costs, and increases profitability.	

The previous studies related to cloud computing in the public sector were analysed in Table 2.3 above and the knowledge gaps pursued by this study were established.

Sallehudin et al. (2020) conducted a study in the public sector to better understand and identify factors that influence cloud computing adoption. The study proposed a model based on the IS Success Model, the Diffusion of Innovation Theory, and the Technology-Organization-Environmental Framework. Technological characteristics, organizational characteristics, environmental characteristics, and human characteristics are the variables that have been identified. The study found that relative advantage, compatibility, perceived risks, top management support, and organizational readiness all play a significant role in public sector cloud computing adoption. However, in the Malaysian public sector, factors such as government regulations and external support have no impact on cloud computing adoption.

Talmizie, Ibrahim and Chuprat (2018) conducted a study to review the factors of cloud computing in three sectors namely the education sector, health sector and the public sector. The study used the combination of the TOE structure, the SEM model and the HOT-fit model as the lenses for study. The study found that factors such as organizational support, human readiness, environment, technology readiness, privacy and security as important for cloud computing. The study concluded that cloud computing would offer more benefits to organisations than drawbacks, especially in the area of data security and data privacy.

Alsharari (2020) conducted a study to move from a conventional enterprise resource planning (ERP) system to a cloud-based ERP system In the UAE public sector. The study's primary data was gathered through interviews with employees of the case organization. The study found that transitioning to a cloud-based ERP system strengthens an organization's control system, decreases costs, and increases profitability. Furthermore, other advantages included increased usability, reliability, and productivity, as well as improved financial performance.

2.4.3 Cloud computing manifest in the health sector

This section reviews previous studies related to cloud computing in the health sector. Table 2.4 is outlined as follows; the first column of the table mentioned the author(s) and year of publication, followed by the nature of the study and the study findings. The knowledge gaps identified are summarized in the last column.

Table 2.4: Cloud computing manifest in healthcare sector related studies

Author(s)/Year	Nature of the study	Findings	Knowledge Gap in the literature
Mekawie and Yehia (2021)	Conducted a study to identify the challenges of deploying cloud computing in eHealth	The study found factors such as security, management support, legal, risk management, and financial factors are critical for the successful adoption of cloud in eHealth	❖ The three studies looked at how cloud computing manifest in the health sector. ❖ The studies identified factors such as hardware, software, training, data security, complexity, compatibility as the most important factors towards cloud computing adoption ❖ Sharma and Sehrawat (2020), the identified factors such as government policy, management strategic planning, security, as important in the cloud computing adoption
Kadhum and Hasan (2017)	The study identified essential factors when using cloud-based health information systems.	The study results found that the factors related to the environment such as hardware, software, network, and training. The technology factors included complexity, data security, compatibility, and privacy.	
Sharma and Sehrawat (2020)	Conducted a study to propose a hybrid multi-criteria decision-making process for cloud adoption.	The study found that management strategic planning, government policy, security funding of IT in hospitals, perceived visibility, and colleagues' attitudes toward cloud computing are the most significant factors in cloud computing adoption.	

The previous studies related to cloud computing in the health sector were reviewed in Table 2.4 above and the knowledge gaps pursued by this study were established. The literature review on health sector cloud computing shows the following:

Mekawie and Yehia (2021) conducted a study to identify the challenges of deploying cloud computing in eHealth. The study used a qualitative approach. The data was collected from cloud experts, physicians and hospital managers using in-depth interviews in Egypt. The study found that cloud for eHealth is highly advantageous and should be introduced. For successful adoption of cloud in eHealth, factors such as security, management support, legal, risk management, and financial factors are critical.

Kadhum and Hasan (2017) conducted a study to identified essential factors when using cloud-based health information systems. The primary data was collected from thirty (30) specialists from four hospitals. The study found that environmental contexts such as training, network, software and hardware. The technology factors included complexity, data security, compatibility, and privacy.

Sharma and Sehrawat (2020) conducted a study to propose a hybrid multi-criteria decision-making process for cloud adoption. The framework will be used to identify the most important factors driving cloud computing (CC) adoption in the healthcare sector. The study found that management strategic planning, government policy, security funding of IT in hospitals, perceived visibility, and colleagues' attitudes toward cloud computing are the most significant factors in cloud computing adoption.

2.4.4 Cloud computing manifest in developing countries

This section reviews previous studies on cloud computing in developing countries. Table 2.5 is outlined as follows; the first column of the table mentioned the author(s) and year of publication, followed by the nature of the study and the study findings. The knowledge gaps identified are summarized in the last column.

Table 2.5: Cloud computing manifest in developing countries related studies

Author(s)/Year	Country	Nature of the study	Findings	Knowledge Gap in the literature
Wang et al. (2019)	China	Conducted a study to examine the positions of the government in cloud computing adoption from two perspectives: government regulation and government support.	The study found that top management support aims to mediate the effects of both government regulation and government support on cloud computing adoption. Top management support is influenced more by government support than by government regulation	❖ The practical adoption and use of cloud computing are not yet discussed in the context of a developing country such as South Africa. ❖ Factors such as performance expectancy; effort expectancy; absorptive capacity; data security and privacy; and perceived trust were found to be predictors of cloud computing adoption ❖ Factors such as IT infrastructure, internet availability, and social trust in the adoption continue to
Al Mudawi et al. (2020)	Saudi Arabia	Conducted a study to investigate the challenges of the e-government cloud service model in developing countries.	The study found that governments are influenced by the way top management deals with cloud computing adoption. Furthermore, technological readiness levels within organizations, such as IT infrastructure, internet availability, and social trust in the adoption of emerging technology such as cloud computing, continue to be obstacles to e-government cloud service adoption	
Priyadarshinee et al., (2017)	India	The study determines the cloud computing factors of Indian private organizations.	The study found that the perceived risk of IT security, trust, technological innovation	

			and management style has a major impact on cloud computing.	be obstacles to cloud computing adoption
Khayer et al. (2020)	Bangladesh	Conducted a study to look into the factors that affect cloud computing adoption in small and medium businesses in Bangladesh.	The study found factors such as performance expectancy; effort expectancy; absorptive capacity; data security and privacy; and perceived trust were found to be predictors of cloud computing adoption in the analysis	

Table 2.5 above reviewed studies related to cloud computing in developing countries and identify knowledge gaps, which this study pursued. The literature review on cloud computing in developing countries reveals the following:

Khayer et al. (2020) conducted a study to look into the factors that affect cloud computing adoption in small and medium businesses in Bangladesh. The UTAUT and TOE frameworks were combined to create a model. The primary data was collected from three hundred and seventy-two(372) SMEs.The study found factors such as performance expectancy; effort expectancy; absorptive capacity; data security and privacy; and perceived trust were found to be predictors of cloud computing adoption in the analysis.

Wang et al. (2019) conducted a study to examine the positions of the government in cloud computing adoption from two perspectives: government regulation and government support. Primary data was collected from 376 Chinese businesses that have already adopted cloud computing services. The study found that top management support aims to mediate the effects of both government regulation and government support on cloud computing adoption. Top management support is influenced more by government support than by government regulation. Top management support is discovered to be an effective creation of cloud computing adoption and to indirectly mediate the impact of government regulation and support on cloud adoption.

Al Mudawi et al. (2020) conducted a study to investigate the challenges of the e-government cloud service model in developing countries. The challenges identified included IT infrastructure, a shortage of funds, and inadequate data security were among the issues found. The adoption of cloud computing is supported and influenced by organizational readiness levels in terms of IT infrastructures and senior management. The study found that governments are influenced by the way top management deals with cloud computing adoption. Furthermore, technological readiness levels within organizations, such as IT infrastructure, internet availability, and social trust in the adoption of emerging technology such as cloud computing, continue to be obstacles to e-government cloud service adoption.

Priyadarshinee et al., (2017) conducted a study to determine the cloud computing factors in Indian private organizations. The study proposed a theoretical acceptance model with external factors of risk analysis and perceived IT security risk using the extended technology-organization-environment (TOE). Using both the artificial neural network (ANN) and structural equation modelling (SEM) methodologies, the primary data was gathered from six hundred and sixty participants. The study found that confidence, creativity in technology, security and style of management have a major effect on cloud computing.

2.4.5 Critical review on cloud computing manifest in general

These studies include Sarode and Bakal (2020); Yadegaridehkordi et al. (2020); Almajalid (2017); Sallehudin et al. (2020); Talmizie, Ibrahim and Chuprat (2018); Alsharari (2020); Mekawie and Yehia (2021); Sharma and Sehrawat (2020); Wang et al. (2019); Al Mudawi et al. (2020); Khayer et al. (2020) and Priyadarshinee et al., (2017). These studies bridged some knowledge gaps as follows:

- Studies identified and examined the cloud computing benefits and cloud computing challenges in general, while other studies suggested a model or framework for studying the advantages and challenges of cloud computing.
- In their study Sarode and Bakal (2020), centred on the benefits of mobile learning such as better connectivity, teamwork, portability, high versatility, increased learner motivation, higher learner engagement, and more personalized learning
- The methodological findings indicate that few qualitative studies have contributed to the general manifestation of cloud computing.
- A study by Sallehudin et al. (2020) found factors such as relative advantage, compatibility, perceived risks, top management support, and organizational readiness all play a significant role in public sector cloud computing adoption.
- The research gap has been established as the models of technology adoption that are applicable to the context of developing countries. The practical adoption and use of cloud computing are not yet discussed in the context of a developing country such as South Africa.
- Practically, the lack of application offerings that guarantees the quality of service via a service-level agreement.

- The studies reviewed the factors that might influence the organisations ’adoption and use of cloud computing. This has left several knowledge gaps that have been tried to fill in by the current study.

The present study aimed at filling the knowledge gaps by exploring and describe how cloud computing could be strategically adopted and used. This is done through the views and perspectives of South African information technology professionals.

2.5 Drivers of cloud computing for different stakeholders

This section reviews literature with respect to research question two “*What are the drivers of cloud computing for different stakeholders*”. A literature review was performed to identify cloud computing drivers for various stakeholders was conducted.

This section reviews previous studies on drivers of cloud computing for different stakeholders. Table 2.6 is outlined as follows; the first column of the table mentioned the author(s) and year of publication, followed by the nature of the study and the study findings. The knowledge gaps identified are summarized in the last column.

Table 2.6: Cloud computing drivers for different stakeholder's related studies

Author(s)/Year	Nature of the study	Findings	Knowledge Gap in the literature
Agrawal (2021)	The study was conducted to investigate how cloud computing technology can be used in educational settings.	The study found that cloud computing is also an excellent tool for educators to develop their teaching practices and efficiency. Computing technology reduces IT costs as well as energy usage. The key challenge of cloud computing, according to the report, is the risk of data privacy, security, and integrity.	❖ The four studies looked at how cloud computing delivers value to different stakeholders. ❖ The knowledge gap found was that cloud computing adoption and use should involve the viewpoints of various stakeholders. ❖ The due diligence needs to be conducted to gather detailed business requirements when planning to move workloads into the cloud environment. ❖ The knowledge gap identified from the perspective of stakeholders in the security issues in the cloud environment, such as data privacy, the integrity of data and security.
Verma and Adhikari (2020)	The study was conducted to better understand the security issues that are faced by different stakeholders.	Safe access to the services, data protection, data confidentiality, data control, and service availability were all listed as issues in the study. Interoperability and trust between cloud users and cloud service providers are also essential.	
Ali (2019)	conducted a study to understand the impact of cloud computing factors that can support multiple stakeholders.	The study found that the key determinants of non-adoption, are security, privacy, and trust. Improving relationships between students and teachers through collaboration platforms is one of the determinants of cloud adoption	

Lynn et al. (2020)	Lynn et al. (2020) conducted a study to examine the factors that influence initial decisions to use cloud computing for high-performance computing.	The study found factors of organizational and human factors significantly influence cloud computing adoption decisions for high-performance computing. Furthermore, various stakeholders are concerned about data privacy and security issues.	

Table 2.6 above reviewed previous studies on cloud computing that could benefit different stakeholders and identify knowledge gaps, which this study pursued. The literature review on cloud computing benefit different stakeholders reveals the following:

Agrawal (2021) conducted a study to see how cloud computing technology can be used in educational settings. The simultaneous use of infrastructure by multiple stakeholders for teaching, learning, and testing has become critical because of the COVID-19 pandemic. The study found that cloud computing is also an excellent tool for educators to develop their teaching practices and efficiency. Computing technology reduces IT costs as well as energy usage. The key challenge of cloud computing, according to the report, is the risk of data privacy, security, and integrity.

Verma and Adhikari (2020) conducted a study to better understand the security issues that are faced by different stakeholders. In the cloud computing world, the study listed five major stakeholders: cloud service provider, cloud customer, cloud broker, cloud auditor, and cloud carrier. Safe access to the services, data protection, data confidentiality, data control, and service availability were all listed as issues in the study. Interoperability and trust between cloud users and cloud service providers are also essential. The study suggested multi-factor authentication, multi-level authentication, and the implementation of different back solutions as techniques for the security of data.

Lynn et al. (2020) conducted a study to examine the factors that influence initial decisions to use cloud computing for high-performance computing. A model for high-performance computing was proposed in the study. Data was collected from 619 decision-makers around the world using a survey technique. The study found factors of organizational and human factors significantly influence cloud computing adoption decisions for high-performance computing. Furthermore, various stakeholders are concerned about data privacy and security issues.

Ali (2019) conducted a study to understand the impact of cloud computing factors that can support multiple stakeholders. The Multiview 3 (MV3) approach was used to investigate the key elements and risks that influence higher education institutions' adoption or non-adoption of cloud computing. The study found that the key determinants of non-adoption, are security, privacy, and trust. Improving relationships between students and teachers through

collaboration platforms is one of the determinants of cloud adoption. In addition, the study proposed cloud apps for mobile devices that allow safe off-campus access to virtual learning materials and email,

2.5.1 Critical review of the drivers of cloud computing for different stakeholders

The literature review suggests that various stakeholders may benefit from cloud computing. Several researchers (Agrawal (2021); Verma and Adhikari (2020); Lynn et al. (2020); Ali (2019)) believe that cloud computing will add value to the various stakeholders.

- A study by Agrawal (2021) found that cloud computing is also an excellent tool for educators to develop their teaching practices and efficiency. Computing technology reduces IT costs as well as energy usage.
- Verma and Adhikari (2020) in their study suggested multi-factor authentication, multi-level authentication, and the implementation of different back solutions as techniques for the security of data.
- Ali (2019) study proposed cloud apps for mobile devices that allow safe off-campus access to virtual learning materials and email via smartphones from anywhere.

The present study aimed at analysing the value of cloud computing to different stakeholders and then to fill the knowledge gaps by exploring and explaining how cloud computing could be strategically adopted and used. This is achieved through the opinions and insights of South African information technology professionals. This section has shown that cloud computing can add value to different stakeholders.

2.6 Contingencies of cloud computing

This section reviews literature with respect to cloud computing contingencies following the research question – "*What are the practical and theoretical contingencies for strategic cloud computing in the South African context?"*

Table 2.7 below provides a summary of previous studies on cloud computing contingencies for cloud computing for adoption and use. As can be seen in Table 2.7, the author(s) and year of publication are listed in the first column; the nature of the study is captured in the second column, and, finally, the findings of the study. In the last column, the knowledge gaps informing the studies are summarized.

Table 2.7: Related studies on adoption and use of cloud computing contingencies

Author(s)/Year	Nature of the study	Findings	Knowledge Gap in the literature
Van Dyk and Van Belle (2019)	Conducted a study to understand and examine the current perceptions and status of digital transformation within a SA retail organisation.	The study found the factors using the TOE framework. The Technology (such relative advantage, data security), Organisational (such as resistance to change, need for change management and corporate culture), and Environmental (such as customer-orientation) can assist retailers in their decision-making process concerning digital transformation adoption	❖ All these studies looked at how cloud computing delivers value to different stakeholders. ❖ The knowledge gap identified the implementation challenges such as costs and trust while adopting cloud service. ❖ The level of adoption and use of cloud computing in developing countries has been described as a knowledge gap.
Bello et al. (2021)	The study investigated the use of cloud computing in the building industry. The study needed to make construction professionals aware of the possible benefits of cloud computing technology.	The study discovered that cloud computing is becoming more commonly used in the construction industry, with possibilities in waste minimisation systems, supply chain management systems, energy management systems, and construction informatics.	
Rajabion and Ehsani (2019)	Conducted a study to come up with a new model to assess how to improve the e-learning process by using cloud services	The study found that the development of e-learning is significantly influenced by the quality of services, cloud features, university readiness and users' readiness.	

Table 2.7 above summarises previous studies on a cloud computing contingency and identify knowledge gaps, which these studies pursued. The literature review on cloud computing contingencies shows the following:

Bello et al. (2021) investigated the use of cloud computing in the building industry. The authors needed to make construction professionals aware of the possible benefits of cloud computing technology. An academic database such as SCOPUS, Science Direct, or Google Scholar was used to perform a systematic literature review on ninety-two (92) peer-reviewed publications, published between 2009 and 2019. The study discovered that cloud computing is becoming more commonly used in the construction industry, with possibilities in waste minimisation systems, supply chain management systems, energy management systems, and construction informatics. Some of the advantages of cloud computing, according to the study, included computing resources for data analysis, as well as safe cost-effective, and convenient access to construction data by all stakeholders. Some of the issues raised in the study included trust, data privacy, and security.

Van Dyk and Van Belle (2019) conducted to understand and examine the current perceptions and status of digital transformation within a SA retail organisation. A case study approach was deemed to be an appropriate strategy. The study found the factors using the TOE framework. The Technology (such relative advantage, data security), Organisational (such as resistance to change, need for change management and corporate culture), and Environmental (such as customer orientation) can assist retailers in their decision-making process concerning digital transformation adoption.

Waema et al., (2016) assessed low cloud computing in higher institutions. The case study research strategy was used and in the universities, the study participants were chosen deliberately. The study found that higher education institutions are becoming increasingly interested in cloud computing as an alternative technology to reduce costs. An adoption strategy based on money, confidentiality, honesty and availability was proposed in this report. The research gap found in higher education is the adoption challenges, costs and confidence when adopting and using cloud services.

Rajabion and Ehsani (2019) conducted a study to come up with a new model to assess how to improve the e-learning process by using cloud services. The study used mixed methods for

review of related work and statistical analysis. The study found that the development of e-learning is significantly influenced by the quality of services, cloud features, university readiness and users' readiness

2.6.1 Critical review of the contingencies of cloud computing

Researchers such as Blanton, Watson, & Moody (1992) used the contingencies elements of environment, strategies and structure to describe how an organization will need its structure to establish strategies to boost the organisation's economic stance in the sector.

The components of the environment, strategies, and structure were reviewed in several studies. A specific collection of resources for understanding cloud computing contingencies is presented by the reviewed studies. Researchers have highlighted the importance of having a cloud strategy in organizations (for instance, Waema et al, 2016; Van Dyk and Van Belle (2019)).

The strategy focuses on information, procedures, functions, and implementation. The strategy is created to improve agility and cost savings. Van Dyk and Van Belle (2019) focused on digital transformation. The study found that digital transformation can assist retailers in their decision-making process concerning digital transformation adoption. Rajabion and Ehsani (2019) conducted a study to come up with a new model to assess how to improve the e-learning process by using cloud services. Waema et al (2016) in their study recommends the adoption strategy for cloud computing concerning the resources, confidentiality, integrity, and availability. It should be noted that a cloud strategy must be matched with the organisation strategy, based on the reviewed literature.

In decision-making, the environment and organisation structure is critical. Bello et al. (2021) investigated the use of cloud computing in the building industry. The study found the factors using the technology (such as relative advantage, data security), organisational (such as resistance to change, need for change management and corporate culture), and environmental (such as customer orientation) can assist retailers in their decision-making process concerning digital transformation adoption. The literature review points out that the acceptance of cloud computing may be influenced by environmental factors.

Cloud computing is seen as a modern environment for organisations. The study discovered that cloud computing is becoming more commonly used in the construction industry. It was envisaged that the decision-making process would help address stability, efficient operations and privacy.

2.6.2 Identified research gaps on the contingencies of cloud computing

Based on the reviewed literature on the contingencies of cloud computing, the following knowledge gaps were established, which the present study sought to address:

- Cloud computing has problems in terms of deployment. Waema et al. (2016) identified deployment issues such as costs and confidence when implementing cloud services.
- Bello et al. (2021) in their study identified the cloud computing adoption levels in developed countries are significantly lower.
- The lack of strategy for cloud computing is another knowledge gap. This is envisaged to address the challenges of moving workloads into the cloud environment. Van Dyk and Van Belle (2019) claims that the multiple user domains, implementation models, and service models must be included in the cloud computing strategy.

The research goal was to conceptualise a strategic cloud computing framework in the context of South African Information Technology Professionals. The knowledge gap will be filled by including the elements of contingencies such as organisation strategy, organisational structure and environment aspects to the strategic cloud computing framework.

2.7 Factors influencing the adoption and use of cloud computing

This section reviews literature with respect to factors that influence cloud computing following the research question – "*What are the factors influencing adoption and use of cloud computing?"*

The reviewed studies identified and examined factors that influence cloud computing using various theories. The next sub-section discusses the factors that influence cloud computing using the TOE framework.

2.7.1 Identification of factors influencing cloud computing using TOE framework

In order to identify cloud computing factors, the Technology Organization Environment (TOE) concept is mostly used. The TOE concept was created in 1990 by Tornartzky to investigate how technological innovations are implemented by an organization.

A summary of previous studies on the factors affecting cloud computing using the TOE framework is given in Table 2.8 below. As can be seen in Table 2.8, the author(s) and year of publication are mentioned in the first column, the nature of the study was captured in the second column, and finally the research findings. For the studies, the knowledge gaps found are summarized in the last column.

Table 2.8: Related studies on factors for adoption of cloud computing using the TOE framework

Author(s)/Year	Nature of the study	Findings	Knowledge Gap in the literature
Adiyasa et al. (2019)	The study to uncover the factors that affect consumer decision-making when it comes to cloud computing adoption using the TOE framework	The study found that relative advantage, complexity, top management support, alignment of adoption plans with business plans, and stress are all factors that influence cloud adoption.	❖ All these studies looked at the cloud computing factors using the TOE framework. ❖ Cloud computing benefits are increased mobility; enhance availability, increase scalability and reduction of investment in physical servers. ❖ Cloud computing hinders are data security, contract lock-in and staff resistance to change ❖ Factors influencing cloud computing are costs, security concern, external pressure such as competitive pressure, management style and
Priyadarshinee *et al.*, (2017)	The study identified the factors of cloud computing in Indian private organisations using the TOE framework	The study found that technological factors(security concern and relative advantage), environmental factors (trade partners and competition pressure), organisational factors(technology readiness and top management support) are the most important in the adoption and use of cloud computing.	
Ahmed (2020)	The study used the Technology Organisation Environmental Framework(TOE) to investigate the factors that influence the use of cloud services	The study found a link between the TOE framework and the decision of an organisation to adopt cloud computing and all three factors that are positively linked to the decision to adopt cloud computing.	

Senyo, Effah and Addae (2016)	The study investigated cloud computing factors in a developing country.	The study found that factors such as trading partners' pressure, relative advantage, competitive pressure, technology readiness and security concern to be significant in cloud computing adoption.	support and technology readiness
Van Dyk and Van Belle (2019)	Conducted a study to understand and examine the current perceptions and status of digital transformation within a SA retail organisation.	The factors identified in this study, using the Technology (such as relative advantage, data security), Organisational (such as resistance to change, need for change management and corporate culture), and Environmental (such as customer-orientation) can assist retailers in their decision-making process concerning digital transformation adoption.	

A summary of previous research on the factors affecting cloud computing using the TOE framework has been presented in Table 2.8 above. The literature review on cloud computing factors reveals the following:

Adiyasa et al. (2019) conducted a study to uncover the factors that affect consumer decision-making when it comes to cloud computing adoption using the TOE framework. The study employed the survey method. A questionnaire was used to gather primary data from 179 respondents. The study found that relative advantage, complexity, top management support, alignment of adoption plans with business plans, and stress are all factors that influence cloud adoption.

Priyadarshinee et al., (2017) identified factors of cloud computing in Indian private organizations using the TOE framework. To gather primary data from six hundred and sixty-six (660) participants, a survey was conducted. The study found that factors such as management style, technological advancement and security were important factors in Indian private organizations' adoption of cloud computing.

Senyo, Effah and Addae (2016) conducted a study in Ghana to analyse factors influencing cloud computing using the TOE framework as the research lens. A survey was carried out to gather primary data from three hundred and five (305) participants from organisations in Ghana. The study found that technological factors (security concern and relative advantage), organizational factors (technology readiness and top management support), environmental factors (trade partners and pressure on competition) are the most important factors in the adoption and use of cloud computing.

Ahmed (2020), used the Technology Organisation Environmental Framework(TOE) to investigate the factors that influence the use of cloud services. The researchers performed a systematic review analysis to identify important aspects of information technology adoption in cloud computing organizations. The usage of TOE in cloud computing by 20 Bangladeshi SMEs is discussed in three contexts (Technical, Organizational and Environmental). The study found a link between the TOE framework and the decision of an organisation to adopt cloud computing and all three factors that are positively linked to the decision to adopt cloud computing. In addition, the analysis was important in understanding the factors that led to the adoption of cloud computing in the TOE framework by several organizations in recent years.

Van Dyk and Van Belle (2019) conducted to understand and examine the current perceptions and status of digital transformation within a SA retail organisation. A case study approach was deemed to be an appropriate strategy. The study found the factors using the TOE framework. The technology (such relative advantage, data security), organisational (such as resistance to change, need for change management and corporate culture), and environmental (such as customer orientation) can assist retailers in their decision-making process concerning digital transformation adoption.

2.7.2 Identification of factors influencing cloud computing using combined theories

Table 2.9 below provides a summary of the systemic literature review of previous studies on the factors for use of cloud computing using combined theories. As can be seen in Table 2.9, the author(s) and year of publication are mentioned in the first column, the nature of the study was captured in the second column, and finally the research findings. In the last column, the knowledge gaps found are summarized.

Table 2.9: Related studies on factors for adoption of cloud computing using combined theories

Author(s)/Year	Nature of the study	Findings	Knowledge Gap in the literature
Kayali and Alaaraj (2020)	Conducted a study to examine factors that influence student adoption of cloud-based e-learning (CBEL).	The study found that user satisfaction is the most important predictors of behavioural intention (BI) followed by relative advantage(RA), social influence (SI), and perceived ease of use (PEOU). behavioural intention affected use behaviour significantly.	❖ All these studies looked at how cloud computing manifest using a combination of DOI and TOE. ❖ Sayginer and Ercan (2020) in their study identified a conceptual model that could be used to investigate cloud computing adoption using a combination of DOI and TOE. ❖ Cloud computing benefits are increased mobility; enhance availability, increase scalability and reduction of investment in physical servers. ❖ When deciding on the adoption and use of cloud services within an organization, it is often important to take into account the stakeholders, as well as practical and theoretical contingencies.
Sayginer and Ercan (2020)	The study investigates the internal and external factors for cloud computing adoption decisions of companies using a combination of DOI and TOE models.	The study found factors such as relative advantage, compatibility, complexity, and top management support and cost savings as giving the relative advantage for cloud computing adoption	
Twala and Kekwaletswe (2020)	The study developed a strategic cloud computing framework in the South African context	The study found that cloud computing adoption and use in South African organizations are enabled by factors such as relative advantage, top management support, organization size, compatibility, and complexity	

Table 2.9 above reviewed previous studies on factors for adoption and use of cloud computing using combined theories and identify knowledge gaps, which these studies pursued. The literature review on factors of cloud computing using combined theories reveals the following.

Kayali and Alaaraj (2020), conducted a study to examine factors that influence student adoption of cloud-based e-learning (CBEL). According to the study, relative advantage (RA), perceived ease of use (PEOU), social influence (SI), and user satisfaction are all factors that influence behavioural intention (BI). The primary data was collected from 422 students from four universities in Lebanon. The study found that user satisfaction is the most important predictors of behavioural intention (BI) followed by relative advantage(RA), social influence (SI), and perceived ease of use (PEOU). behavioural intention affected use behaviour significantly.

Sayginer and Ercan (2020) conducted a study to investigate the internal and external factors for cloud computing adoption decisions of companies using a combination of DOI and TOE models. The study employed a survey method to collect primary data from 176 IT decision-makers of non-cloud or cloud user businesses in the city of Izmir in Turkey. The study found factors such as relative advantage, compatibility, complexity, and top management support and cost savings as giving the relative advantage for cloud computing adoption.

Twala and Kekwaletswe (2020) conducted a study to develop a strategic cloud computing framework in the South African context. To create a framework, the researcher combined the TOE framework, stakeholder theory, and contingency theory. The study found that cloud computing adoption and use in South African organizations are enabled by factors such as relative advantage, top management support, organization size, compatibility, and complexity. When deciding on the adoption and use of cloud services within an organization, it is often important to take into account the stakeholders, as well as practical and theoretical contingencies.

2.7.3 Critical review of the factors influencing cloud computing

This section presents a critical review of the factors for the adoption and use of cloud computing. The studies reviewed include Priyadarshinee *et al.*, (2017); Senyo, Effah and Addae (2016); Van Dyk and Van Belle (2019); Sayginer and Ercan (2020); Adiyasa et al. (2019); Kayali and Alaaraj (2020); Twala and Kekwaletswe (2020)

- Studies reviewed identified and examined factors that influence the adoption and use of cloud computing using various theories.
- The TOE framework was the theory used most in the adoption and usage of cloud computing.
- The TOE theory was developed to understand the adoption of innovation in the organisation using three main contexts of environmental context, organisational context and technological context (Tornatzky, Fleischer and Chakrabarti, 1990).
- The literature review of the previous studies is consistent with the three main contexts of the environment, organisation and technology as suggested by the TOE framework. Researchers such as (for example, Adiyasa et al. (2019); Senyo, Effah and Addae (2016)) in their studies used the TOE framework and concluded that environmental, organisations and technological factors are highly significant when deciding on cloud computing adoption and use.
- The most predominant factors from previous studies from the environmental context (best practices, government regulation, trading partner's pressure), organisational context (organisation size, top management support and relative advantage), and technological context (technology readiness, security concerns, complexity and compatibility).

The present study aimed at filling the knowledge gaps by conceptualising a strategic cloud computing framework in the context of South African IT professionals. The present study used the TOE framework elements such as environmental context (competition pressure, government regulation, and trade partner pressure), organisational context (organisation policies, top management support, and organisation size) and technological context (relative advantage, compatibility and complexity).

2.7.4 Summary of factors influencing adoption and use of cloud computing

This section presents a summary of cloud computing factors. Table 2.10 below summarises the cloud computing factors

Table 2.10: Summary of factors influencing cloud computing adoption and use

Factor	Description	References
Relative advantage	Refers to the benefit of using or adopting cloud computing services	Jianwen and Wakil (2019);Senyo, Effah and Addae (2016)
Security concern	Security issues are the threats associated with cloud computing, such as data breach, data loss and data privacy.	Jianwen and Wakil (2019);Talmizie, Ibrahim and Chuprat (2018); Senyo, Effah and Addae (2016)
Top management support	Refers to the support from management in order to accelerate the transition from conventional implementation to cloud adoption.	Jianwen and Wakil (2019);Talmizie, Ibrahim and Chuprat (2018); Senyo, Effah and Addae (2016).
Technology readiness	Evaluate the readiness of existing technologies	Jianwen and Wakil (2019);Talmizie, Ibrahim and Chuprat (2018); Senyo, Effah and Addae (2016)
Competitive pressure	External drive from the sector to adopt cloud computing	Jianwen and Wakil (2019);Senyo, Effah and Addae (2016);
Trading partner pressure	External drive from the partners to adopt cloud computing	Jianwen and Wakil (2019);Senyo, Effah and Addae (2016)

2.7.5 Identified research gaps on factors influencing cloud computing

The related previous studies on the factors for adoption and use of cloud computing were reviewed and subsequently, a number of knowledge gaps were identified. The knowledge gaps found are addressed in four folds: methodological, practical, theoretical, and contextual.

2.7.5.1 Theoretical knowledge gap

The related studies reviewed show that the majority of the studies used the TOE to understand the factors of cloud computing. However, the adoption also includes individual users within the organisations who are adopting and using cloud computing. Therefore, TAM was also used to understand individual behaviour to predict the acceptance of cloud computing. The present study is underpinned by three theories, stakeholder theory, contingency theory, and TOE framework. This may shed a new theory on the adoption and use of cloud computing.

2.7.5.2 Methodological knowledge gap

The methodological findings indicated that fewer qualitative studies have contributed to the understanding of cloud computing factors. Survey methods are often used to describe the factors of cloud computing (for example, Priyadarshinee et al., (2017); Senyo, Effah and Addae (2016); Ahmed (2020)). Cloud computing factors are extensively addressed through surveys and less addressed through qualitative case studies.

In the context of the present study, a case study research strategy is employed. The case study allowed participants to give a real perspective on cloud computing. The case study research strategy was used to collect primary data in great depth from South African information technology professionals.

2.7.5.3 Practical and contextual

The contextual and practical findings indicate the lack of studies that are specific to developing countries, despite the popularity of cloud computing. The present study may bridge that contextual gap by conducting the study in South Africa. The views and experience of South African information technology professionals are used to conceptualise a strategic cloud computing framework.

The following is a summary of the knowledge gaps:

- There is a shortage of theoretical frameworks applicable to the background of developing countries that will help to realize the importance of cloud computing technology.
- Minimal qualitative studies are available, contributing to the understanding of cloud computing factors.

- There are minimal practical studies on how limiting factors can be managed easily without incurring additional costs.
- There is no known practical or theoretical framework for cloud computing adoption and use in the context of South African IT professionals.

The present study, thus, aimed at filling the knowledge gaps by conceptualising a strategic cloud-computing framework in the context of South African information technology professionals, using an interpretive qualitative case study. The framework may be used to position cloud computing technology strategically sensitive to the needs of different stakeholders in the South African context.

2.8 Summary of the chapter

This chapter described cloud computing, including the five essential characteristics of cloud, the three cloud service models, four deployment models, benefits of cloud computing and the challenges of cloud computing. In addition, the drivers of cloud computing for different stakeholders were reviewed, cloud computing manifestation in South Africa, the contingencies of cloud computing and factors of cloud computing were discussed. The systematic literature review was driven by the primary research question of "*How should cloud computing be strategically adopted and used sensitive to South African context"*. The secondary research questions were used as themes for the systematic literature review.

The systematic literature review highlighted important factors, which influence cloud computing usage and adoption. The literature review highlighted the theoretical, practical, methodological and contextual knowledge gaps, which were needed to be addressed by the present study.

The next chapter presents the theoretical frameworks and the conceptual research framework.

CHAPTER 3: THEORIES AND THE CONCEPTUAL RESEARCH FRAMEWORK

3.1 Introduction

The previous chapter reviewed related studies and surveyed the existing scholarship in cloud computing. This chapter discusses the Information Systems theories on the adoption and use of innovative technology. The theories underpinning this study and the conceptual research framework are then discussed. The Stakeholder theory, Contingency theory and the Technology-organization-environment framework underpin the study. The other theories are discussed in order to justify why these three were deemed appropriate as lenses.

The goal of the present study was to conceptualise a strategic cloud computing framework in the context of South African IT professional's view, opinion and experience. The chapter is structured as follows, in section 3.2, discuss the popular theories on technology adoption or use in the information system are discussed. The three theories, which underpinned the study, are discussed in section 3.3. In section 3.4, the conceptual research framework is provided for the study by operationalising the environmental, stakeholder elements, contingency elements, organisational and technological elements.

3.2 Overview of technology adoption and usage theories in information systems

In various fields, including information systems, there are different theories for evaluating the implementation or adoption behaviour of users of new technologies. The theories of adoption and usage may be at the level of individuals or organizations.

The theories at the individual level are:

- Theory of Reasoned Action (TRA) as developed by Fishbein and Ajzen (1975);
- Technology Acceptance Model (TAM) by Davis (1989);
- Theory of Planned Behaviour (TBP) by Ajzen (1991);
- Unified Theory of Acceptance and Use of Technology (UTAUT) by Venkatesh et al., (2003).

The theories at the organisational level are:

- Diffusion of innovation (DOI) theory by Rogers (1995);
- Technology-organization-environment (TOE) framework by Tornatzky, Fleischer and Chakrabarti (1990).

In the next section, the theories are discussed

3.2.1 Theory of Reasoned Action (TRA)

Theory of Reason Action (TRA) is the most influential theory in behavioural social science and information systems. TRA assumes that predicting behaviour is determined by behavioural intentions and attitudes. The TRA is composed of four constructs, which are shown in figure 3.1.

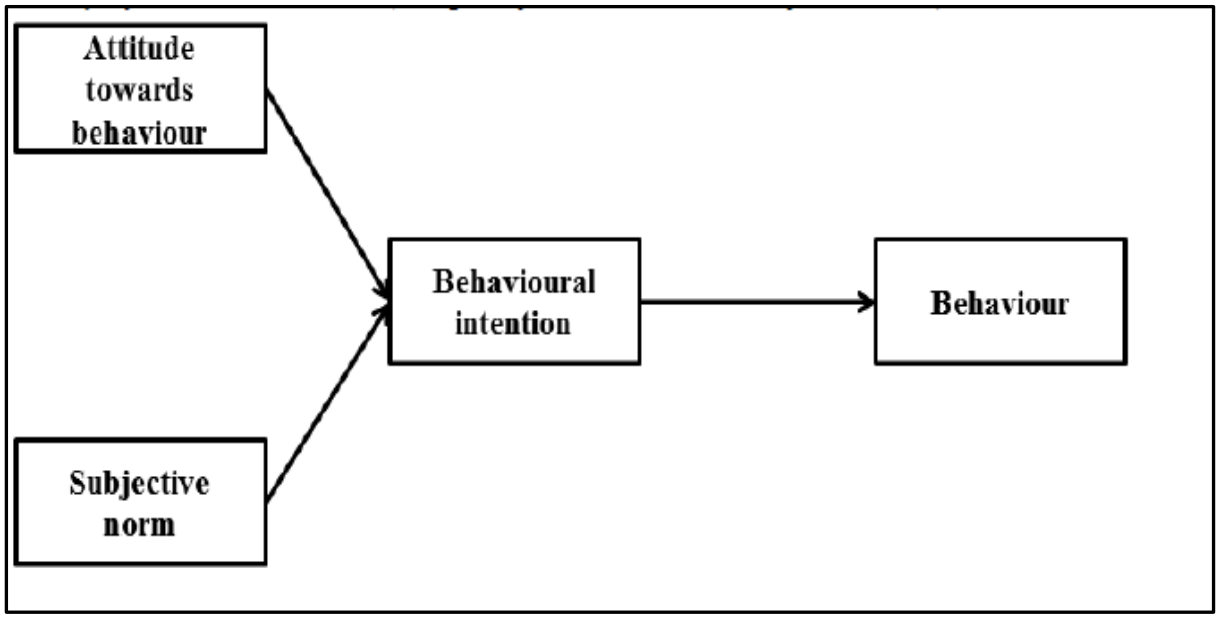

Figure 3.1: Theory of Reasoned Action (Fishbein and Ajzen, 1975)

The behaviour intentions are explained by a) individual attitudes towards the behaviour; b) subjective norms. The most significant relationship is between behavioural intention and behaviour.

The constructs are briefly explained:

- Attitude-this applies to the degree to which people feel about the behaviour of interest.
- Subjective norm applies to the assumption that behaviour is accepted or disapproved by individuals.

- Behavioural intention-this applies to the motivational factors affecting a particular behaviour in which the greater the behaviour's intention to perform, the more likely the behaviour is to perform.
- Behaviour-this refers to the measurable reaction of a person in a given situation with regard to a given goal.

The Theory of Reasoned Action is often a basis for explaining the technology acceptance and use. It is also the basis for newer theories like UTAUT (Venkatesh et al., 2003).

3.2.2 Theory of Planned Behaviour (TPB)

Theory of Planned Behaviour (Ajzen, 1991) is an extension of the Theory of Reasoned Action (TRA) by adding the concept of perceived behavioural control. The theory was intended to predict the intention of a person to participate in a behaviour at a particular time and place. The TPB is based on five constructs, which are illustrated in figure 3.2.

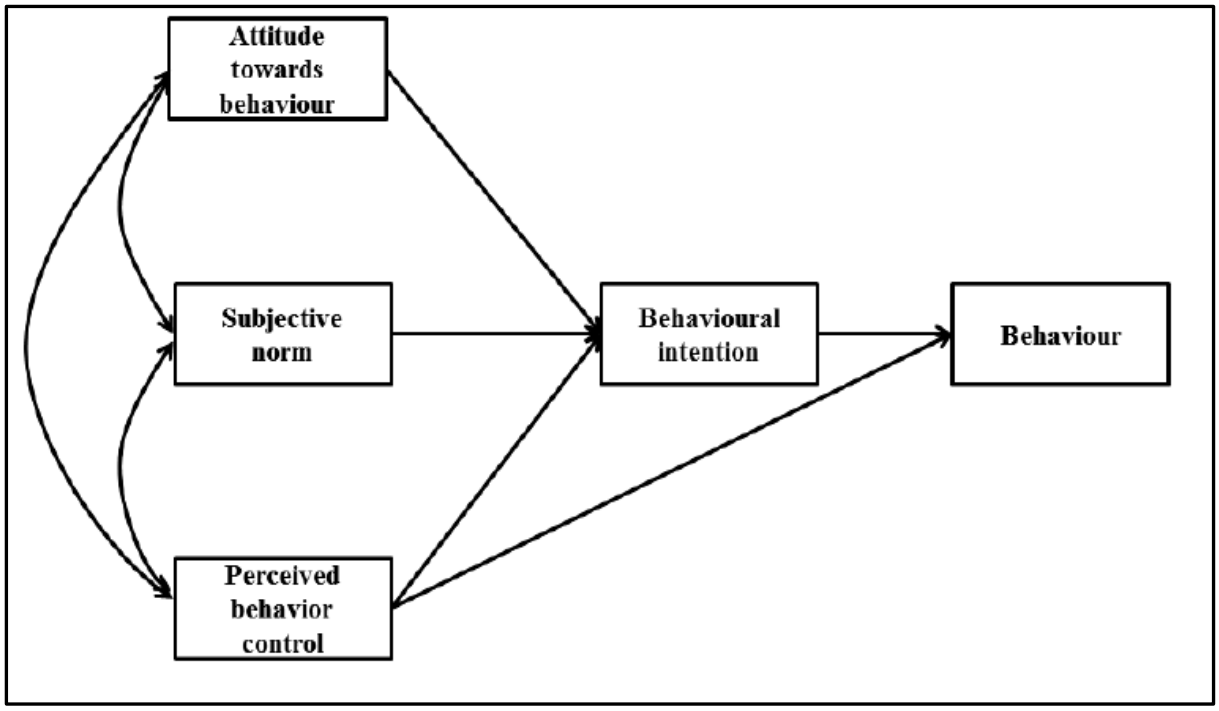

Figure 3.2: Theory of planned behaviour (Ajzen 1991)

The constructs are briefly explained:

- Attitude-this applies to the degree to which people feel about the behaviour of interest.

- Subjective norm applies to the assumption that behaviour is accepted or disapproved by individuals.
- Behavioural intention-this applies to the motivational factors affecting a particular behaviour in which the greater the behaviour's intention to perform, the more likely the behaviour is to perform.
- Behaviour-this refers to the measurable reaction of a person in a given situation with regard to a given goal.
- Perceived behaviour control refers to the understanding of the ease or difficulty of conducting the behaviour of interest by an individual.

While previous studies have shown that TPB has been widely used to predict the use of behaviours by different groups of individuals, there are several TPB constraints, including the following:

- TPB assumes that irrespective of the purpose, the individual has acquired the opportunities and resources to be effective in performing the desired behaviour.
- TBP does not take into account other factors such as anxiety, anger, mood, or experience that factor into behavioural purpose and motivation.
- TBP implies that the product of a linear decision-making process is behaviour.
- The theory does not discuss the period between "intent" and "behavioural action"

Related studies using Theory of Planned Behaviour

The following section reviews the related studies that have used the theory of planned behaviour.

Asadi and Abdekhoda (2019) conducted a study to understand and predict teacher intention to use cloud computing in their classroom. The study used the Theory of planned behaviour (TPB) to understand and predict teacher intention to use cloud computing in their classroom. The study found that an attitude towards the behaviour, perceived behaviour control and privacy; had direct and significant associations with teachers' intention to use cloud computing. However, subjective norms and security were not significant predictors of intention to use cloud computing.

Hamilton and Terblanche-Smit (2018) conducted a study to look at Consumer intention to purchase green vehicles in the South African market. The effect of attitude (A), subjective standard (SN), and perceived behavioural influence (PBC) on the intention to purchase green vehicles in the South African market was investigated using the theory of planned behaviour (TPB). The findings revealed that while attitude factors have the biggest influence on intention, perceived support and encouragement factors are significant in consumers' decisions to buy green vehicles.

Yang et al. (2017), conducted research to look at the consumer acceptance of smart home services. The study created a research model based on the theory of planned behaviour to describe the behavioural intentions of potential customers. Using survey samples, collect primary data from two hundred and sixteen (216) individuals. The study results indicated that mobility, security, data privacy, and confidence in the service provider were all listed as important factors affecting the adoption of smart home services.

Canhoto and Arp (2017) conducted a study to look at the factors that encourage the adoption and use of health and fitness wearables. Qualitative data was gathered to see how subjective perceptions influence behaviour. The findings from the study are that consumers' attitudes toward health and fitness seem to affect how they use wearables, what they demand from them, and, as a result, what they value. In addition, the devices' observability appears to be essential for adoption. Other important factors included societal expectations and social pressure in the context of peer pressure.

3.2.3 Technology Acceptance Model (TAM)

Technology Acceptance Model (TAM) was developed by Davis (1989) and is an adaption of the Theory of Reasoned Action (TRA). The TAM model was used to describe user behaviour trends towards the implementation of new technologies. The decision to embrace and use technology is influenced by many variables. The TAM consists of two independent constructs namely perceived usefulness (PU) and perceived ease-of-use (PEOU) as depicted in figure 3.3.

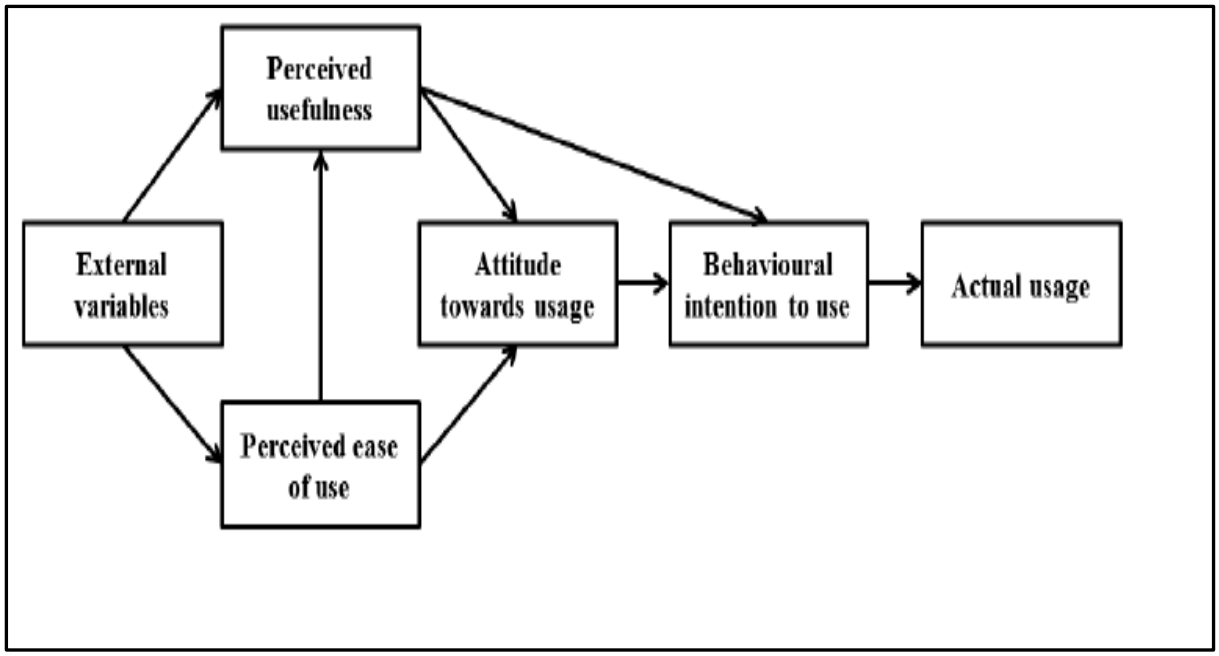

Figure 3.3: Technology acceptance model (Davis, 1989)

The constructs are briefly explained:

- External variables – this refers to the external social influences and facilitating conditions.
- Perceived usefulness – this refers to individual feelings towards innovation contributing to improving the results or the extend to use the system.
- Perceived ease of use – this refers to an individual feeling towards how friendly is the system.
- Attitudes towards usage and behavioural intention to use – this refers to the decision a person had made and the use of a specific technology.

Related studies using Technology Acceptance Model

The following section reviews samples of studies that have used TAM to understand the user behaviour and usage of innovation in the information systems.

Kaushik and Agrawal (2021) conducted a study using the technology adoption model to identify the factors that can encourage or inhibit students from using online learning platforms. The study found that the students had a good attitude toward e-learning. They are filled with optimism and innovation as a result of the e-learning platforms. However, there was some difficulty in using the newly infiltrated e-learning sites. Furthermore, no major differences between demographics were discovered.

Rachman and Napitupulu (2018) using the technology acceptance model, studied the diagnosis of plant pests. To collect primary data from two hundred and four (204) participants, a survey was carried out. The study found that both the perceived ease of use and the perceived usefulness have a significant influence on the intent to use actions.

Razmak and Bélanger (2018) conducted a study using the technology acceptance model, to forecast patient attitudes towards personal health records. To gather the primary data from three hundred and twenty-five (325) participants, a survey was conducted. The study found that there is a positive relationship with variables such as beliefs, experiences and needs for the implementation of personal health record systems. In addition, the perceived ease of use of the system was a helpful indicator for the acceptance of personal health records systems.

3.2.4 Technology Acceptance Model 2 (TAM2)

The TAM2 model introduced the external variables in order to expand the original TAM. The TAM2 expanded model added additional variables such as social influence processes and cognitive processes. As shown in Figure 3.4, TAM2 is based on several constructs.

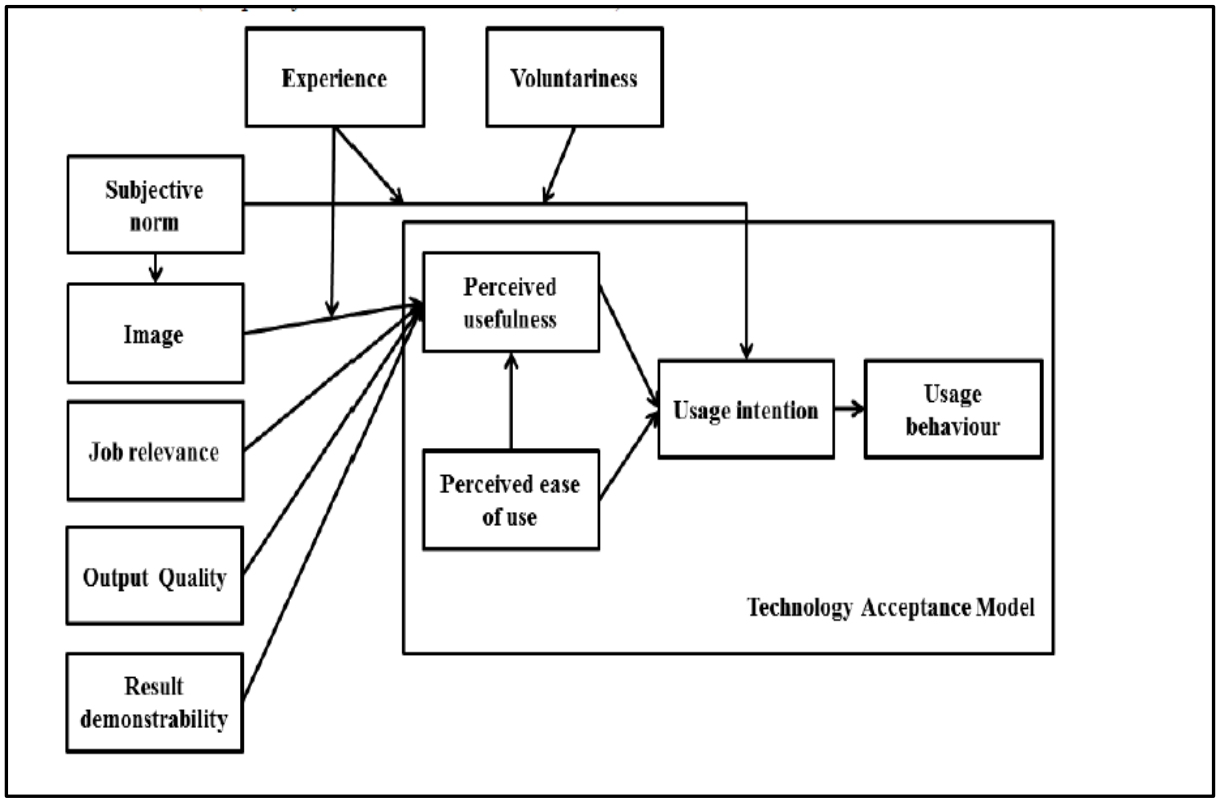

Figure 3.4: TAM2 expanded Model (Venkatesh and Davis, 2000)

3.2.5 Unified Theory of Acceptance and Use of Technology (UTAUT)

The Unified Theory of Acceptance and Use of Technology (UTAUT) was developed to explain the user of technology and the consequent usage.

Venkatesh et al., (2003) studied from the previous models and theories and formed Unified Theory of Acceptance and Use of Technology (UTAUT). The UTAUT was proposed by (Venkatesh et al. 2003) as a combination of other previous models after reviewing eight IT adoption theories to address the limitation of the previous models.

The UTAUT has four predictors of users' behavioural intention and there are performance expectancy, effort expectancy, social influence and facilitating conditions as shown in figure 3.5.

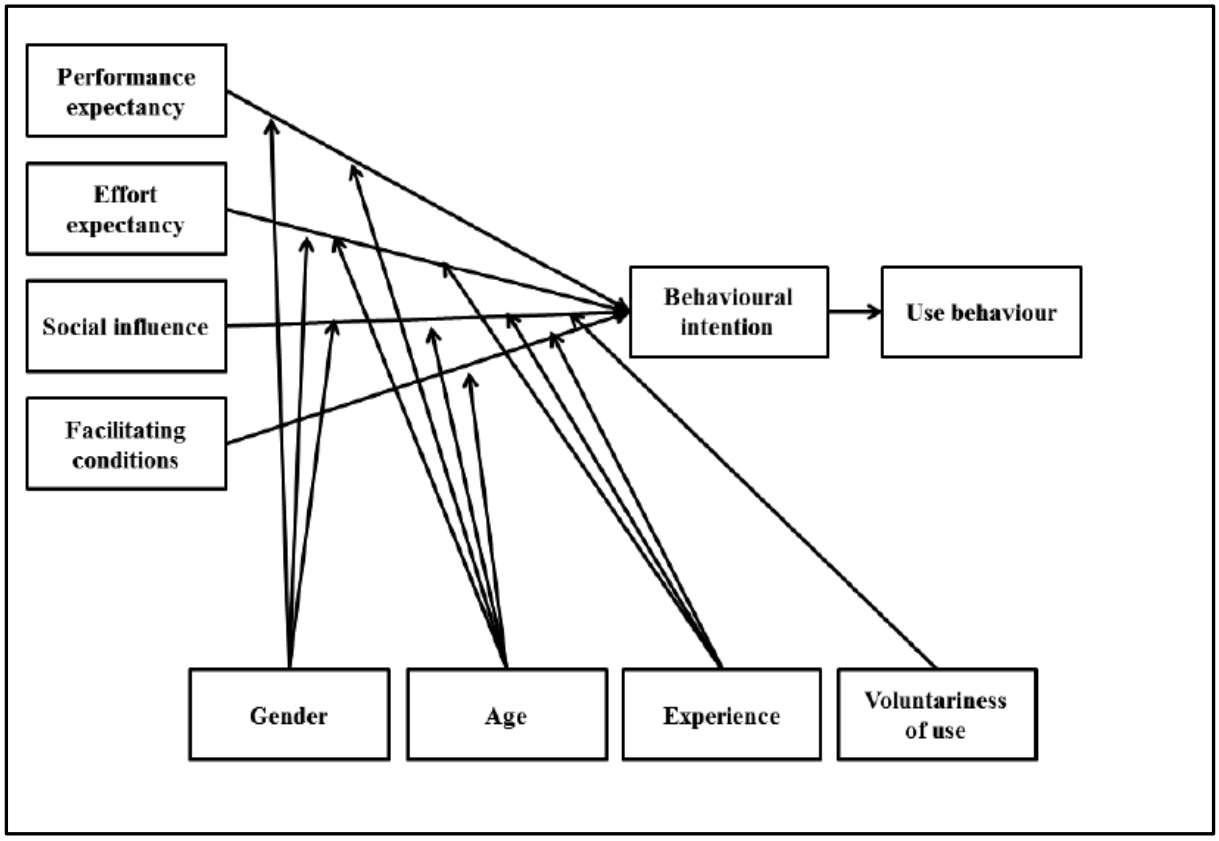

Figure 3.5: Unified theory of acceptance and use of technology (Venkatesh et al., 2003)

The constructs are briefly explained:

- Performance expectancy – this refers to the individual perception that the system will improve job performance.

- Effort expected – this refers to the amount of time and the degree of individual efforts using the technology.
- Social influence – this refers to individual perceptions of new technology.
- Facility conditions – refers to the infrastructure and the equipment that necessary for new technology.

The performance expectancy, social influence, effort expectancy and facilitating conditions have a direct influence on the usage intention and behaviour. The facilitating conditions have a direct effect on the actual user behaviour. Age, gender, voluntary usage, and experience are the moderating variables.

Related studies using UTAUT.

This section reviews a sample of studies that have used the UTAUT to understand the user behaviour and usage of innovation in information systems.

Salam and Ali (2020) conducted a study to determine the factors that affect the adoption of cloud computing by Indonesian local government employees. The UTAUT (Unified Theory of Acceptance and Use of Technology) theory was used to identify these factors. The primary data came from 123 workers who took part in an online survey. The study found Performance Expectations, Business Expectations, and Perception of Availability all had a positive impact on the local government employees' willingness to use cloud computing.

Kissi, Oluwatobiloba and Berko (2017) studied factors that influence the intentions of university students to use debit card services. In the Faculty of Business Administration, a survey was conducted to obtain primary data from four hundred (400) students using a questionnaire. The study found that individuals trust the use of the debit card for online payment and accept it. The result endorsed the UTAUT theory that, among others, consumer intentions to use a specific technology are focused on success expectancy and social influence.

Gupta and Dogra (2017) conducted a study to examine the variables influencing tourists' use of a map application. To obtain primary data from two hundred and eighty-four (284) participants, a survey was conducted. The study showed that moderating variables such as gender, experience, and age have an effect on behavioural intentions on facilitating conditions, motivation, and habit.

Liu and Zhou (2017) conducted a study using the theory of UTAUT to examine the planned usage of Apple Pay services by consumers. The research assessed the effort expectation, perceived control, focused attention. A survey was conducted to gather primary data from two hundred (200) participants. The study found that expectation of efforts, perceived control, focused attention constructs have an influence on the behavioural intention to use Apple's payment services.

3.2.6 Diffusion of Innovation Theory (DOI)

Rogers (1995) developed the Diffusion of Innovation (DOI) theory. According to Alatawi, Dwivedi and Williams (2013), the DOI theory is the most used adoption theory in different sectors or disciplines. The DOI theory was created to assist in decision-making in organizations on IT adoption. The more perceived benefits of innovation, the stronger the influence on their adoption decision. The DOI theory has four structures, namely innovation, communication channels, time and the social system, as shown in Figure 3.6.

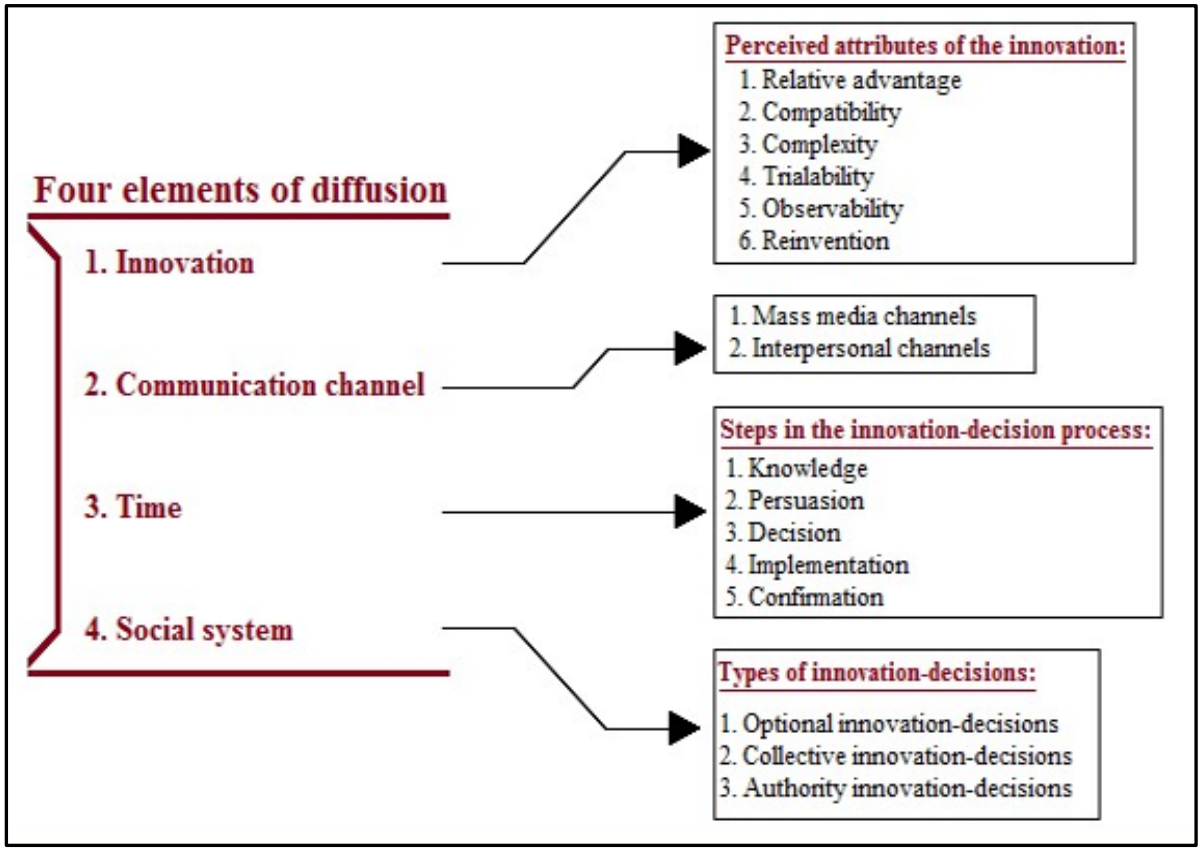

Figure 3.6: Main elements in the diffusion of innovation (Rogers, 2003)

The constructs are briefly explained:

- Innovation – this refers to the individual idea that is perceived as new (Rogers, 2003).
- Communication channel – these may be formal or informal. Communication takes place from one individual to another. The innovation spread across people through the communication channel of mass media and interpersonal channels.
- Time – this refers to the length of time it takes people to take to adopt the innovation.
- Social system – this refers to determining the boundaries and communication for diffusion.

Related studies using Diffusion of Innovation theory

This section reviews a sample of studies that have used the DOI to understand the adoption behaviour and usage of innovation in information systems.

Sayginer and Ercan (2020) conducted a study to investigate the internal and external factors for cloud computing adoption decisions of companies using a combination of DOI and TOE models. The study employed a survey method to collect primary data from 176 IT decision-makers of non-cloud or cloud user businesses in the city of Izmir in Turkey. The study found factors such as relative advantage, compatibility, complexity, and top management support and cost savings as giving the relative advantage for cloud computing adoption.

Scott and Mcguire (2017) conducted a study to promote course instruction using the DOI theory. According to the study, DOI offers another lens for examining innovation. The study focused on the impact of time, communication channels, social systems, and innovation. The study concluded that the adopters often overlooked the importance of studying an innovation's consequences as pointed out by Roger (2003). Furthermore, the study found that there is insufficient knowledge of the effects of including the teaching of the course in the college curriculum.

Tiwari and Damle (2020) conducted a study to explore the perception-based study of Virtual Reality Technology using the DOI theory. The attributes were linked to a behavioural intention n a certain way. Complexity, compatibility, relative advantage, observability, and trialability were the five attributes used. The questionnaire survey was used with 414 respondents from the Asia Pacific, Latin America, the Middle East, Europe, North America, and Africa who

contributed to the research. The findings are that complexity, compatibility, relative advantage, observability, and trialability all have important relationships with behavioural intention.

3.3 Theoretical frameworks underpinning the present study

In this section, the theories that grounded the present study are discussed. The three theories are Stakeholder theory by Freeman (1984), Contingency theory by Blanton, Watson and Moody (1992) and Technology-organization-environment by Tornatzky, Fleischer and Chakrabarti (1990).

3.3.1 Stakeholder Theory

The Stakeholder theory is viewed by Freeman (1984) as a method for understanding the relationship between management and stakeholders as well as the behaviour of the organization towards stakeholders. In several studies, stakeholder theory has been used to explain the value that is generated when stakeholders work together. In several studies, including information systems and management studies, the theory has been adopted.

Different stakeholder definitions are proposed as follows:

> Freeman (1984) describes stakeholders as "any *group or individuals that may influence or is influenced by the accomplishments of the organization's objectives*".
>
> Clarkson (1995) describes stakeholders as "*persons or groups that have asserted ownership, rights, or interests in a company and its operations, past, current, or future*".

The stakeholder theory starts with the assumption that value is important and part of doing business. The stakeholder theory asks managers to express the value that is generated when stakeholders work together. In two key questions, the emphasis of stakeholder theory is expressed. Firstly, the stakeholder theory asks, "What is the firm's purpose?" This question encourages executives to articulate the sense of value they make, which brings together their key stakeholders. This motivates the company to step forward and helps it to deliver excellent results. Secondly, the stakeholder theory asks, "What is the duty of management to stakeholders?" Thus, the stakeholder theory seeks to resolve this problem and other related issues in this chapter.

Who are an organization's stakeholders?

Freeman (1984) distinguishes two kinds of stakeholders, namely primary and secondary stakeholders, to answer the question. The key stakeholders are those stakeholders that are important to the organization's survival. Those who are not important to the organization's survival are the secondary stakeholders (Clarkson 1995).

Freeman (1984) initially presented the stakeholder model as a map in which the business is at the middle of a wheel and stakeholders are at the end of spokes along the rim. According to the model (Figure 3.7), various stakeholders affect the firm and stakeholders may not be seen or handled as one, both of whom have different demands and influence.

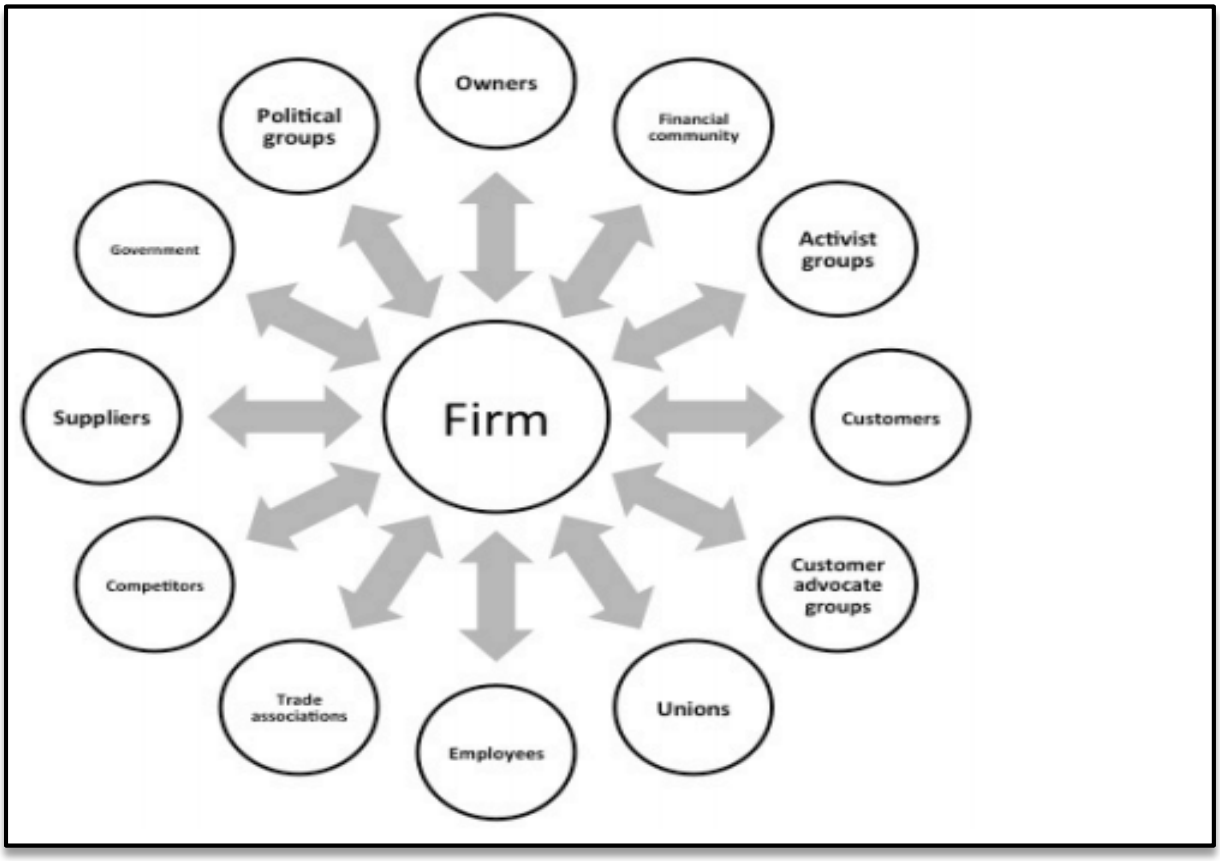

Figure 3.7: Stakeholder Map (Freeman, 1984)

Stakeholders may influence organizations in many ways. Stakeholders' value depends on the organization's managerial views of the stakeholders, which in turn affects the organization's strategy. More or less proactive or reactive strategy can be pursued depending on the influence of the stakeholder organization.

The key stakeholders for the present study are those without whom the organization or company cannot survive without, including third parties, vendors, suppliers, staff, government and IT professionals. The second question to be answered by the stakeholder theory is as follows:

What is the purpose of the firm and what do stakeholders want?

All stakeholders have relationships with the organization and want to benefit from such relationships. According to Phillips (2004), stakeholder communication is necessary to understand what the various stakeholders want. Managers who are in regular contact with stakeholders are in a better place to determine their organizational goals.

What responsibility does management have to stakeholders?

Freeman (1984) suggests that managers need to create partnerships, encourage their stakeholders, and establish communities in which everybody seeks to give their best to achieve the value promised by the business.

How should managers prioritize among stakeholders?

Phillips (2004) provides some guidance in dealing with the above question. Normatively legitimate stakeholders take first, moral precedence over derivative legitimate stakeholders (those stakeholders to whom the business has an obligation). Second, those that pose a threat to the viability of the business should be allocated much time and energy. The voice of the decision-making stakeholders and the sharing of organizational results should concentrate on their contribution to the business. The more a stakeholder contributes to a company, the greater their voice and share of the value generated should be (Phillips 2004).

Related studies using Stakeholder Theory

Several scholars concluded that a better approach was to pay attention to the stakeholders. Organizations include several stakeholders with whom relationships must be established. Through their stakeholders, companies must establish contact.

Waheed et al. (2020) conducted a study to investigates the impact of corporate social responsibility on buying behaviour tendencies of consumers based on the stakeholder theory and practices. The study used the survey method to gather data through convenience sampling from 1650 companies. The study found that a positive relationship between corporate social responsibility and buying behaviour tendencies the findings provide insights for management, especially those in corporate social responsibility –oriented firms, on how the incorporation of corporate social responsibility activities may influence the buying behaviour tendencies of consumers

Mawela, Ochara and Twinomurinzi (2017) in their study titled "E-Government Implementation: A Reflection on South African Municipalities". The role of stakeholders on how they can influence the implementation of e-Government services in municipalities was discussed. The study was a qualitative research approach and the primary data was from the interviews with representatives from local government. The study used the purposive sampling technique. The study acknowledges that the municipality has a range of stakeholders to maintain the relations of stakeholders and service delivery. The study concluded that it is essential to maintain communication with stakeholders.

Hutsaliuk et al. (2020) conducted a study and a stakeholder approach to selecting strategies for engagement with this stakeholder type was investigated. According to the stakeholder principle, it is important to consider the key stakeholders' needs, roles, and desires while developing a long-term strategic strategy for the enterprise. The stakeholder theory will allow companies to choose engagement strategies that meet their financial service needs while also balancing the interests of their partners. The study found that the engagement strategies with stakeholders, taking into account the stakeholders' potential for cooperation as well as the potential negative effects on business activity

Justification of Stakeholder theory

The stakeholder theory was deemed as appropriate to address the research question two that is "What are the drivers of cloud computing for different stakeholders?"

From the above literature, it can be observed that stakeholder theory has not been used as a lens to how cloud computing could be strategically adopted and used in the context of South African IT professionals.

Freedman first introduced the stakeholder theory in 1984. The stakeholder theory was used to understand the relationship between management and stakeholders. Freeman defined stakeholders as "any group or individual that can affect or is affected by the achievement of the organisation's objectives. The stakeholder theory describes the value that is being created when stakeholders are working together.

This study used the stakeholder theory as a lens to understand how stakeholders may influence the adoption and use of cloud computing. The stakeholder included all stakeholders who have experience and decision-making regarding the adoption and use of cloud computing.

3.3.2 Contingency Theory

The theory of contingency presents a class of behavioural theories that claim that there is no one better way to organize. Donaldson (2001), describe contingency as a "variable that moderates the impact of organisational characteristics on organisational performance". The Contingency theory is used to interpret organisations as a whole. The principles of the Contingency theory are that there is no better way to organize and that any organizational strategy is not equally successful.

The basis of Contingency theory is that organisational performance is dependent on the organisational characteristics, such as a structure, that reflects the situation of an organisation (Donaldson 2001). The organisational performance depends on the matching fit between organisational structure and the contingencies. The key contingencies that have been suggested are environmental uncertainty, organisational strategy, and technology. The organisations are seeking to design their organisational characteristics that can handle uncertainties in the

contingencies to achieve high performance and avoid any loss due to misfit when contingencies changes.

Other research that used the theory of contingency as a theoretical context aimed to describe the effect on organizations of contingent variables. The contingencies reflect any variable that moderates the impact of its output on an organizational characteristic. Blanton, Watson and Moody (1992) used the components: structure, performance, strategies and environment as shown in figure 3.8, to explain how an organisation would require its structures to create strategies to improve the organisation's economic stance in the market, thus ensuring the organisation (performance) creates a profit.

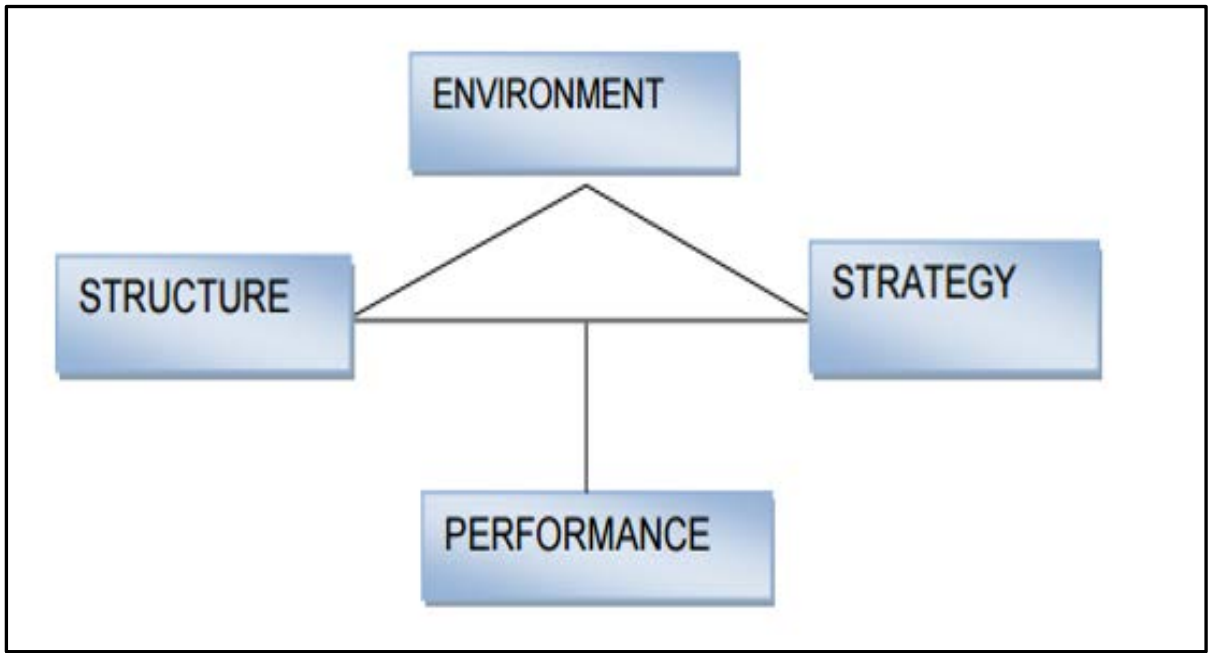

Figure 3.8: Contingency theory (Blanton, Watson and Moody, 1992)

The contingency components are as follows:

- An environment is a place that allows its employees to work in favourable conditions. Employees, embracing the same vision, should be able to complete a task easily by freely accessing various procedures and processes.
- The structure is the foundation of each organisation that explains how tasks can be shared or how to delegate responsibilities in different departments to maintain the processes within the organisation. It also allows decision making to sustain workflow.
- The strategy is the core of the organisation. It directs the functions of the organisation in the long term. It allows the organisation to be sustainable towards its competitors.

- Performance is evaluated according to organisational performance over some time, to measure whether the organisation is successful or not.

Related studies using Contingency theory

Several researchers, (for example, Magaji (2018); De Crescenzo et al. (2020); Sunder and Prashar (2020)) have applied Contingency theory in their studies.

Magaji (2018) conducted research that looked at the contingency theory and how it applies to management accounting and organizational systems. The theory describes organizational actions based on contingent factors, there is no one-size-fits-all leadership style. It also affects technology and the environment, which makes it applicable to accounting. The research found that contingency theory on budgeting, control, and information disclosure is valued in management accounting research. However, the study discovered a weakness in contingency theory's claims about organizations' stagnant behaviour and failure to resolve problems of organizational size. Nevertheless, its shortcomings, the theory is acceptable in leadership studies, management accounting, and control research.

De Crescenzo et al. (2020) conducted a study to explore how contingency factors combine and causally connect in leading to possible success or failure in equity crowdfunding rounds. The researchers used qualitative approaches to identify and analyse various combinations of conditions that explain specific outcomes. The study found crowdfunding to be successful for start-ups with a large number of founders. Crowdfunding has been found to fail in businesses with no female founders, businesses in conventional industries (non-clean tech businesses), businesses that are not start-ups, and businesses that publish few pictures yet give investors incentives.

Sunder and Prashar (2020) conducted a study to examine the critical success factors and critical failure factors from a contingency theoretic perspective. The study used a survey to collect data from 213 business units from the UK, China, USA and India. The study found that critical failure factors have large variations in occurrence across countries. Furthermore, crucial failure factors are less common in smaller and medium-sized businesses in the service sector. The lesson learned can help to boost organizational learning and performance at the strategic maturity stage.

Justification of Contingency theory

The contingency theory was deemed as appropriate to address research question three that is "What are the practical and theoretical contingencies for strategic cloud computing in the South African context.

From the above literature, it can be observed that contingency theory has not been used as a lens to how cloud computing could be strategically adopted and used in the context of South African IT professionals. The basis of contingency theory is that there is no one best way of organizing and managing an organization. The contingency theory permits organizational characteristics such as strategies and structure to be aligned with the organization's objectives to achieve organizational performance

This study used the contingency theory as a lens to understand what are the theoretical and practical contingencies that may influence the adoption and use of cloud computing.

3.3.3 Technology-Organization-Environment Framework (TOE)

Technology-Organization-Environment framework examines the process of how an organization goes about adopting and implementing technological innovations. The framework is used to research from an organization-level perspective. Three key contexts are the basis of the TOE framework: technology, organization and environment (Tornatzky et al. 1990). The TOE framework is shown in Figure 3.9. It is also assumed that the decision to implement cloud computing is affected by environmental, organizational and technological contexts.

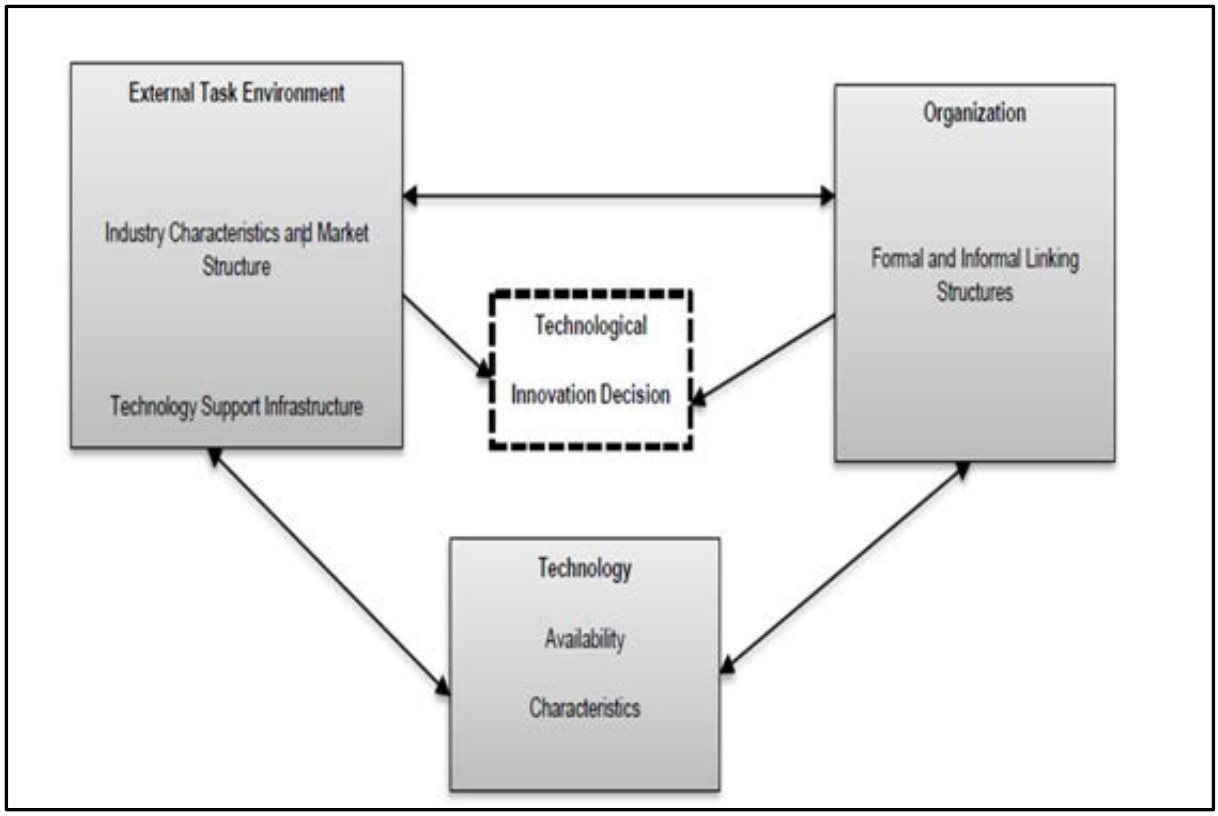

Figure 3.9: TOE framework (Tornatzky et al, 1990)

Technology context

Technological context refers to the features applicable to the organisation in both new and existing technology.

Organization context

Organizational context refers to characteristics such as the organizational structure and the number of available internal resources that can be modified or altered by the organization to assess emerging technologies.

Environment context

The environmental context includes industry, competitors, trading partners and the government, which can pose challenges and innovation opportunities (Tornatzky et al. 1990).

Related studies using TOE Framework

This section reviews a sample of studies using the TOE framework. The TOE framework was used by researchers (for example, Wang et al. (2019); Ahmed (2020); Mulyawan et al. (2020); Van Dyk and Van Belle (2019)) to study cloud computing adoption over a period of time.

Mulyawan et al. (2020) conducted a study on how education business processes can be improved to handle the demands of increasing its stakeholders and the development of educational activities. The study proposed an IT governance framework using the Technology Organisation Environmental Framework (TOE) to help determine the adoption of cloud computing technology. The study proposed Hybrid cloud computing with the ability to access and manage cloud resources and combine them into the private cloud. In addition, the study found that governance structures, technological context, organisational context and environmental context influence the adoption of cloud computing.

Wang et al. (2019) conducted a study to examine the positions of the government in cloud computing adoption from two perspectives: government regulation and government support. The study used the combination of technology–organization–environment (TOE) framework, human–organization–technology fit (HOT-fit) model, diffusion of innovation theory, information processing view and institutional theory, to examine the factors of cloud computing adoption and its business impacts. The study found that top management support aims to mediate the effects of both government regulation and government support on cloud computing adoption

Ahmed (2020) conducted a study to investigate the factors that influence the use of cloud computing, used the Technology Organisation Environmental Framework(TOE). The study found a link between the TOE framework and the decision of an organisation to adopt cloud computing and all three factors that are positively linked to the decision to adopt cloud computing. In addition, the analysis was important in understanding the factors that led to the adoption of cloud computing in the TOE framework by several organizations in recent years.

Van Dyk and Van Belle (2019) conducted to understand and examine the current perceptions and status of digital transformation within a SA retail organisation. The TOE framework was used to examine all technology aspect, organisation and environmental aspect used by the enterprise. The study found the factors such as relative advantage, data security, resistance to

change, need for change management, customer orientation and corporate culture could assist retailers in their decision-making process concerning digital transformation adoption.

Justification of the TOE framework

The TOE framework was deemed as appropriate to address research question four, which is "What are the factors that influence the adoption and use of cloud computing". The TOE framework was used to address this objective. The TOE framework was used to describes the factors that influence the adoption and use of cloud computing.

The TOE framework has been used in different industries and national contexts. The TOE framework identifies the components of an organisation that tend to influence the adoption and use of technological innovations, which are categories as technological, organisational and environmental context. The first category refers to the technological issues that are involved in an organisation such as hardware, software and IT infrastructure. The second refers to internal and external pressure related to an organisation such as the market conditions, competition, regulations and policies. The third category describes an organisation scope, size and management structure.

The TOE framework is an effective analytical framework. The TOE framework helps in studying the process of adopting and assimilating many innovations in information technology. The TOE framework has a strengthened theoretical background and persistent empirical adherence. It is potentially applicable to the domain IS innovation. Admittedly, the factors notified under the above-mentioned context may tend to transform into a variety of researches. The TOE factors were identified for strategic cloud computing adoption and use in the context of South African IT professionals.

The next section discusses how the study is conceptualised with the three preceding theories used as study lenses.

3.4 Conceptual Research Framework

This section discusses how elements of theories discussed in the preceding sections are now contextualised for the present study. It is worth noting that although the study is conducted from individual IT professionals' perspective, the use of organizational level theories is in line

with the reality that cloud computing manifest mostly organizationally. To this point, IT professionals are hereby given a rare opportunity of expressing themselves as individuals but in an organizational context. This section presents a conceptualised research framework for the study.

Stakeholder theory (Freeman, 1984), Contingency theory (Blanton, Watson and Moody, 1992) and Technology-organisation-environment (Tornatzky et al., 1990) are the research lenses to develop a conceptual research framework. Based on our literature review, the conceptual framework is made of five categories: environmental, stakeholder, contingencies, organisational and technological. All the constructs and their definitions are provided in Table 3.1. These constructs are discussed in detail in the following subsections.

Table 3.1: Elements of the conceptual research framework

Factors	ST	CT	TOE
Environmental			
Government regulation			√
External pressure			√
Industrial pressure			√
Stakeholders			
Employees (Managers, staff, IT professionals)	√		
Third parties	√		
Customers	√		
Contingencies			
Organisation strategy		√	
Organisation size and structure		√	
Organisation			
Organisation policies			√
Top management support			√
Technological			
Relative advantage			√
Compatibility			√
Complexity			√

ST: Stakeholder Theory; **CT**: Contingency Theory; **TOE**: Technology-Organization-Environment

3.4.1 Environmental context

The environmental context looks at how the organisation operates. The environmental context that influences the organisation's decision for usage and adoption of cloud computing is government regulation, competitive pressure and trade partner pressure:

3.4.1.1 Government regulation

Government regulation refers to the directives, legislations, acts, and laws, which support compliance through the adoption and use of cloud computing within the South African context.

3.4.1.2 Competitive pressure

Competitive pressure refers to the pressure felt by organisations from industry competitors. IT professionals ought to give how they feel these pressures influencing their respective views.

3.4.1.3 Trade partner pressure

Trade partner pressure refers to the pressure felt by the organisation from business partners with whom the business is conducted. IT professionals ought to give how they feel these pressures influencing their respective views and experiences.

3.4.2 Stakeholders elements

The stakeholder elements of the framework ensure that, in the interest of stakeholders in organizations, cloud computing decisions are made. A stakeholder may be affected by decisions taken by the organisation (Freeman, 1984). IT professionals ought to give how they feel these pressures influencing their respective views and experiences.

3.4.2.1 Employees as stakeholders

In this study, the employees as stakeholders consist of Senior Managers, Middle managers, IT experts and Consultants.

3.4.2.2 Third parties as stakeholders

In this study, the third parties will include government, regulation bodies, external

parties such as suppliers and vendors.

3.4.2.3 Customers as stakeholders

In this study, the customer as stakeholders will include all the customers that the organisation is trading with or selling goods and services to those customers.

3.4.3 Contingency elements

Contingency elements describe the external and internal factors, which can affect the decision-making process of management. Senior managers and middle managers in the organisations identify the external and internal factors that may influence the decision-making process. The contingency theory lens is used in analysing cloud computing adoption and use. The following elements of environmental uncertainty, organisational strategy, and organisational structure:

3.4.3.1 Organisation strategy

Organisation strategy is described as future-oriented strategies to engage with the competitive environment in order to achieve business objectives and goals (Pearce and Robinson, 2000).

In this thesis, strategy refers to what information technology professionals deem as the best way to achieving an improved adoption and long term use of cloud computing.

3.4.3.2 Organisation size and structure

The size of an organisation refers to the number of employees and the organisation structure looks at the functional structure, which is directed towards the achievement of the organisational goal. This involves defining how responsibilities in different departments within the organization are maintained. The decision making from the organisation structure and size influence the adoption and use of cloud computing within the organisation.

3.4.4 Organisational context

Organizational context can influence cloud-computing adoption. Organizational factors include policy, management support and relative advantage, which may influence cloud computing adoption and use:

3.4.4.1 Organisation policies

Organisation policies refer to a form of policies to support cloud computing. Policies are created to have a favourable environment that will influence the usage and adoption of cloud computing within the organisation. The organisation policies may be the drivers or hinders for cloud computing adoption and use.

3.4.4.2 Top management support

Top management support is the action of devoting financial, political and supervision support from top management to support the adoption of cloud computing. The power of top management may have a significant influence on cloud computing adoption and use within the organisation.

3.4.5 Technological context

Technological context can influence cloud-computing adoption and use. Technological factors include compatibility, interoperability, scalability and flexibility can influence cloud computing:

3.4.5.1 Relative advantage

Relative advantage is the benefits and advantages that can be gained by using cloud computing over the traditional way of doing the same task. Relative advantage influences the usage and adoption of cloud computing (Jianwen and Wakil (2019); Talmizie, Ibrahim and Chuprat (2018); Senyo, Effah and Addae (2016)).

3.4.5.2 Compatibility

Compatibility is the degree to which existing infrastructure and system can be used to the cloud computing technology. Technical compatibility influences the usage and adoption of cloud computing (Jianwen and Wakil (2019); Talmizie, Ibrahim and Chuprat (2018); Senyo, Effah and Addae (2016)).

3.4.5.3 Complexity

Complexity is defined as the degree to which an innovation is perceived as relatively difficult to understand and use. Complexity is the degree to which cloud computing is difficult to use, recognised and realised (Jianwen and Wakil (2019); Talmizie, Ibrahim and Chuprat (2018); Senyo, Effah and Addae (2016)).

Figure 3.10 graphically presents the conceptual research framework that guided the present study. The framework consists of five contingencies, technology, organization, environment, and stakeholder elements.

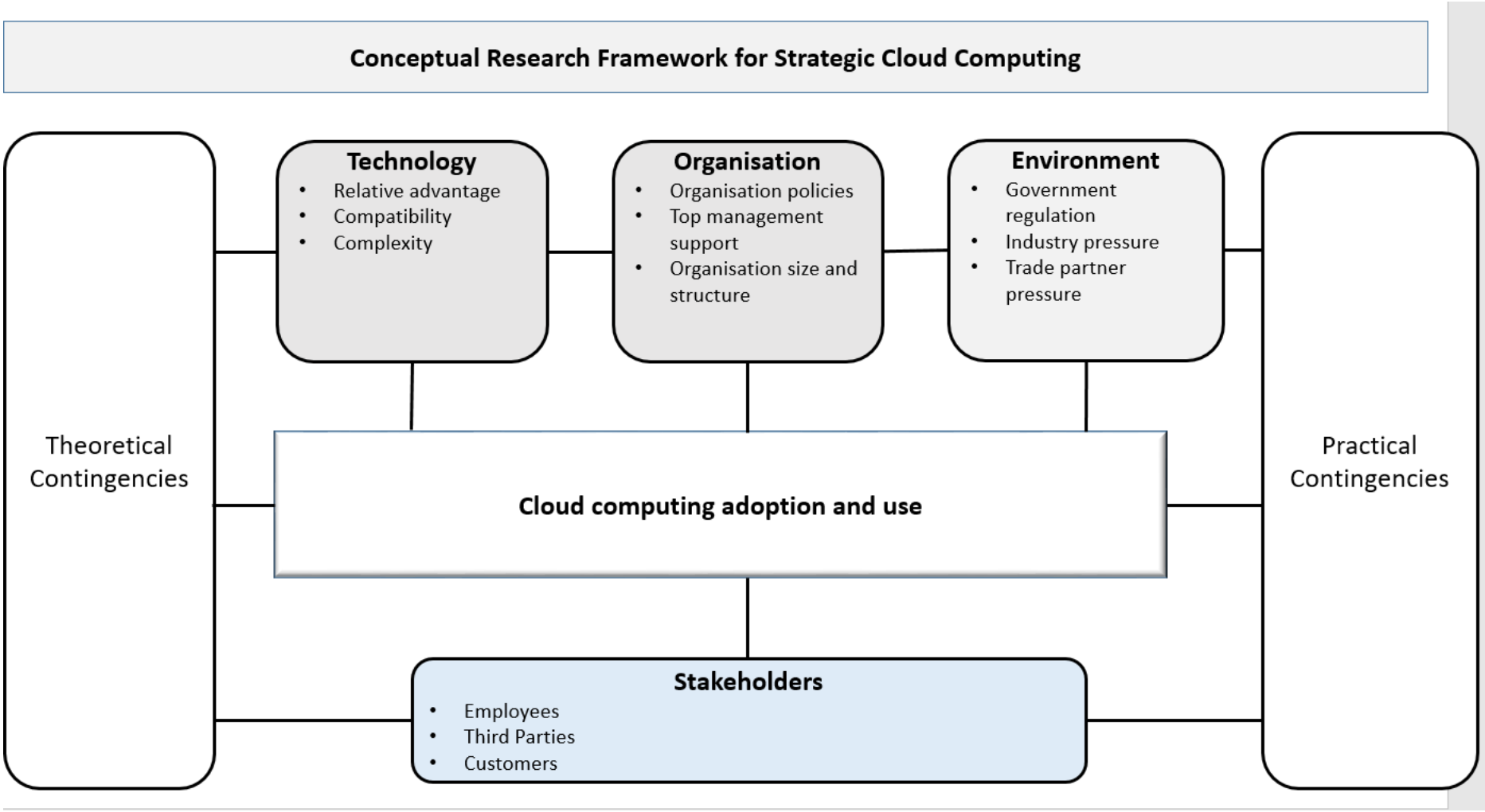

Figure 3.10: Strategic adoption and use of cloud computing conceptual research framework

The conceptual research framework as shown in the above figure 3.10 consists of the following:

- Theoretical contingencies, technology context, organisation context, environmental context, practical contingencies and stakeholders.
- Stakeholders includes IT *senior managers, IT middle managers, other IT experts and consultants* as employee stakeholders. Other stakeholders included *third parties (suppliers and vendors)* and *customers.*
- The environmental context includes *government regulations, external pressures and internal pressures*
- Practical contingencies include IT *strategy, organizational structure and size*
- The organisational context includes policies *and top management support*
- The technology context includes IT *relative advantage, compatibility and complexity.*

3.5 Mapping conceptual research framework to research questions

The conceptual research framework consists of an environment, stakeholders, contingencies, organisation, and technology. The conceptual research framework talks to the five secondary research questions in the following:

RQ1: How does cloud computing manifest in South Africa according to South African IT professionals?

As per the conceptual research framework, Stakeholder theory, Contingency theory and TOE framework were the best existing theories that would clarify cloud computing adoption and use. The theories capture the essential elements such as cloud computing benefits, cloud computing requirement, cloud deployment and service models that are needed to conceptualise a strategic cloud computing framework in the context of the South African Information technology professionals.

RQ2: What are the drivers of cloud computing for different stakeholders?

The ability to deliver the technology needs of an organization as a service is one of the main advantages of cloud computing. When conceptualized, the framework can be used to assess how different stakeholders embrace cloud-based tools such as emails, social networking, cloud-based communication tools, and information collection tools.

RQ3: What are the practical and theoretical contingencies for strategic cloud computing in the South African context?

Contingency theory attempts to describe the impact of contingent variables on organizations as a theoretical framework. The conceptual research framework discusses contingency factors that characterize the external and internal variables that may affect the decision-making process. The conceptual research framework consists of environmental uncertainty, strategy, size, and structure contingency variables.

RQ4: What are the factors influencing the adoption and use of cloud computing?

As per our conceptual framework, TOE theory will help to explain the factors that influence cloud computing adoption and use. Our conceptual framework also includes important factors as per the TOE framework. The elements of technology context (complexity, compatibility, and relative advantage), organisational context (policies, top management, and the size of the organisation), and the environmental context (completion pressure, government regulation and best practices). This is in line with the previous study of researchers such (Senyo, Effah and Addae, 2016); Gutierrez, Boukrami and Lumsden, 2015) who found in their studies that the factors of technology, organisation and environmental have a significant influence on cloud computing adoption or use.

RQ5: How can cloud computing be strategically adopted and used in a South African context?

The conceptual research framework is an overview of elements, which may be necessary for how cloud computing can be strategically adopted and used.

3.6 Summary of the chapter

This chapter presented and reviewed theoretical frameworks for the adoption or use of information systems and technology. These frameworks later informed the conceptual research framework that guided the study.

The next chapter discusses the research methodology followed in the studying of cloud computing adoption and use, in the context of South African information technology professionals.

CHAPTER 4: RESEARCH METHODOLOGY

4.1 Introduction

The previous chapter presented the theoretical background underpinning this study. This chapter explains the qualitative research methodology followed for this study.

The term research is described as "*an operation that contributes to a phenomenon's understanding*" (Hevner and Chatterjee 2010). The research process is undertaken to come up with a solution to a problem or to contribute new knowledge. Leedy and Ormrod (2010), the research methodology is described as "*the general approach taken by the researcher in the conduct of the research project*". The research methodology focuses on the research process and methods used in the study. A research design is a strategy or a blueprint of a research project. This chapter includes a plan or guide as to how the study was conducted.

This chapter provides a plan or direction as to how the study was conducted. This chapter is structured as follows; section 4.2 recaps the research objectives of this study. Section 4.3 discusses the ontological assumptions of this study and the epistemological assumptions is discussed in section 4.4. Research philosophy is discussed in section 4.5; the research approach is discussed in section 4.6. The research strategy is discussed in section 4.7 and the research design is discussed in 4.8. Data collection methods and data collection processes are discussed in section 4.9 and 4.10 respectively. Data analysis is discussed in section 4.11. Research trustworthiness is discussed in section 4.12. Validity and reliability in qualitative research are discussed in section 4.13. The research ethics are discussed in section 4.14.

The present study sought to explore and describe how cloud computing could be strategically adopted and used. This is done through the views and perspectives of South African information technology professionals. The next section presents an overview of the research.

4.2 Recap of Research Objectives

As described in Chapter 1, the goal of this study was to conceptualise a strategic cloud computing framework in the context of South African Information Technology Professionals. The research objectives of the study were to:

- Describe how cloud computing manifests in South Africa according to South African IT professionals.
- Analyse and describe the drivers of cloud computing for different stakeholders.
- Analyse and describe the practical and theoretical contingencies for strategic cloud computing in the South African context.
- Analyse and describe factors influencing the adoption and use of cloud computing.
- Determine how cloud computing could be adopted and used strategically in the South African context.

The section that follows discusses the ontological assumptions, epistemological assumptions and research philosophy stances of the study.

4.3 Research Philosophy

The research philosophy refers to a way of analysing social phenomena from which it is possible to obtain a clear understanding of these phenomena and try to clarify them. (Saunders, Lewis, and Thornhill 2016). The research philosophy is selected based on assumptions about the views of the study and how the environment is viewed.

The study's assumption underpins the research strategy and is based on the philosophical assumptions adopted. The study assumption about the world is based on ontological assumption and the nature of knowledge and knowledge is based on epistemological assumptions.

The study's philosophy can be classified as positivism, interpretivism, realism and design science research. The four study philosophies are discussed as follows:

- Positivism is defined as a research philosophy that relies on experiments, observation of reality and statistics. According to Collis and Hussey (2013), the assumptions are that reality is independent of the researcher. The research philosophy of positivism is often connected with the quantitative research study.

- Interpretivism is defined as a research philosophy that relies on the views and perceptions of participant's experiences of the external world. The interpretivism philosophical stance is subjective and relies on the participant's experience or participant's perception (Collis and Hussey, 2013).
- The realism research philosophy has the features of both positivism and interpretivism. The presence of a reality independent of human perceptions and behaviour is acknowledged by realism. According to Saunders, Lewis and Thornhill (2016), realism will affect their beliefs and behaviour.
- Design Science research is a research paradigm that has been advocated by Vaishnavi and Kuechler (2004). The research paradigm of design science originates from science and engineering. Design science research is seen as the paradigm of problem solving. Two main activities need to be conducted in design science research, such as creating knowledge by creating innovative objects such as things, ideas, practices and processes. The study of the objects is used efficiently.

Interpretivism research philosophy was deemed appropriate for the present study. According to Leedy & Ormrod (2010), the interpretivism philosophy is trying to understand people's behaviour, perspective and particular events external to the person. The present sought to understand cloud computing adoption and use from the perspectives of individual IT professionals.

4.3.1 Justification for following the interpretivism research philosophy

The **interpretivism** research philosophy was followed in this study as advocated by Saunders et al., (2016). The emphasis of this study was to understand how cloud computing could be strategically adopted and used sensitive to the South African context. Ontologically, the interpretive paradigm is involved in the research through multiple realities and socially constructed. The epistemological stance was to acquire knowledge by using interpretivism research philosophy to understand cloud computing and gathering rich information from individuals through semi-structured interviews. Therefore, the interpretive philosophy gave the study the best way to understand cloud computing from the individual's views and experiences.

4.4 Ontological Assumptions

Ontology is concerned with the question of what is the nature of reality (Creswell 2014). As explained by Creswell (2014), ontology refers to the essence of existence and its characteristics. The study ontological beliefs are based on the following:

- The nature of reality and being
- The reality is subjective with various types of evidence, as seen by the perceptions, views and experiences of the individual.
- The reality can be constructed by participants involved in the research situation
- The study ontological beliefs are examined through the expected answers to the research problem.

According to Willis (2007), the ontological stance can be idealism, materialism and metaphysical subjectivism. The materialist ontological beliefs are only on physical things. The idealist ontological beliefs are on mental and spiritual things. The metaphysical subjectivist ontological belief is on perceptions.

The ontological stance of this study is to gain further knowledge on cloud computing and subsequently how cloud computing could be strategically adopted and used sensitive to the South African context. The subjective evidence was collected on the cloud computing adoption and use from the individual's views, opinions and experiences.

4.5 Epistemological Assumptions

Epistemology is derived from *episteme,* the Greek word for *knowledge.* Epistemology is the theory of knowledge that informs the research. Creswell (2014) describes epistemology as "how researchers know what they know." Epistemology is concerned with the question of what constitutes knowledge and how knowledge is constructed. The study's epistemological beliefs are about the knowledge of cloud computing. The following epistemological assumptions guided the study

- How is the researcher related to those being researched?
- The researcher gets closer to the participants being studied but the researcher is independent of what is being researched.
- The researcher's epistemological beliefs are the relationship with what is being studied.

The positivist epistemological stance is concerned with observable social reality and the formulation of 'law-like generalisations and the realist epistemological stance is a concern that reality exists independently of perception. The positivist and realist epistemological stances are suitable for explanatory research.

In the present study, the question of what constitutes knowledge and how knowledge is answered by using the interpretivism research philosophy. That is, the epistemological stance was to acquire knowledge by using interpretivism research philosophy to understand cloud computing and subsequently how cloud computing could be strategically adopted and used sensitive to the South African context.

4.6 Research Approach

Research approaches are classified into either the inductive approach or the deductive approach, as explained by Saunders, Lewis and Thornhill (2016). The importance of the hypotheses to the analysis is the distinction between deductive and inductive approaches. The deductive method checks the validity of assumptions, while the inductive approach leads to new ideas, on the other side.

4.6.1 Deductive research approach

The deductive research approach is concerned with developing a hypothesis based on existing theory (Wilson 2010). In the deductive approach, there are a set of hypotheses, which need to be confirmed or rejected. Figure 4.1 presents the deductive approach path to the study:

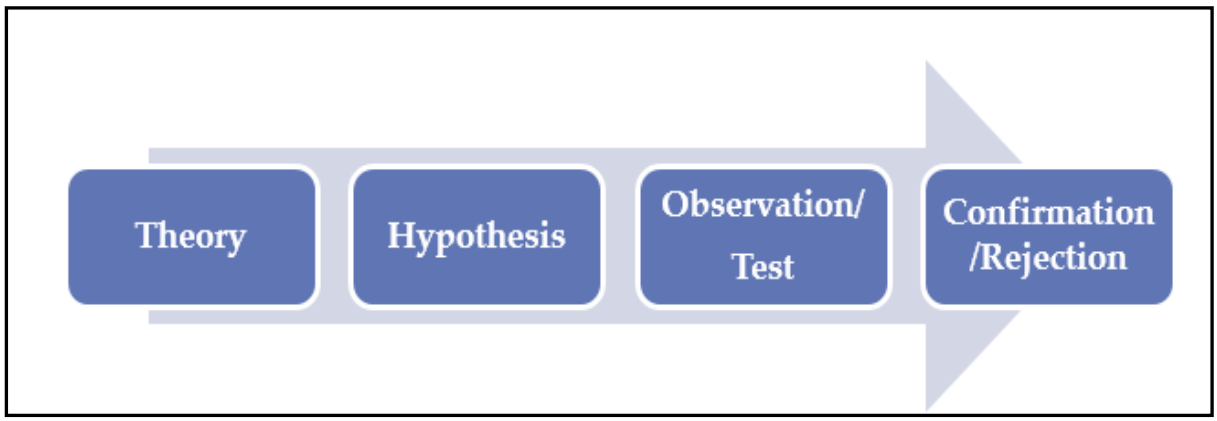

Figure 4.1: Deductive research approach (Saunders et al. 2016)

4.6.2 Inductive research approach

The inductive research approach is based on transforming specific observations into a general theory (Lancaster 2005). The inductive approach begins with research goals, research objectives and research questions that need to be reached. In the inductive approach, the objectives are achieved through finding answers to the research questions. Figure 4.2 presents the inductive approach path to the study:

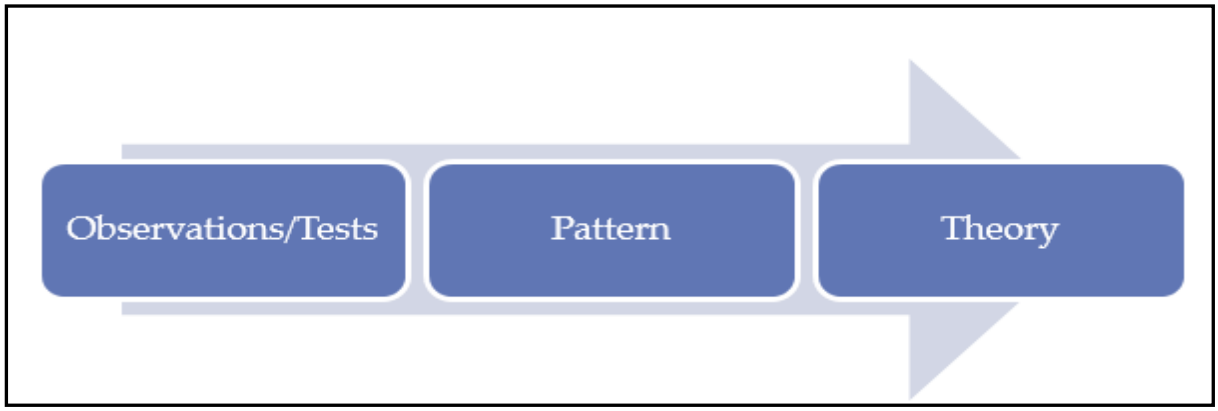

Figure 4.2: Inductive research approach (Saunders et al. 2016)

The study may be a quantitative approach or a qualitative approach and/or a combination of both approaches. The choice between the two depends on the field of study, the paradigm or philosophy of research, research problems, research questions, and the objectives of the research. To achieve the research objectives, the researcher selects the approach that will best address the research questions. The nature of this study is interpretive and a research approach is an inductive approach to qualitative research.

4.6.3 Justification for using an inductive research approach

The study mainly followed the inductive research approach. The reason for choosing the inductive method was to collect qualitative data from an individual with experience and knowledge of cloud computing to understanding how it could be strategically adopted and used sensitive to the South African context. The nature of this study is interpretive and the research approach is inductive.

4.7 Research Strategy

Saunders, Lewis and Thornhill (2016) describe a research strategy as "*the general plan of how the researcher will address the research questions*". The research strategy consists of

experimental, ground theory, surveys, case study, action research, ethnography and archival. Below is a discussion of the most popular study strategies.

4.7.1 Surveys

According to Saunders, Lewis and Thornhill (2016), the survey strategy often collects quantitative data, but can also, through open-ended questions, collect qualitative information. The survey technique is used to collect information within a given time frame from small or large numbers of individuals. A questionnaire to obtain objective data from a sample of the selected population is often conducted by the survey study technique.

4.7.2 Case Study

Creswell (2014) describes a case study as the study of a problem examined within a restricted system by one or more cases. Yin (2016) describes case study research as a practical examination that investigates a current event in a day-to-day setting where the constraints between the event and the setting are not well defined. According to Saunders, Lewis and Thornhill (2016), a case study is defined as “a strategy for doing research that involves an investigation of particular interest”.

Case studies are used to answer research questions such as "how" and "why" to identify a current phenomenon, and where the researcher has almost no influence over the events at all. The data collection techniques in case studies include observation, interviews, and review of existing documents.

4.7.3 Other Research Strategies

Action research, also known as participatory research, the aim of the research is highlighted. Action research requires research by doing something. Action research involves evaluating procedure and deciding if it is in line with best practices or approach.

Ethnography originated in the anthropology field. The strategy seeks to explain the way individuals connect with each other. The purpose of the social word is to define and explain.

Ground theory research does not have research objectives to measure against fact. From the study of a social condition, the ground theory produces theory.

Archival research is research that is conducted from existing materials such as administrative records and documents.

Experimental research is primarily in the study of science laboratories. Experimental research refers to the strategy of developing a research method.

4.7.4 Justification for selecting case study research strategy

The present study adopted a case study as a research strategy. The case study is a preferred research strategy, given the interpretive position and the nature of the research questions. The following are the main factors that motivated this study to pursue a case study research strategy over other research strategies. According to Yin (2016), there are three criteria for deciding on a study strategy.

- **Type of research questions**

The case study was preferred because the research questions take the form of the "how" and the "what". The study had to answer the primary research question *"How should cloud computing be strategically adopted and used sensitive to the South African context?"* The secondary research questions were 1) How does cloud computing manifest in South Africa according to South African IT professionals? 2) What are the drivers of cloud computing for different stakeholders? 3) What are the practical and theoretical contingencies for cloud computing adoption and use in a South African context? 4) What are the factors influencing its adoption and use of cloud computing? Moreover, 5) How can cloud computing be strategically adopted and used in a South African context from IT professionals' perspective? The research questions consist of how and what type of research questions, which makes a case study an appropriate research strategy.

- **The extent of control the researcher has over actual behavioural events**

The second condition is the extent of control the present study has over actual behavioural events. In this study, there was no control over the behaviour of IT managers, professionals,

cloud expects, consultants and users of cloud computing who were involved in the study. The researcher was outside of the "case."

- **The degree of focus on contemporary issues**

A case study strategy was used because it offered an understanding of a complex issue or object, adding value to existing knowledge garnered through previous research (Mason 2002). The purpose of this present study was to explore and describe how cloud computing could be strategically adopted and used sensitive to the South African context. A case study strategy was selected to obtain views, opinions, and experiences from IT managers, professionals, cloud expects, consultants and users through in-depth, semi-structured interviews. The reason for conducting interviews was to obtain rich information about cloud computing through individual views, opinions and experiences.

4.7.5 Limitation of Case studies

Case studies are in-depth investigations of a single person, group, event or community. some of the limitations of case study research (Robert K. Yin 2016) (Guba and Lincoln 1994).

- This study is exposed to regular case studies limitations, as the study is qualitative research studying IT professionals in the South African context. The study only focused on South African IT professional's views, opinion and experiences on cloud adoption and use.
- The limitation is the extent of generalization of the research findings. The case study provides little basis for the generalization of findings to the wider population.
- Qualitative researches are special and have different settings; the researchers own subjective may influence the research biasness. The researcher expertise, knowledge and intuition is a vital part of the case study approach.
- Case study data collection is time-consuming and even more time-consuming to analyse
- The case studies happen in the natural setting it difficult to replicate the study
- Small studies always raise issues of ethics. The limitation is at what point does a study become unethical?

4.8 Research Design

A research design is defined as a blueprint of how a researcher plans to conduct a study (Vinet and Zhedanov 2011). A research design focuses on the outcome and all the steps in the process to achieve that outcome. The research design is considering the type of data that would be collected, for example, the qualitative data, which inform the nature of the research.

4.8.1 Unit of Analysis

Babbie (2013) defines units of analysis as "the 'what' or 'whom' being studied. The emphasis is there must be a major entity that is being analysed. Cooper and Schindler (2011) define the unit of analysis as the level at which the research is performed and which objects are studied. In the present study, the unit of analysis is the individual, the IT professional.

4.8.2 Study Population

Bryman and Bell (2007) refer to the study population as "the totality of all members or subjects from which the sample is to be selected". Saunders, Lewis and Thornhill (2016) define a population as a complete set of cases or group of members. The population for the present study was IT professionals including senior managers, middle managers, IT/cloud experts, specialists and consultants who have working experience and knowledge of cloud computing adoption and use, including those who take decisions about cloud computing technology.

4.8.3 Participants

The participants of this study included IT professionals such as senior managers, middle managers, IT/cloud experts, specialists and consultants who have working experience and knowledge of cloud computing adoption and use, including those who take decisions about cloud computing technology. The participants were grouped according to their level of influence, interest, and involvement as stakeholders, as follows:

Level of influence

- Senior Managers– these were purposively chosen because of their strategic decision-making role within organisations.

Level of involvement

- Middle managers, cloud experts – these were purposively chosen because of their professional and operational involvement at the different levels in the organisation structure.
- Consultants – these were purposively chosen as both the customers and the service providers

Level of interest

- IT/cloud experts – these were purposively chosen to give a day to day perspective on cloud computing services

4.8.4 Sampling Techniques

The term "Sampling" refers to the process of selecting a subset or a portion of a larger or total population. According to Babbie (2013) sampling, consist of two types of sampling namely, probability and non-probability sampling.

Probability sampling

Probability sampling is a method in which, according to probability theory, samples are chosen. Some of the probability samplings are simple random sampling and systematic sampling.

Non-probability sampling

Non-probability sampling is a method in which probability theory does not suggest samples are chosen in any way. Non-probability sampling involves dependence on the subject's available, purposeful sampling, snowball sampling, and quota sampling.

Justification for using the purposive sampling technique

A method of non-probability sampling called purposive sampling was used in this study. The purpose of the sampling is to be defined as a non-probability sample in which the units to be sampled are selected based on the opinion of the researcher who would be most useful or representative.

The present study purposively sampled IT professionals, including senior managers, middle managers, cloud experts, and consultants with working experience and understanding of cloud computing adoption and use, including managers who make decisions about technology and services in cloud computing. The participants were chosen because of their working experience in cloud computing and they presented themselves in their private capacity.

4.8.5 Sampling Size

According to Sinkovics and Alfoldi (2012), a sufficient number of participants to reach the saturation point in a qualitative case study ranges from 15 to 20. As a reference, Baker and Edwards (2012) a number of 12 to 60 interviews is suggested as a guideline for a qualitative research study. The number is guided by research methodology and epistemological perspective. Small (2009) claims that it is important to achieve saturation in qualitative research to gain depth in the full spectrum of phenomena. According to Leedy and Ormrod (2010), a sample size between 5 and 25 is considered appropriate for a study.

Knowledge and experience with the adoption and use of cloud computing were the selection criteria in the purposeful sampling. This number was reached after the point of saturation based on the advice of Baker and Edwards (2012). The study has a sample of 34 participants. According to Yin (2016), when no new data is obtained and no new theme appears, a point of saturation is reached.

The 34 participants in the study are categorized according to table 4.1.

Table 4.1: Sample of IT professionals who participated in the study

Participants	Total Number
Senior Managers	8
Middle Managers	6
IT experts and specialists	10
Consultants	10
Total	**34**

Each class or cluster of IT professionals who participated in the study is shown in Table 4.1 above. Every class or cluster has given the cloud computing phenomenon a different perspective.

4.9 Data-collection Method

Kothari (2004) described data collection as a systematic collection of information that solves the research problem by using various techniques. In a natural environment, the aim was to collect data. Yin (2016) identified the six different sources of data collection, namely documents, archival reports, interviews, direct observations, participant observations and physical objects. However, the purpose of the study guides the selection of appropriate data collection technique.

Creswell (2011) claims that qualitative research requires different data collection methods, which include, but is not limited to, interviews, findings, case studies, focus groups, intervention research and ethnography. The qualitative data collection method was used in the present study. The qualitative methods of data collection involved conducting interviews and observations of the participants. The details of the study's qualitative methods are given below.

4.9.1 Interviews

According to Boyce and Neale (2006), interviews are characterized as qualitative interviewing techniques involving a person with a small number of participants to explore their perspectives on a specific concept.

Interviews are face-to-face interviews between an interviewer and an interviewee to obtain accurate details on a specific subject. Interviews are ways of obtaining knowledge using a series of pre-planned core questions through an oral quiz.

Depending on the study, interviews are the most widely used method of gathering data in qualitative research. There may be structured, semi-structured, or unstructured interviews.

Structured interviews

In a structured interview, the interviewer uses a set of predetermined questions, which are short and clearly worded. There are some close-ended questions asked by the interviewer and

detailed responses provided by the interviewee. Structured interviews may be standardized since all participants are asked the same questions.

Semi-structured interviews

Semi-structured interviews have characteristics of structured and unstructured interviews and therefore use both closed and open questions. As a result, it has the advantage of both processes. A collection of questions is prepared by the interviewer to be answered by all participants.

Unstructured interviews

Unstructured interviews allow the interviewer to ask some open-ended questions and the interviewee to freely express his / her own opinion. In the formulation of questions, unstructured interviews differ.

4.9.1.1 Advantages and disadvantages of interviews techniques

Bless and Higson-Smith (1995) and Brown (2001) cited the following as the advantage of qualitative interviews

- Qualitative interviews actively involve the respondent in the research process – thereby, empowering the respondents
- They allow free interaction between the interviewer and the interviewee
- They allow opportunities for clarification so that relevant data is captured
- The interviewer can decide the place for an interview in a private and silent place
- They offer researchers access to people's ideas, thoughts, and memories in their own words, rather than in the words of the researcher.

Disadvantages

- An interview can cause biases. The interviewer may give out an unconscious signal or guide the respondent to give answers expected by the interviewer
- Conducting interview studies can be very costly as well as very time-consuming
- Not very reliable – respondent may be asked different questions (non-standardised)
- Difficult to generalises
- Interview studies may provide less anonymity, which is a big concern for many respondents.

- There is a lack of accessibility to respondents since the respondents can be in around any corner of the world or country.

4.9.1.2 Justification for choosing semi-structured interviews

Semi-structured interviews were performed in the present study to ascertain the views of people with cloud computing expertise and knowledge. This has helped to better understand how, in the context of South Africa, cloud computing can be strategically adopted and used. The study uses a pluralistic approach to data collection.

In this study, the following method of data collection was used.

- Semi-structured interviews were used to collect primary data
- Interview questions were developed from literature and theories that grounded this study
- The researcher conducted face-to-face semi-structured interviews with the individual participants.
- The researcher developed an interview guide that was used during the interview processes (Attached as Appendix A).
- The aim of preparing an interview guide was to ensure quality and construct validity (Saunders et al., 2016).
- Telephonic follow-up was conducted when necessary.

The semi-structured interviews were conducted with IT senior managers, Executives and IT experts. This method allowed for asking additional questions, which sought clarity from the participants. The method allowed the researcher to explore questions in more depth to answer the research questions and fulfil the research goals in terms of having the substance to the responses rather than condensed quantities (Saunders et al. 2016).

4.9.2 Use of an interview guide

The interview guide was used to guide the interview process. The aim of preparing an interview guide was to ensure quality and construct validity (Saunders et al., 2016). From the literature and theories that grounded this research, interview questions were developed. Table 4.2 below provides an interview guide that was used in this study.

Table 4.2: Interview guide

Research objectives	**Interview Questions**
1. To describe how computing manifest in South Africa	a. In your view, what is your understanding of cloud computing?
	b. In your view, what are the key requirements (essential requirements) that should be taken into account, before moving into cloud computing? [Regulation requirements, organisation requirements, and technology requirements]
	c. In your view, what is the value derived from cloud computing? Alternatively, in your view, what are the benefits of moving to cloud computing?
	d. Describe the different deployment models in cloud computing are public cloud, private cloud, community cloud and hybrid cloud you are familiar with.
	e. In your view, out of the four deployment models, which deployment model is the most appropriate in the context of your work?
	f. Who manages your chosen deployment model and how?
	g. Who manages your type of deployment model?
	h. Most of the cloud computing service models are classified into three broad categories namely infrastructure as a service, platform as a service and software as a service.
	i. In your view, which service model is the most appropriate in the context of your work?
2. To describe the drivers of cloud computing for different stakeholders	a. In your view, who are your typical stakeholders?
	b. In your view, what is the role of stakeholders in cloud computing adoption and use?
	c. In your view, how does each stakeholder derive value from adopting and using cloud computing?

	d. In what ways stakeholders influence what happens in an organisation as far as adoption and use of cloud computing?
	e. In your view, are stakeholders ever held accountable? In what ways, are stakeholders held accountable?
	f. How are stakeholder handicapped (could not have influence)? In what ways are stakeholders handicapped?
3. To describe the practical and theoretical contingencies for strategic cloud computing in the South African context	a. In what ways a business strategy or IT strategy influence cloud computing adoption and use? How business strategy or IT strategy influence cloud computing adoption and use?
	b. In your view, what are the requirements to be taken into account when moving into the cloud computing environment?
	c. In your view, who should be making decisions? Do you believe they have appropriate skills or what skills and calibre should they have?
	d. In your view, what kind of organisation structure is appropriate for cloud computing adoption and use?
	e. In your view, does the structure influence the decision to adopt and use cloud computing?
	f. In your view, what is the impact of competitive pressure on cloud computing adoption and use in the context of your work?
	g. Name other external factors that influence cloud computing adoption and use in the context of your work? In your view, what are the external factors influencing cloud computing adoption and use in the context of your work?
4. To describe factors influencing the adoption and use of cloud computing?	a. In your view, in what way is the cloud computing adoption and use gives a relative advantage? Alternatively, how do relative advantage influence cloud adoption and use?
	b. In your view, in what way is top management support influence the adoption and use of cloud computing? Alternatively, how does top management support

	influence cloud computing adoption and use?
	c. In your view, what is the ideal size of an organisation or how does firm/organisation size influence cloud computing adoption and use?
	d. In your view, how does complexity influence cloud computing adoption and use?
	e. In your view, in what way is or how does the compatibility of cloud computing with existing infrastructure influence cloud computing adoption and use?

The section that follows discusses the data collection process.

4.10 Data-collection Process

The data collection process entails the gathering of information in the established systematic way and the data collected enables the researcher to answer the research questions.

4.10.1 Pilot Testing

A pilot test or pilot interviews were conducted with three participants. The pilot interviews were conducted to ascertain the following:

- The flow of questions on the interview guide
- The ease with which the questions were responded to by participants
- Interviewing techniques were practised
- Test the recording device
- Subsequently, a few changes were made to the interview schedule to cut the long questions, making them shorter and clearer.

4.10.2 Interviews

Semi-structured interviews were used in this study. In this study, primary data was collected through face-to-face semi-structured interviews with 34 participants.

Semi-structured face-to-face interviews are the most popularly used practices in business research. Collected information about the individual participants to determine their relevance

to the study. Before a formal invitation was issued, the researcher made contact with the individual participants telephonically. The interviews were conducted at a convenient time and place, which permitted the participant to speak freely. First, the researcher told the respondent of the purpose of the study and that participation was voluntary. The researcher asked the participant to sign a consent form at the beginning of an interview.

The researcher used the interview guide to ensure content and construct validity. The interviews were digitally recorded. It took an average of 45 minutes to do each interview and all interviews were recorded on a digital tape recorder. The interviews were subsequently transcribed for further study. During the interview sessions, the researcher maintained observation notes.

Table 4.3: Interview participants

Interview Participants	Total Number
IT Security Specialist	5
Technical Consultant	6
IT Infrastructure Specialists	5
Chief Information Officer	2
Business Analysts	5
Service Delivery Manager	2
Virtualization Specialist	5
IT Risk Manager	4
Total	**34**

4.10.3 Challenges during the data collection process

These are some of the challenges experienced during the data collection process:

- Some potential participants were hesitant to participate
- Participants reported feeling uncertain, at some point, about the confidentiality of the data collected.

- The setting of the interview is a crucial element. The interview location should be convenient for the participants to reduce the likelihood of disturbance and for the participant to freely express themselves
- The length of the interview determines how long participants will remain fully engaged.
- Lengthy interviews can create discomfort for participants. Some participants provide information to rush through the interview.
- Interviews can cause both the interviewer and the participants to be exhausted. This means that the quality of data can be decreased by researcher exhaustion. One interview was planned each day, with a question guide to keeping the track session.

4.11 Data Analysis

To gather data, the researcher used a case study research strategy and the method of analysis selected for this study was thematic analysis. The primary data was gathered from thirty-four (34) participants using semi-structured interviews. Until the point of saturation, semi-structured interviews were performed where no new insights surfaced. Some of the interviews were conducted face-to-face and others were conducted through a virtual platform, such as Zoom, Microsoft Teams and Skype for Business Skype. The data obtained from semi-structured interviews were audiotaped, transcribed and checked sentence by sentence.

According to Yin (2016), data analysis involves many processes of examining, categorizing, tabulating, and recombining the data towards deriving the results so desired from the input made. Creswell (2014) describes data analysis as the process that involves organizing, examining, and categorizing data with the aim of deriving meaning to find answers to the research questions. The analysis of qualitative data aims to discover patterns, concepts, themes, and meanings. The data analysis process is illustrated in figure 4.4

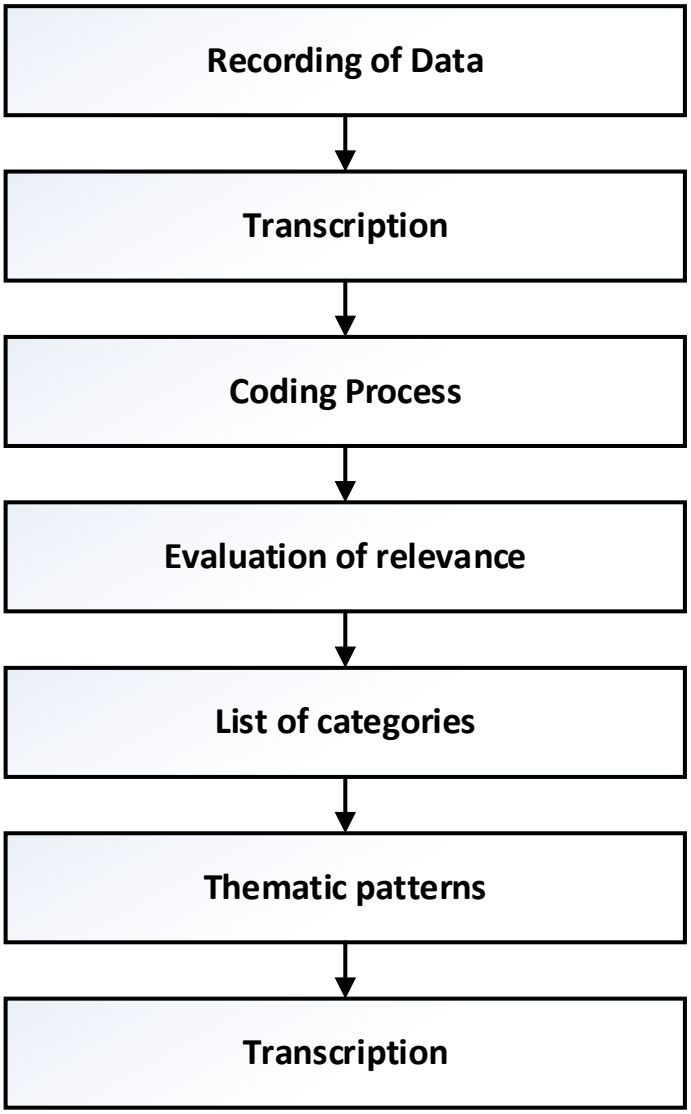

Figure 4.3: Data analysis process (Creswell, 2014)

The qualitative data analysis for the present study was done according to Creswell (2014).

4.11.1 Thematic Analysis

Thematic analysis is a popular tool for transcript qualitative analysis for the identification, analysis and reporting of themes within data. Thematic analysis is a tool used for defining, analysing and reporting patterns (themes) within the data (Braun and Clarke 2006). The thematic analysis is the most used qualitative method to analyse and define themes from interviews. The analysis is organized according to the predetermined themes. The themes were based on the elements of the conceptual research framework, research questions and the study's objectives.

According to Braun and Clarke (2006), theoretical thematic analysis is informed by the theoretical or analytical interest of the researcher in the field. Theoretical thematic analysis is used in this study. The data analysis was carried out according to themes, built on the study objectives and the framework of conceptual science. Additional key themes under which the views and insights of the participants are reported are further described.

For the purpose of this study. The analysis of data following a thematic analysis (Braun and Clarke, 2006) involving encoding the information obtained from the interviews. This goes to ensure the validity of the qualitative research data and helps towards proving that the findings are concluded with genuine information.

The main steps of thematic data analysis that were followed in this study are detailed below:

- Interview data from the recording device were transcribed verbatim into interview transcripts.
- Making efforts to read through all the raw data to get familiar with it and understand what is available.
- Formulate the meaning of the sentences or phrases from the raw data.
- The patterns of data were identified by the utilizing of the interview guide, with the researcher taking the time and
- The data were coded and identify patterns, categories, and themes
- Reviewing themes and locating common themes across the individual data and exploring the relationship between them
- Identifying common themes and conceptual ideas as well as the relationship among them
- Similar and different themes and categories, cross-themes matrix were developed
- Validate the study further by the participants to check that the transcript is an accurate description of their experiences.

In this study, each objective or research question was viewed as a theme with subthemes as they emerged from the data. These are the main themes are described in the literature:

1. To describe how cloud computing manifest in South Africa
2. To describe the drivers of cloud computing for different stakeholders
3. To describe the practical and theoretical contingencies for strategic cloud computing in the South African context

4. To describe factors influencing the adoption and use of cloud computing

4.12 Research Rigours

The quality of qualitative research cannot be determined as prescribed. The research rigour and validity are important in qualitative research. The research rigour of the analysis is that one-way researchers will reassure themselves and readers that their study results are worthy of publicity. According to Guba & Lincoln (1994), there are different criteria to assess the research rigour in qualitative research. These include credibility, dependability, transferability and confirmability. These research rigour criteria will be briefly defined.

4.12.1 Credibility

The concept of credibility refers to the value and believability of the findings. Member checking to test the findings and interpretations with the participants can operationalise the process. This study ensured that the research data is true by conducting the actual semi-structured interviews. The interviews were recorded using a digital audio recorder and stored in secure storage media for preservation. In addition, participants were provided with their transcribed interview to review and validate. By allowing the participants to read their transcribed interviews to ensure that they were correctly recorded and transcribed as is, this study ensured credibility.

The objectivity of this study was assessed using three methods. Firstly, the number of interviews given. There were 34 interviews performed, this number is higher than the 12 considered appropriate for a qualitative study, 6 to 25, as expressed by Creswell (2014). Secondly, this study has reached saturation. No new ideas came out of the last interviews. Thirdly, is the similarity in the sampling decision, where two comparative studies had sample sizes of between eleven and fourteen participants.

Member checking, where the researcher has returned to the participants to check that the transcript is an accurate description of their experiences. Debriefing sessions took place. The researcher engaged with those in the area, such as colleagues, scholars and peers, in peer review. Some assumptions made along the way were questioned by the fresh insight they gave.

4.12.2 Dependability

The concept of dependability refers to how stable is the data. To achieve dependability, researchers can ensure that research data is true by conducting the actual interviews, digitally audio recording and keeping in the secure storage media. The researcher captured the participants' exact words. The interviews were transcribed. The participants read their transcribed interviews to ensure that they have been correctly transcribed.

The data analysis was done according to themes that merged from the research objectives. The first theme concentrated on how cloud computing manifest in general. A basis for explaining the concept of cloud computing, the important things to be taken into account when shifting to the cloud, the advantages of cloud computing.

The second theme concentrated on the drivers of cloud computing for different stakeholders. The theme captured the contributions made by individual stakeholders to cloud computing adoption and use. The third theme concentrated mainly on contingencies that were practical and theoretical. Finally, the fourth theme defined the factors affecting cloud computing adoption and usage. The reliability of findings was assured by all these actions.

4.12.3 Transferability

The concept of transferability refers to particular findings being transferrable to the other context. In order to understand cloud computing, the researcher spent some time with individual people. The study was conducted in the context of South African IT professionals. The findings of the research cannot be extended to other professions; the study can, however, be applied in the sense of other business professionals or other countries. Qualitative researches are special and have different settings, the study findings cannot be generalised.

This study's context and location are in South Africa. The Republic of South Africa is a country situated in the southern part of Africa. This was a qualitative study and rather than generalizing the findings, the aim was to get an in-depth perspective. The study population was IT professionals, including senior managers, middle managers, cloud specialists, consultants, and cloud computing users with working experience and knowledge of the adoption and use of cloud computing, including those who make cloud computing technology decisions. Efforts

have been made to gain as many diverse viewpoints as possible, so numerous IT professionals have been consulted to ensure the profession is generalized.

4.12.4 Confirmability

The concept of confirmability refers to the reliability of the data. Furthermore, it is concerned with establishing that the assumptions and observations of the researcher are derived from the data, requiring the researcher to show how conclusions and interpretations have been reached. Through separately performing data audits of the actual interviews and reviewing the data collection process and data analysis, the research ensured confirmability.

Efforts were made to ensure that there is no chance of biasness, in order to gain credibility and the social position of the researcher does not affect the study. Explanations were given so that a holistic story from the interviews was presented during data analysis. This research was considered reliable and trustworthy as it had written and deduced its data correctly to facilitate the conclusion.

4.13 Research Ethics

According to Saunders, Lewis and Thornhill (2016), ethics implies behaviour with respect to others. This thesis adhered to the rules and guidelines laid down by the University of South Africa Research Ethics Committee. The researcher considered the following during the execution of this study through the cause of the study.

4.13.1 Permission to conduct the study

The researcher requested and received permission to perform the study from the Research and Ethics Committee at Unisa. The ethical clearance certificate was obtained from the University of South Africa's Graduate School of Business Leadership before data collection could begin. The researcher told the participants of the intent of the study and ensured the confidentiality and privacy of the participant.

4.13.2 Informed consent

The researcher told the participants of the study's purpose and the researcher sought the potential participants' consent. The researcher told the participants that, because participation

was voluntary, they had the right to withdraw from the study at any time. Before engaging in the study, the researcher sought direct informed consent from the prospective participant.

4.13.3 Right to privacy

The researcher observed the right to privacy of all the participants. The researcher informed the participants that all information that could disclose their identity would be treated in a strictly confidential way. The researcher told the participants that this study had been conducted anonymously.

4.13.4 Protection from harm

During the data collection process, the researcher ensured that no emotional and physical harm to the participants was caused and that normal ethical principles were taken into account and upheld to not cause any harm to the participants during the study. The researcher explained to the participant the purpose and the advantages of the study. The researcher carefully designed questions, not to infringe on the privacy of the participant. In the event that the participants had any questions during the interview, the researcher provided the participants with contact numbers to facilitate contact.

4.14 Summary of the chapter

This chapter provided a detailed research methodology followed during the study. This chapter started by explaining the research philosophical stance of the study. This was followed by a discussion of the research approach and strategy employed. The research design, the data analysis and the credibility of the study were detailed. The research ethics followed during the study were outlined, lastly.

The next chapter presents the findings from the study fieldwork

CHAPTER 5: DATA ANALYSIS AND DISCUSSION OF FINDINGS

5.1 Introduction

The previous chapter detailed the research methodology followed to collect and gather the thoughts, views, ideas and perceptions of IT professionals who have knowledge and experience in cloud computing adoption and use, to respond to the research questions. To recap, the primary research question for this study is "*How should cloud computing be strategically adopted and used sensitive to the South African context?*

The following secondary research questions are addressed to answer the primary research question:

- How does cloud computing manifest in South Africa according to South African IT professionals?
- What are the drivers of cloud computing for different stakeholders?
- What are the practical and theoretical contingencies for strategic cloud computing in the South African context?
- What are the factors influencing the adoption and use of cloud computing?
- How could cloud computing be strategically adopted and use in the South African context?

This chapter analyses the collected data and discusses the study findings. The following subsection gives the demographics of the study participants.

5.2 Overview of Study Participants

A total number of thirty-four (34) participants took part in the study. Semi-structured interviews were conducted until the point of saturation, where no new insights were surfacing. The participants were purposively chosen because of their ability to provide insights to the research questions based on their knowledge, expertise and experience in cloud computing adoption and use, as depicted in Table 5.2 below.

Table 5.2: Participants Profile

Interview Participants	Total Number
IT Security Specialists	5
Technical Consultants	6
IT Infrastructure Specialists	5
Chief Information Officers	2
Business Analysts	5
IT Service Delivery Managers	3
IT Virtualization Specialists	5
IT Risk Managers	3
Total	**34**

Table 5.2 above indicates that the participants have diverse IT roles representing the varied IT professions. The researchers assigned pseudonyms to each participant for anonymity purposes, such as Participant_01, Participant_02, and Participant_03, and so on, to maintain the participant's anonymity. To maintain confidentiality, pseudonyms were used to mark the transcripts and field notes. The following section addresses the method of the data analysis process.

5.3 Discussion on the link between themes and findings

The four research questions were broadly supported by semi-structured interview data, with certain themes and subthemes emerging more strongly than others do. The analysis and discussions is done following the study objectives as themes and subthemes, as illustrated in Table 5.1.

Table 5.1: Study objectives and themes

Theme	Sub-themes
To describe how cloud computing manifest in South Africa according to South African IT professionals	Cloud computing concept
	Cloud computing requirements
	Cloud computing benefits
	Cloud computing deployment models

	Cloud computing service models
To describe the drivers of cloud computing for different stakeholders.	Cloud computing stakeholders and classification
To describe the practical and theoretical contingencies for strategic cloud computing in the South African context.	Organisation strategy
	Organisation competencies
	Organisation size and structure
	Environment uncertainty
To describe factors influencing the adoption and use of cloud computing	Organisation context
	Technology context

Each of the research objectives are discussed below as themes to illustrate the link between a theme and findings. The following section discusses the first themes "How cloud computing manifest in South Africa.

5.4 Theme One: How cloud computing manifests in South Africa according to South African IT professionals

The first theme "*how cloud computing manifest in South Africa according to South African IT professionals*" provided the basis for defining the concept of cloud computing, the important things to be taken into account when moving to the cloud, the advantages of cloud computing over and on premise computing. Also, in the context of individual IT professionals, consider the deployment and service models.

This section answers the first research question of "*How does cloud computing manifest in South Africa according to South African IT professionals?*" The data analysis follows a similar process, the interview question (what the researcher wanted to know), and the participants' response in italics. The researcher's comments are also given. The following sub-themes were illustrated by this theme, namely the cloud computing concept, cloud computing requirements, cloud computing advantages, deployment models, and service model.

5.4.1 Sub-theme: Cloud computing concept

This subtheme ascertains how familiar the participants are with the concept of cloud computing. The rationale for this theme emanates from chapter two, the survey of scholarship and theoretical foundation, which shows that there are wide views regarding the understanding of cloud computing, there are different perspectives.

Interview question: *In your view, what is your understanding of cloud computing?*

The participants concurred with the statement that cloud computing is reshaping how IT resources are consumed. The following extracts below illustrate the participants understanding of the concept of cloud computing from a different point of views. Participant_03 elaborated that:

> [Participant_03] "…*the way I understand it is that cloud computing is a form of storage, for example, virtual storage, where data is stored somewhere in the cloud and it can be accessed via the Internet. Our services are managed by the third party, Microsoft Azure*"

Participant_06 also agreed to this answer:

> [Participant_06] "…*to my understanding, cloud computing is basically an external data centre like AWS that you connect to through the Internet. You can build a virtual machine in a cloud environment and have access to the software*"

Participant_01 also added that:

> [Participant_01] "…*cloud computing is hosted services delivered over the Internet*"

A similar account by Participant_02

> [Participant_02] "…*cloud computing is more of a technology that gives your access to IT resources via the Internet to enable a user to create a virtual machine or use the software as a service*"

The above statements support Gartner's concept of cloud computing, which describes cloud computing as "*a computing style in which scalable and elastic IT-enabled capabilities are delivered as a service using Internet technologies to external customers.*" (Gartner, 2010).

Researcher's comments

The participants have a good knowledge of cloud computing and are able to describe cloud computing from a different point of views. The cloud computing paradigm enables the provision of IT resources as service remotely via the Internet. The above highlight that the general understanding of cloud computing is consistent across all participants.

5.4.2 Sub-theme: Requirements for cloud computing

The subtheme solicits the opinions of participants about the pre-requirements to the cloud computing environment.

Interview question: *In your view, what are the key requirements (essential requirements) that should be taken into account, before moving into cloud computing? [Regulation requirements, organisation requirements, and technology requirements]*

The participants were asked to identify the requirements to be taken into account when moving into the cloud computing environment. Moving to the cloud computing environment should be planned activities that take into account issues such as regulatory requirements, organisation requirements, and technology requirements. The following quotes from the interviewed participants managed to list their pre-requirements before moving to the cloud environment. Participant_04 elaborated that:

> [Participant_04] *"...Okay, I guess, the main concern moving to the cloud environment will be security. You are taking your company data to somewhere else, so what happens to company data should be a data breach? Although the research into cloud computing environment assures that cloud computing is more secured"*

> [Participant_11] "*…we need to develop the following cloud key performance metrics, for example, build a data migration plan, set cloud governance policies, data security, and a backup and recovery plan for your cloud infrastructure.*

The participant believes that the security concerns in the cloud environment can be alleviated by a service level agreement (SLA) that can be signed between the cloud computing service provider and the organisation.

> [Participant_19] *"When you enter into a contract or service level agreements with the third party such as cloud service provider. The security breaches and service restorations times must be defined. The service provider is held accountable should they lose the company data... this must form part of the service level agreements"*

Participants identified several requirements to be taken into account when moving to the cloud computing environment:

[Participant_04] *"...the following can be our checklist before moving workloads to the cloud for example…*

- *The organisation to establish its cloud key performance indicators, such as performance matrix, security requirements, etc.*
- *Together with the service provider, the organisation need to create cloud migration plans*
- *Enter into service level agreement for the availability of the system and performance matrix and response to service tickets.*
- *Together with the service provider, the organisation need to create a cloud computing backup and recovery plan.*

As pointed out by Kshetri (2012), a plan needs to exist to address concerns that are related to data security, data privacy and the protection of sensitive data in the cloud computing environment.

Researcher's Comments

Participants are aware of the requirements when moving to the cloud computing environment and are able to list the requirements to be taken into account. For organisations, moving to a cloud computing environment has more economic value such as cost savings.

5.4.3 Sub-theme: Cloud computing benefits

The subtheme solicits the opinions of participants about the benefits that come with cloud computing. Moving to cloud computing have many potentials for organisations. Cloud computing allows organisations to eliminate the initial upfront investments in IT infrastructure.

Interview question: *In your view, what is the value derived from cloud computing? Alternatively, in your view, what are the benefits of moving to cloud computing?*

When moving to the cloud computing environment, participants are asked to explain the advantages of cloud computing or the value derived. The highlights from these interviews are:

[Participant_07] *"...The most benefits of moving to cloud computing will be to reduce complexity in our process, reduce physical hardware and by doing this, the cost is saved by reducing hardware and maintenance costs".*

> [Participant_23] *"…cloud computing gives the organisation the competitive advantage … you can access your data anywhere using any device such as mobile device …"*
>
> [Participant_17] *"…Cloud computing services allow staff members to access organisation data from any location at any time"*

Participant_08 also added that:

> [Participant_08] *"...Instead of running physical servers in an in-house data centre. The cost of hardware, maintenance and software costs can be reduced by cloud computing. Through shifting workloads into cloud computing, IT spending is minimized because resources are consumed as a pay-as-your-use service."*

Other benefits of cloud computing are efficiency, high availability and mobility which allows individuals more flexibility in their work.

> [Participant_05] *"...cloud computing is more flexible in that services can be accessed at anytime from anywhere with an Internet connection. Efficiency as a benefit, enterprise users can get applications to the market quickly without worry about the infrastructure. This results in the reduction of IT costs"*

As pointed out by Marston et al. (2011), cloud computing entails cost saving, resource flexibility and a pay-as-use model. The findings were consistent with the literature reviewed. The findings were similar to the reviewed literature. Cloud computing provides organizations many advantages, such as lower hardware upfront costs, improved mobility, flexibility and scalability of resources (increasing or decreasing computing capacity) (Miller 2009).

Researcher's Comments

Participants are able to identify cloud computing's potential benefits. The participants agreed that cloud computing provides advantages such as faster hardware provision, pay as you use model, virtualization, pooled infrastructure and data security. Varia (2010) confirms the above argument by highlighting that cloud computing provides advantages such as fast hardware provision, pay as you use model, virtualization, pooled infrastructure, and data security.

5.4.4 Sub-theme: Cloud computing deployment models

The sub-theme cloud computing deployment model deals with how the cloud can be implemented. The deployment models are divided into the public cloud, private cloud, community cloud, and hybrid cloud. The organisations or individuals' users can choose from the four different types of cloud computing deployment model, depending on their business needs or requirements (Mell and Grance, 2011; Mohlameane and Ruxwana, 2014; Marston et al., 2011).

The participants were asked to highlight which deployment model means to them, how familiar are they with each deployment model, what experience they have on each deployment model, which of the four-deployment model is the most appropriate in the context of their work and who manages the deployment model.

Interview question: *Describe the different deployment models in cloud computing are public cloud, private cloud, community cloud and hybrid cloud you are familiar with?*

The interview questions served to assess what each deployment model meant to a participant, how familiar is the participant with each deployment model and what experience does a participant have for each deployment model

Interview question: *In your view, out of the four deployment models, which deployment model is the most appropriate in the context of your work?*

Interview question: *Who manages your chosen deployment model and how?*

This question serves to assess whether the deployment model is managed internally within the organisation or by the cloud service provider. The following are the extracts from the interviews about cloud computing deployment models and the comments are similar to that of the literature reviewed.

> [Participant_04] *"...based on my opinion, public cloud is the most readily available type of cloud, like Gmail and drop Box. This is the most popular one [How familiar are you with public cloud?] I am very familiar with the public cloud [what is your experience with the public cloud?] Our company mailboxes are hosted in the Office365*

environment and I have a Dropbox account and Microsoft One Drive are use both of them to back up my data"

The participant indicated that the public cloud was more familiar and appropriate to the context of their work

[Participant_02] *"...I am very familiar with the public cloud. The public cloud is, for me, described as a computing service provided over the Internet by a third party. Public Cloud provides applications such as Google Drive, Microsoft Azure (virtual machines, backup) and cloud storage.*

The participant indicates that the hybrid cloud is more suitable for the context of their work

[Participant_10] *"...in my opinion hybrid cloud is the in-house infrastructure that includes links between privately-owned infrastructure (private cloud) and the one publicly available cloud which is owned by the third party for example office365 federated server to the AD account"*

Researcher's Comments

The findings show that the public cloud is the most common option. Organizations are increasingly moving some of their workloads from the on-site data centre to the public cloud. Furthermore, another implementation model is a hybrid cloud that is gaining popularity as organizations still retain their data centres and transfer certain workloads into cloud computing.

5.4.5 Sub-theme: Cloud computing service models

The sub-theme cloud computing service model deals with how cloud computing services are consumed. The service models are infrastructure as a service, platform as a service and software as a service.

The participants were asked to highlight which service model they prefer, how familiar are they with each service model, what experience they have with each service model, which of the three-service model is the most appropriate in the context of their work and who manages the service model.

Interview question: *Most of the cloud computing service models are classified into three broad categories namely infrastructure as a service, platform as a service and software as a service.*

These questions serve to assess what each service model mean to a participant, how familiar is the participant with each service model and what experience does a participant have for each service model.

Interview question: *In your view, which service model is the most appropriate in the context of your work?*

This question serves to assess which service model is the most appropriate in the context of their work. The following are the extracts from the interviews about cloud computing service models and the responses are similar to the literature reviewed.

> [Participant_07] *"...the infrastructure as a service in the AWS or Microsoft Azure environment provides the ability to create virtual networking, virtual firewalls, virtual machine and virtual storage over the Internet"*
>
> [Participant_10] *"…we use cloud computing Microsoft Azure Recovery Service Agent to backup files and folders on premise or in the cloud into Azure recovery vault. This ensures that organisational data is available both on premise and cloud computing ".*
>
> [Participant_04] *"...the platform as service is less used in our environment. My understanding of platform as a service is that it allows programs to be created, run and managed in the platform environment, for example, Windows Azure, Google App Engine"*
>
> [Participant_06] *"...In my opinion, software as a service is a packaged software that is hosted by the cloud services provider and made available over the Internet to users or customers, such as Gmail, Office 365 and Dropbox storage"*

Researcher's Comments

The findings show that participants have high levels of awareness about different service models of cloud computing varies among the participants. The three cloud service models can be applied to any organisations depending on their needs. The participants choose a service model, which they perceive to be suitable for an organisation.

The software as a service is the most suitable service models for individuals and most organisations, followed by the infrastructure as a service model. The service model preferences may be attributed to the organisation's needs. Furthermore, the service model chose may depend on the benefits that an organisation may y derive from the services in each service model.

5.4.6 Summary of research findings – Theme one: how cloud computing manifests in South Africa according to South African IT professionals

The first theme "*how cloud computing manifest in South Africa according to South African IT professionals*". The theme provided the basis for explaining the cloud computing concept, the advantages of cloud computing and the factors to be taken into consideration when bringing workloads into the cloud computing environment. The cloud deployment model and cloud service models are also discussed in the theme.

The key findings for theme one are summarised as follows:

- Most of the participants who took part in the semi-structured interviews are familiar with the concept of cloud computing. The findings are consistent with the definition of cloud computing by Gartner researchers. Gartner defined cloud computing as "*a computing style in which scalable and elastic IT-enabled capabilities are delivered as a service using Internet technologies to external customers.*" (Gartner, 2010).
- Organizations move their workloads slowly from the on-site data centre to the public cloud. All the participants managed to list their pre-requirements, before transferring their workloads into the cloud environment.
- Participants were able to identify cloud computing's potential benefits. Reducing operating costs and maintenance costs of IT infrastructure, platforms and software are among the advantages of cloud computing.
- The findings were consistent with the reviewed literature. Cloud computing provides organizations with many advantages, such as lower hardware upfront costs, improved mobility when required by increasing or decreasing computing capacity. (2009 Miller).
- Cloud computing, as pointed out by Marston et al. (2011), has the ability to have a beneficial influence on adoption and use. The benefits of the cloud include cost savings, resource flexibility and a pay-as-use model.
- Organizations are increasingly moving some of their workloads, such as Microsoft Office 365, from the on-site data centre to the public cloud. Furthermore, another

implementation model is a hybrid cloud that is gaining popularity as companies still retain their data centres and switch some workloads to cloud computing.

- The most suitable service models from individuals and most organizations were the software as a service, followed by the infrastructure as a service model.
- The findings on cloud service models agree with the literature. Erdogmus (2009) conducted a study and discovered that software as a service is viewed as the core concept of cloud computing. Software as a service may be used regardless of the deployment model.

5.5 Theme Two: The drivers of cloud computing for different stakeholders.

The second theme "*the drivers of cloud computing for different stakeholders*" – captured the contributions that individual stakeholders make to the adoption and use of cloud computing. The rationale for these questions aimed at determining who the stakeholders when coming to adopting are and using cloud computing, how each stakeholder derives value out of cloud computing, in what ways stakeholders influence what happens.

The theme answers the second research question of "*What are the drivers of cloud computing for different stakeholders?"* The data analysis followed a similar process, the interview question (what the researcher wanted to know), and the participants' response in italics. The researcher's comments are given. This theme highlighted the following sub-theme namely cloud computing stakeholder value. The next subsection discusses cloud computing stakeholder value.

5.5.1 Sub-theme: Cloud computing stakeholder and classification

The purpose of this question was to determine how participants are familiar with how each stakeholder derives value from the adoption and use of cloud computing and how stakeholders influence the adoption and use of cloud computing. Below are related questions and the answers obtained from different participants.

Interview question: *In your view, who are your stakeholders?*

In deciding to adopt and use cloud computing, who are the typical stakeholders. This question aimed to decide how familiar the participants were with their stakeholders. The extracts from

the interviews given show a few of the answers that are relevant and appropriate to the stakeholder question:

> [Participant_01]: *"...my organisation actively engage with our stakeholders includes competitors, suppliers, customers and public authorities"*
>
> [Participant_17]: *"...the bank actively* to *be working with suppliers, employees, investors, government organisation, clients and regulators"*
>
> [Participant_23]: *"...our company engage with the following stakeholders, business partners, suppliers, NGO's, employees and customers"*
>
> [Participant_28]: *"...our internal stakeholders include senior managers, business process owners, IT managers and internal staff members"*
>
> [Participant_30]: *"...working with suppliers, employees, government organisation, customers and regulators"*

The participants managed to identify different stakeholders. As pointed out by Freeman (1984), stakeholders are divided into internal stakeholders and external stakeholders. This study identified the internal stakeholders such as business process owners, customers/clients, creditors, suppliers and employees. The external stakeholders were identified such as government regulators, investors, third parties (NGO's, public authorities), and the government.

Researcher's Comments

In this study, the findings are confirming that participants managed to list their typical stakeholders. This shows the importance of knowing your stakeholders.

Interview question: *In your view, what is the role of stakeholders in the adoption and user of cloud computing?*

The interview question served to assess the role of stakeholders in the adoption and use of cloud computing. The following extracts captured the foregoing sentiment:

[Participant_04] *"...Stakeholder role change from traditional stakeholder in the cloud environment. Stakeholder roles will change from participatory stakeholders to decision-making stakeholders."*

[Participant_19] "*…the success of any cloud project depends on the process, people and technology…The role of a stakeholder such a cloud expert is to manage the day to day cloud operations*"

[Participant_21] "*…to ensure the most effective strategy and solutions, it is important to engage business stakeholders in cloud understanding.*"

[Participant_26] *"…As a project sponsor my role is to support cloud computing strategy one of the strategies to enhance the competitiveness of innovative ICT"*

Interview question: *How does each stakeholder derive value out of adopting and use of cloud computing?*

The interview question was aimed at obtaining views about each stakeholder derives from adopting and using a cloud computing environment. The following are the extracts from the interviews about stakeholders derives from adopting and using the cloud computing environment:

[Participant_11] *"...The benefits that could help to outperform competition such as financial benefits, mobility, and productivity - cloud-based application, availability -> 24/7 application access"*

[Participant_12] *"...Cloud computing technology gives all employees access; they can access their job anywhere at any time, giving them great mobility."*

Interview question: *In what ways stakeholders influence what happens in an organisation as far as adopt and use of cloud computing?*

The interview question served to assess the stakeholder's influence on what happens in the organisation as far as the adoption and use of cloud computing. The following are the extracts from the interviews.

[Participant_13] *"... Our stakeholders are influencing cloud computing adoption and use. The IT department needs to consider the expectations of the stakeholders."*

[Participant_10] *"…Without the buy-in of stakeholders, you cannot move forward and introduce cloud services."*

Interview question: *In your view, are stakeholders ever held accountable? In what ways, are stakeholders held accountable?*

The interview question served to assess whether stakeholders are ever held accountable. The following are the extracts from the interviews.

[Participant_23] *"... Stakeholders are mindful that there are both advantages and risks to any change to their requirements. The role of stakeholders in decision making is accountable."*

[Participant_14] *"...Our service provider, for example, provides our business with third-line support. What is happening is that their services are managed via a service level agreement. It is clear that they should be held accountable if they do not meet our requirements"*

Interview question: *How are stakeholder handicapped (could not have influence)? In what ways are stakeholders handicapped?*

The interview question served to assess whether if stakeholders are handicapped, they do not have any influence when coming to the adoption and use of cloud computing. The extracts from the interviews provided show a few of the responses that are relevant and appropriate to this question.

[Participant_34] *"...Our stakeholders, in my view, are not disadvantaged. Our stakeholders recognize their role in the decision-making process of adopting and using cloud computing."*

[Participant_15] *"...If top management does not support what you plan to do or does not support cloud service adoption, then it means that the IT department or other stakeholders are handicapped."*

Researcher's Comments

IT professionals who took part in the semi-structured interviews have highlighted the importance of stakeholder management when deciding on the adoption and use of cloud computing within an organisation. All of the participants were able to list their typical stakeholders, the role played by stakeholders in cloud computing adoption and use. The stakeholder value is deriving from how stakeholders are often kept accountable when adopting and using the cloud computing environment.

5.5.2 Summary of research findings – Theme two: The drivers of cloud computing for different stakeholders

The second theme analyses and describe the drivers of cloud computing for different stakeholders. The second theme was the contributions made by individual stakeholders to the adoption and usage of cloud computing.

The research findings for theme one are summarised as follows:

- All participants have managed to define their typical stakeholders and the role of stakeholders in cloud computing adoption and usage.
- The relationship between stakeholders and organisations needs to be recognized in order to manage stakeholder groups.
- The findings of this study are that the role of stakeholders is gaining interest in the decision-making process.
- The theory of stakeholders is used to analyse management decisions regarding managing stakeholders ' interests.
- In deciding on the adoption and use of cloud technology within the organisation, the participants highlighted the importance of stakeholder management.
- Different stakeholders gain benefit from cloud computing adoption and use.

5.6 Theme Three: The practical and theoretical contingencies for strategic cloud computing in the South African context.

The third theme "*The practical and theoretical contingencies for strategic cloud computing in the South African context*" – captured the practical contingencies and theoretical contingencies for the adoption and use of cloud computing. The rationale for these questions was to assess the variable contingencies such as organization strategy or IT strategy, organizational size, organizational structure, and environmental uncertainty when implementing and using cloud computing.

This theme answers the third research question of "*What are the practical and theoretical contingencies for strategic cloud computing in the South African context?"* The data analysis followed a similar process, the interview question (what the researcher wanted to know), and the participants' response in italics. The researcher's comments are given. This theme highlighted the following sub-themes namely organisation strategy, organisation competencies, organisation size and structure, environment uncertainty. The next subsection discusses the organisation strategy.

5.6.1 Sub-theme: Organisation strategy

The sub-theme organisation strategy deals with how the business strategy clearly defines the business outcomes your organisation seeks and how your organisation is going to achieve them. The strategy of an organisation also helps in the relationship between organisational goals and technological needs.

Interview question: *In what ways a business strategy or IT strategy influence cloud computing adoption and use? How business strategy or IT strategy influence cloud computing adoption and use?*

A strategy is described as future-oriented strategies to engage with the competitive environment in order to achieve business objectives and goals (Pearce and Robinson, 2000). The objective of this question was to ascertain how the organisation strategy or the IT strategy influences the adoption and use of cloud computing. The business strategy clearly defines the business outcomes your organisation sought and how the organisation is planning to achieve them. The following are the extracts from the interviews about organisation strategy:

[Participant_19] *"...There is a need for a reliable, but affordable technology that provides flexibility and scalability that is needed more than ever*"

[Participant_12] *"...There is a need to match the IT strategy with ever-changing technologies to meet the objectives and goals of the company."*

[Participant_25] *"...A cloud strategy must address the overall business strategy. A cloud strategy identifying business goals and mapping benefits of the cloud to them*"

Interview question: *In your view, what are the requirements to be taken into account when moving into the cloud computing environment*?

The interview question served to assess opinions regarding the requirements to be taken into account when moving into the cloud computing environment. The following quotes from the interviewed participants managed to list the things that need to be there for cloud computing adoption and use to be smooth include:

[Participant_07, Participant_11, Particant_15, Participant_18, Participant_04] listed the following to ensure cloud computing is used and adopted smoothly:

- *"...there is a need to involve all the key stakeholders early and through the process*."
- *"...to understand stakeholder requirements and priorities in the process of adoption and use of cloud computing"*.
- *"...develop a business case for adoption and use of cloud computing including total costs of ownership and the return on the investment analysis"*.
- *"...determine which of the current workloads or applications are most suitable to be moved into the cloud computing environment"*.
- *"...determine the security and compliance needs"*
- *"...determine the network bandwidth requirements and the costs analysis"*

The purpose of the question was to reveal what things needed to be there for the adoption and use of cloud computing to be smooth. The views from the participants ranged from the stakeholder participation, prioritisation of stakeholder needs, compatibility of existing applications with cloud environment and the security and compliance needs.

5.6.2 Sub-theme: Organisation competencies

The sub-theme organisation competencies deal with the skills sets that are required to successfully adopt and use cloud computing. Cloud computing has changed the way IT services are consumed in the organization. The organization's IT skills affect cloud computing's efficient adoption and use. A study by Borgman et al. (2013) examined how cloud / IT skills influence cloud computing adoption and use. The study found that the greater the IT expertise and management experience of cloud computing, the greater the chances of successfully implementing and using cloud computing.

Interview question: *In your view, who should be making decisions? Do you believe they have appropriate skills or what skills and calibre should they have?*

The interview question served to solicit opinions regarding the cloud computing and IT skills set and the calibre of the organisation employees who are making decisions on the adoption and use of cloud computing. The following are the extracts from the interviews about organisation competencies:

> [Participant_02] *"...The more the cloud implementation skills, the better the chance to implement cloud more successfully. The manager should possess some cloud computing background to make an informed decision".*

The present study found that most of the participants hold appropriate qualifications and skills sets to successfully adopt and use cloud computing in their organisation.

> [Participant_14] *"...Okay, so I hold a Diploma in IT support, B-tech in Information technology and I enrolled for Master in computing"*

> [Participant_06] "*…IT employees have strong knowledge and understand the basic structure of cloud computing, different models of cloud computing and types of cloud services.*"

Researcher's Comments

The study findings are that the strategy of an organisation also assists in the relationship between organizational goals and technological needs. The biggest attraction to the adoption

and usage of cloud computing is the advantages that pay as you use model, the decline in maintenance budgets, and the need to remain relevant and competitive. Then study identified strategy as future-oriented strategies to engage with the competitive environment in order to achieve business objectives and goals.

Furthermore, the findings demonstrate that the greater the IT expertise and management experience of cloud computing, the higher the chances of successfully implementing and using cloud computing.

5.6.3 Sub-theme: Organisation size and structure

The sub-theme organisation size and structure deals with how cloud computing adoption and usage could be influenced by the organizational structure and size. This question aimed to request views and opinions from participants on how the organizational structure and size could influence the organization's decision to adopt and use cloud computing.

Interview question: *In your view, what kind of organisation structure is appropriate for cloud computing adoption and use?*

Interview question: *In your view, does the structure influence the decision to adopt and use cloud computing?*

Both interview questions served to assess the kind of organisational structure that allows the adoption and use of cloud computing. The following are the extracts from the interviews about both questions.

> [Participant_22] *"...the organisational structure does influence the adoption and use of cloud computing. The more the organisational hierarchical structure, the more the delays to implement decisions. A typical 6 months' project might be delayed because of decision making structures"*

The response from another participant gives a contrasting view of the ideal kind of organisational structure that would allow the adoption and use of cloud computing in the organisation

[Participant_29] *"…The structure of the organization does not influence the decision to implement and use cloud computing. The decision is guided by the goals and objectives of the organisation."*

Researcher's comments

The findings of the study on organizational structure and organizational size offered a mixed view of whether an organization's structure and organization's size could affect cloud computing adoption and usage. The researcher assumes that by adopting and using cloud computing, small and medium-sized companies appear to be more creative and innovative.

5.6.4 Sub-theme: Environment uncertainty

Environmental uncertainty relates to external environmental conditions that are linked to the external world in which the organization performs its operations. This question aimed to seek opinions on environmental factors and how they influence decisions on cloud computing adoption and usage.

Interview question: *In your view, what is the impact of competitive pressure on cloud computing adoption and use in the context of your work?*

The interview question served to assess whether competition pressure influences cloud computing adoption and use. The following are the extracts from the interviews about the impact of competitive pressure on cloud computing adoption and use.

[Participant_12] *"...Competition is healthy...this enables us to adapt and test the technology before our competitors can do that"*

[Participant_23] "*...We operate in a competitive environment and cloud computing will give us the edge over our competitors*"

Interview question: *Name other external factors that influence cloud computing adoption and use in the context of your work? In your view, what are the external factors influencing cloud computing adoption and use in the context of your work?*

The interview question served to identify other external factors, such as the reliable supply of electricity that influence cloud computing adoption and use. In answer to this question, the

following are the extracts from the interviews, which relate to the external factors influencing cloud computing adoption and use.

> [Participant_08] "*...in my view the reliable and affordable power supplier is the most important factor in the adoption and use of cloud computing*".

> [Participant_19] "*…having the most reliable supply of electricity remains the most significant factor in the adoption and use of cloud computing*"

In the context of South Africa, bandwidth costs have an influence on the adoption and use of cloud computing. This is the opinion of the participant who stated:

> [Participant_25] *"...In South Africa, the cost of bandwidth remains a challenge. Organizations need to calculate how much cloud service usage would cost."*

Researcher's comments

The study found that in the adoption and use of cloud computing, competition pressure plays a significant role. Other factors influencing cloud computing adoption and use in South Africa, such as power availability and bandwidth prices.

5.6.5 Summary of research findings – Theme three: the practical and theoretical contingencies for strategic cloud computing in the South African context

The third theme "*The practical and theoretical contingencies for strategic cloud computing in the South African context*". The third theme captured the practical contingencies and theoretical contingencies for the adoption and use of cloud computing. The findings for theme three can be summarized as follows:

- The study found that the strategy needs to be matched with ever-changing technologies in order to meet the organisation's priorities and objectives.
- The findings from the study found that the business strategy clearly describes the business outcomes your organization seeks and how they can be accomplished by your organization.
- The strategy of an organisation also assists in the relationship between organisational goals and technological needs.

- The study found that the greater the IT expertise and management experience of cloud computing, the greater the chances of successfully implementing and using cloud computing
- One of the factors that could promote cloud computing adoption and use is the size of an organisation (Borgman et al. 2013).
- The findings on organizational size and organization structure offered a mixed view on whether cloud computing adoption and usage could be influenced by an organization's structure and organization's size. The researcher assumes that by adopting and using cloud computing, small and medium-sized companies appear to be more creative and innovative.
- Competition pressure plays an important role in cloud computing's adoption and use.
- The study found that other factors influencing cloud computing adoption and use in South Africa, such as power availability and bandwidth costs.
- In the adoption and usage of cloud computing, sufficient network (broadband) and bandwidth costs are the most important.

5.7 Theme Four: Factors influencing adoption and use of cloud computing

The fourth theme was "*Factors that influence the adoption and use of cloud computing*". The rationale of this question was to understand the factors influencing cloud computing according to the South African Information Technology Professionals. The theme identified the following sub-themes.

5.7.1 Sub-theme: Organisation context

The organisational factors also have their influences on the success or the failure of adoption and use of cloud computing. They are internal factors of an organization that the organization itself manages.

Interview question: *In your view, in what way is the adoption and use of cloud computing give a relative advantage? Alternatively, how do relative advantage influence cloud adoption and use?*

The interview question served to discover the advantages and benefits that can be achieved by using cloud computing over the conventional way of doing the same task. The relative advantage factor in the context of this study refers to checking whether the adoption and usage of cloud computing technology would have specific advantages over other technologies. IT professionals need, therefore, to seek information about the relative benefits of cloud computing adoption and use. The following are the extracts from the interviews about relative advantage:

> [Participant_16] *"...cloud computing gives organisation the competitive advantage… you can access your data anywhere using any device such as mobile device…if this not giving you any advantages."*
>
> [Participant_20] *"...By using cloud computing, organisation gaining a competitive advantage over their competitors"*.
>
> [Participant_23] *"...Using technology such as a cloud computing organisation saves on costs of servers, software maintenance and operating a data centre"*.

The relative benefit of using cloud computing can be the ease of technology use, mobility, and the greater potential for online storage is another advantage of cloud computing.

> [Participant_08] *"...The advantage of cloud is convenience… you can access Gmail or Google Drive anytime for access to your emails and documents"*.
>
> [Participant_17] *"...Cloud computing technology brings value to all employees; they could access their work anytime anywhere, giving them great mobility"*.
>
> [Participant_22] *"...Cloud computing provides mobility. Employees can work more flexibly able to access their work anywhere*"

Researcher's comments

The relative advantage of cloud computing technology has emerged as the reason why organizations are adopting and using cloud computing technology to reduce IT costs, ease of use, reliability and enhanced IT services. The above answers indicate that cloud-based applications allow users to access data easily anywhere.

Interview question: *In your view, in what way is top management support influence the adoption and use of cloud computing? Alternatively, how does top management support influence cloud computing adoption and use?*

Top management support relates to the involvement and support of top management. This factor refers to how managers define the scope and functions of cloud computing technology and how it will affect the organization as a whole.

> [Participant_04] "…*Top management support can be a critical factor in cloud computing adoption and use*"

> [Participant_15] "…*Usually, our managers begin to determine the viability, and then we select some IT experts to experiment in detail with the latest technology*"

> [Participant_21] "…*Top management support is necessary for adopting and use of cloud computing. Top management should devote sufficient resources and facilitate the transformation of the organisation process*"

Researcher's comments

The above responses have shown that management support is crucial in organizations' adoption and use of cloud computing. Cloud computing technology has also been integrated by organisations into their strategic goals.

Interview question: *In your view, what is the ideal size of an organisation or how does firm/organisation size influence cloud computing adoption and use?*

The size of organizations is a significant factor in cloud computing adoption and use. One participant remarked that:

> [Participant_22] *"…the decision-making system affects the adoption and use of cloud computing. The more bureaucratic the system, the more the decision-making delays. Due to the decision-making structure, a typical 6 months' project can be delayed"*

Researcher's comments

Our participants agreed that the participation and encouragement of top management are key to the adoption of cloud computing. The only competitive edge to help them stay in business remains the ability to make decisions faster and consistently innovate. Organizational size has been seen as a critical factor in the adoption of cloud services.

5.7.2 Sub-theme: Technology context

The technology context represents the technical challenges that will affect cloud computing adoption decisions and the use of cloud computing. This question was intended to solicit views on how the complexity factor affects the adoption and use of cloud computing.

Interview question: *In your view, how does complexity influence cloud computing adoption and use?*

The complexity element is defined as the degree to which cloud computing is perceived as difficult to use or how easy to use.

> [Participant_01] "…*cloud service provider such as Microsoft Azure makes their cloud solution easy to integrate with the existing on premise solutions*"

> [Participant_06] "…*It may be a challenge to expand the network to Microsoft Azure, such as installing Express Route*"

> [Participant_18] "…*a multi-cloud computing environment such as Oracle Cloud, AWS and Microsoft Azure could be a challenge to choose the correct cloud environment, even the integration with the existing system might be a challenge*"

Other IT professionals shared a different view, concerning complexity:

> [Participant_15] *"... As the users of the system such as emails, I do see any changes. The main concern is the availability of the system".*

> [Participant_17] *"…cloud computing resources are easy to obtain"*

> [Participant_22] *"...Okay, I guess, the main concern moving to the cloud environment will be security. You are taking your company data to somewhere else, so what happens*

to company data should be a data breach? The research into cloud computing environment assures that cloud computing is more secured"

Interview question: *In your view, in what way is or how does compatibility of cloud computing with existing infrastructure influence cloud computing adoption and use?*

The compatibility element is defined as the degree to which cloud computing is compatible with the existing organizational networks and systems.

[Participant_01] "…*A cloud service provider such as Microsoft Azure makes it easy to integrate the cloud solution with existing solutions on-site*"

[Participant_14] "…*It is easy to incorporate the cloud into existing IT infrastructures*"

[Participant_27] "…*The systems that are currently in use are compatible with cloud computing*"

Researcher's comments

The findings are that cloud computing compatibility needs to be consistent with the existing organisation network and systems. Cloud computing is seen to be compatible with their values and business needs.

5.7.3 Summary research findings – Theme Four: Factors influencing adoption and use of cloud computing

The fourth theme "*the factors that influence the adoption and use of cloud computing*". The findings of this study for theme four can be summarized as follows:

- The involvement and support of top management are crucial to the adoption of cloud computing.
- The only competitive edge remains the ability to make decisions faster and constant innovation to help them stay in business.
- Organizational size has been seen as a major factor in the adoption of cloud services.
- Complexity affects the acceptance and usage of cloud computing and
- Cloud computing is compatible with its business needs and values.

5.8 Summary of the chapter

This chapter presented a detailed analysis of data collected from individual using semi-structured interviews. The thematic data analysis conducted enabled the researcher to address the research questions and draw the researcher's comments on the data collected from semi-structured interviews with individual participants.

The data is analysed under the four objectives that add up to the overall research purpose detailed in Chapter 1. The research objectives formed the themes for this study. The first theme "to describe how cloud computing manifest in South Africa "– provides a basis to describe the cloud computing definition, the requirements to the cloud computing environment, benefits of cloud computing. The second theme "To analyse and describe the drivers of cloud computing for different stakeholders" – captured the contributions that individual stakeholders make to cloud computing adoption and use.

The third theme focused more on practical and theoretical contingencies. The purpose of this theme is to the synergy between organisation strategy or IT strategy, organisation size and structure and environment to understand their functional integration when adopting and use of cloud computing. The fourth theme describes the factors that influence the adoption and use of cloud computing. The factors identified as cloud computing enablers include relative advantage, top management support, organisation size, compatibility and complexity.

The next chapter presents the interpretation of the findings and the final research framework.

CHAPTER 6: INTERPRETATION OF FINDINGS AND THE FRAMEWORK

6.1 Introduction

The goal of this study was to conceptualise a strategic cloud computing framework in the context of South African information technology professionals. This chapter interprets the findings of the study against the existing literature to determine whether they support or contradict one another.

The chapter is structured into five sections that are based on the study's five sub-research questions:

- How does cloud computing manifest in South Africa according to South African IT professionals?
- What are the drivers of cloud computing for different stakeholders?
- What are the practical and theoretical contingencies for strategic cloud computing in the South African context?
- What are the factors influencing the adoption and use of cloud computing?
- How could cloud computing be strategically adopted and use in the South African context?

The study findings for each of the four research questions are described and presented to answer the primary research question "*How should cloud computing be strategically adopted and used sensitive to the South African context?"* The chapter then presents the Strategic Cloud Computing framework.

6.2 How cloud computing manifests in South Africa according to South African IT professionals

This section interprets findings which relate to how cloud computing manifests in South Africa and how cloud computing is seen through the eyes of IT professional. This section answers the first sub research question "*How does cloud computing manifest in South Africa according to South African IT professionals?*"

The insights obtained from the findings of the study discussed in Chapter 5 demonstrates that the concepts of cloud computing are widely understood, the criteria when moving to the cloud environment, the advantages of cloud computing. Also, in the sense of individual IT professionals, consider the deployment and service models.

The study findings highlighted the discussions on how cloud manifests in South Africa that the following sub-section would cover, namely the definition of cloud computing, the requirements when moving to the cloud environment, the benefits of cloud computing, and finally the perception of cloud deployment and service models in the sense of individual IT professionals. The next sub-section discusses cloud computing concepts.

6.2.1 Cloud computing concepts

IT professionals were asked about their knowledge of cloud computing. The rationale for this question was to assess how familiar the participants were with cloud computing concepts. The reasoning for these questions stems from the scholarship and theoretical foundation survey in Chapter two, which showed diverse views from various perspectives on the concepts of cloud computing.

Literature related to cloud computing was analysed in chapter 2. Cloud computing, for example, has different meanings, according to the literature. Cloud computing is described by Vaquero et al. (2009) as " *a large pool of virtualized resources (such as hardware, development platforms and/or services) that are easily available and accessible.*" Gartner (2009) describes cloud computing as "*a computing style in which scalable and elastic IT-enabled capabilities are delivered as a service using Internet technologies to external customers.*" (Plummer et al. 2009).

Armbrust et al. (2010) strengthened the concept of cloud computing as "*both Internet applications and data centre hardware and software that provide such services*". The National Institute of Standard and Technology (NIST) defines cloud computing as a model that enables convenient, on-demand network access to configurable computing resources which are shared (e.g., networks, servers, storage, software, and services) that can be easily provided and released with minimal management effort or interaction with service providers (Mell and Grance, 2011; Snaith, Hardy and Walker, 2011).

Most of the participants managed to define cloud computing from the above responses and have a strong knowledge of cloud computing. Participants addressed the study findings also indicated that cloud computing is the consumption of IT resources through the Internet. The findings from both the reviewed literature and the empirical data indicate that participants have a clear understanding of the concept of cloud computing.

The understanding of cloud computing is consistent with Gartner's cloud computing definition. According to Gartner (2010), cloud computing is "*a computing style in which scalable and elastic IT-enabled capabilities are delivered as a service using Internet technologies to external customers*".

The findings are consistent with the researchers (for example, Vaquero, 2009; Gartner, 2009; Armbrust et al., 2010; Mell and Grance, 2011) who described cloud computing as "the provision of IT resources via the Internet". The general understanding of cloud computing is consistent across all participants.

6.2.2 Requirements for cloud computing

Moving into the cloud computing environment, some users see this as an opportunity to step into the cloud computing environment, and others are uncomfortable with the cloud computing environment. The participants were asked about the essential requirements to be taken into account when heading into the environment of cloud computing. The idea behind this question was to request the views of participants on the cloud computing environment's pre-requirements.

In chapter two, a review of previous studies on the pre-requisite of moving to the cloud computing environment was conducted. For example, Talmizie et al. (2018), studied factors that influence cloud computing adoption in the health sector, education sector and the public sector. The study found factors for cloud computing are organisation support, human readiness, environment, technology readiness, privacy and security as the most dominating in all three sectors.

Van Dyk and Van Belle (2019) studied cloud computing factors that may be obstacles to the adoption and use of cloud computing in the context of South Africa. The study found that the participants are concerned with the regulatory requirements, availability and privacy of data.

Additional factors are system integration, lack of approved cloud standards, electricity availability and broadband connectivity.

These findings coincide with the literature, for example, Van Dyk and Van Belle (2019), who emphasized important factors to consider before moving to the cloud environment. Talmizie et al.,(2018) also confirmed the pre-requirements such as organizational support, human readiness, technology readiness and security as the most significant factors that can influence cloud computing adoption and use.

Cloud computing factors such as regulatory requirements, organisational support, technology readiness, human readiness, top management support, security, integration with the in-house system, ease of use and mobility are the most important factors to consider before moving to the cloud computing environment. For organizations moving to a cloud computing environment, economic values such as cost-saving, flexibility, scalability and access to the data any time anywhere, are realised.

6.2.3 Cloud computing benefits

Cloud computing has the potential to improve the competitiveness of an organisation. Organizations need to consider the advantages of cloud computing and optimize the benefits to gain a competitive advantage. Previous studies on cloud computing (for example, Dhar, 2011; Wilson, 2011; Misra and Mondal, 2011; Subashini and Kavitha, 2011; Tripathi and Jigeesh, 2013), have identified the benefits of cloud computing to organisations.

Miller (2009) identified the benefits of cloud computing as flexibility, pay as you use model, scalability, competitive advantage, innovation and cost savings. Akin, Fagbola and Daramola (2014) in their study found that cloud computing could benefit Nigerian Universities by reducing hardware and software maintenance costs. Furthermore, cloud computing enhances the availability of services increase mobility and scalability of services.

Ercan (2010), the study found that cloud computing is an alternative technology that can reduce hardware costs, licensing costs and increase scalability. Furthermore, Sharma et al., (2016) The study found that perceived ease of use, trust, perceived usefulness, job opportunity and self-efficacy are the driving force of cloud computing.

The findings are in line with previous studies such as (Miller, 2009; Marston et al., 2011) who indicated that cloud computing gives a competitive advantage. Furthermore, cloud computing provides potential advantages such as cost savings, resource flexibility and services on a pay-as-you-use model (Marston et al., 2011). There is a popular belief that cloud computing will minimise costs.

The benefits of cloud computing, such as cost savings on software licenses, hardware, support for ICT infrastructure and maintenance, have been described in previous studies. According to IT professionals, cloud computing technology helps to reduce IT infrastructure operating costs and maintenance costs. Participants explained how cloud computing is beneficial to the organization and many of the participants give the same benefits with cloud computing which can be summarised as followings:

6.2.3.1 Cost Saving

Cost saving of cloud computing is seen as the main driver of cloud computing and many organizations are adopting and using cloud computing to reduce their capital expenditure. Cloud computing is seen as a new way of managing costs, because of the way IT resources are consumed and the benefits such as cost savings, ability to scale up and down resources, sharing resources, pay as you use model, flexibility and availability (Varia 2010). Cloud computing services have no upfront investment in hardware and software. A pay-as-you-use model of cloud computing is seen as saving costs.

The literature review in chapter 2 and the empirical findings in chapter 5 considered cost savings as the primary advantage of the adoption and use of cloud computing. Many IT professionals adopt and use cloud computing to reduce the spending of their organization, and this is consistent with the literature that the pay-as-you-use model of cloud computing will contribute to cost savings (Dhar 2011). South African organisation need to consider the benefits of cloud computing, to be able to optimize the cloud benefits to achieve a competitive edge.

6.2.3.2 Scalability

Scalability from a technical point of view is one of the benefits of cloud computing. Cloud is able to handle a peak load or high traffic. Scalability is defined as the ability to scale upwards and down of IT resources depending on the business requirements.

The literature review in chapter two and the empirical findings in chapter 5, found scalability as another major benefit of cloud computing. Cloud computing services have the ability to easily scale upwards and downwards depending on organizations business requirements. As pointed out by Wilson (2011), if there is a change in the demand for resources, the cloud computing services are able to scale up and down to accommodate the business needs.

6.2.3.3 Increase Mobility

Cloud computing allows IT professionals and other employees to access organisation data from anywhere and at any time. That is, cloud computing services enable employees to work in any location and it improves collaboration and sharing.

The literature review in chapter two and the empirical findings in chapter 5, found mobility as another major benefit of cloud computing. Cloud computing allows employees to access organization data from anywhere and anytime. Cloud computing services enable employees to work in any location and it improves collaboration and sharing

6.2.3.4 Improved focus on core business

IT professionals also claim that cloud computing makes it possible to roll out innovations as quickly as possible. Cloud computing services allow new products or innovations to be produced immediately.

The literature review in chapter 2 and the empirical findings in chapter 5, has found the maintenance costs another driving force for cloud computing. In the cloud computing environment, there is no longer a need for maintenance because cloud computing services include security updates and software updates. IT professionals can spend more time focusing on the organization's core business.

The main reason for cloud computing adoption and use is both economic and technical. IT Professionals mentioned cost saving as the major economic benefits of cloud computing. Cost saving is the major benefit of cloud computing to organizations. Cloud computing eliminated capital expenditure on hardware and software. From the technical point of view, cloud computing improves flexibility and scalability of IT resources, increased computing power, improve functionality and integration and improved business continuity. Most of the benefits

of cloud computing from the interviews are the same as the literature review. The findings are in line with the previous studies (for example, Miller, 2009; Marston *et al.*, 2011).

6.2.4 Cloud deployment models

As depicted in figure 6.1, cloud deployment models are classified into a private cloud, public cloud, community/government cloud and hybrid cloud (Mell and Grance 2011).

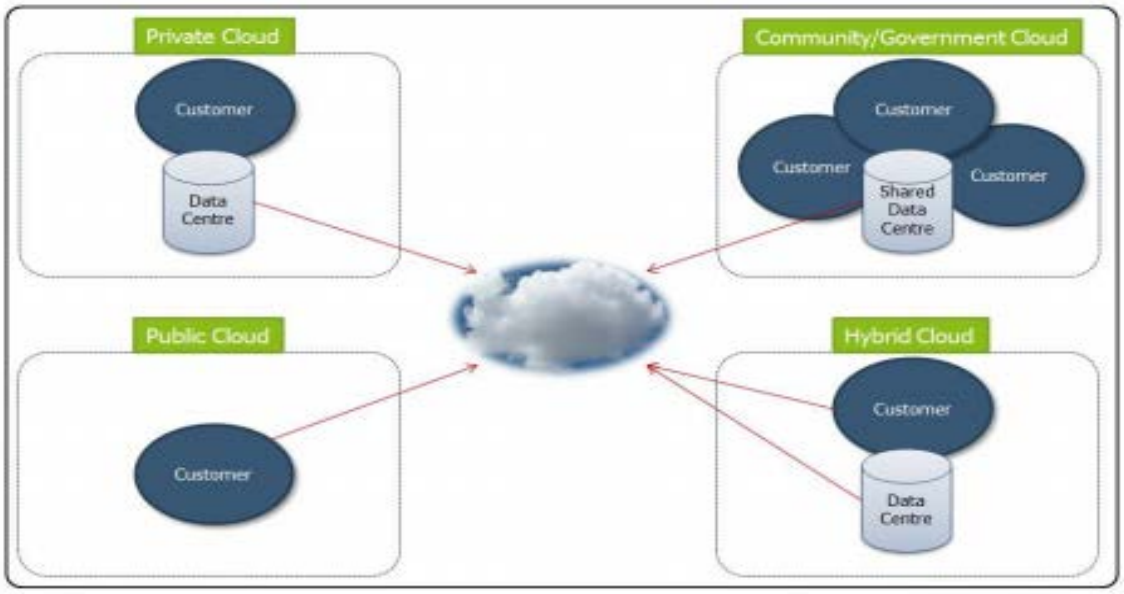

Figure 6.1: Cloud computing deployment model (Mell and Grance,2011)

From figure 6.1 above, the cloud deployment models are discussed next:

- **Public cloud:** The public cloud is where the service provider owns and operates the cloud infrastructure. The services are open via the Internet to the public. The cloud service provider regulates the cloud infrastructure and owns it. Microsoft Azure, Oracle Cloud and IBM Cloud are some examples of public clouds (Zissis and Lekkas 2012).
- **Private cloud:** The private cloud is designed and managed inside an organization. The private cloud runs exclusively in a single organization (Dillon et al. 2010).
- **Community cloud**: a group of organizations with the same goals and missions runs the community cloud. Community cloud supports a mutual purpose, such as teaching and learning, or shared interest (Zissis and Lekkas 2012).
- **Hybrid cloud**: The hybrid cloud derived from the mixture of public cloud and private cloud. Standardised infrastructure ensures data transferability in a hybrid cloud (Mell & Grance, 2011; Mohlameane & Ruxwana, 2014; Marston et al., 2011)

The organizations or individual users can choose from the four different types of cloud deployment models, depending on their requirements and needs (Mell and Grance, 2011; Mohlameane and Ruxwana, 2014; Marston et al., 2011). The deployment model of cloud computing describes how the cloud is located.

IT professionals were asked what each type of cloud deployment model means to them, how familiar they are with each cloud deployment model, lastly, what model out of the four models was the most appropriate in the context of their work. The study found that most of the IT professionals have used the public cloud in the form of email services such as Google Mail and Office365, followed by the hybrid cloud model.

These findings are consistent with the literature reviewed. Garrison, Wakefield, & Kim (2015) in their study found that hybrid cloud contributes to the organisation performance. IT professions believe that organisations use the public cloud for low-risk workloads. The private cloud is used for sensitive workloads towards data losses (Garrison et al., 2015).

6.2.5 Cloud services models

As depicted in figure 6.2, cloud service models are classified into Software as a service, Platform as a Service and Infrastructure as a Service (Mathew, 2012; Mell and Grance, 2011; Liu et al., 2011; Sharma & Banga, 2013).

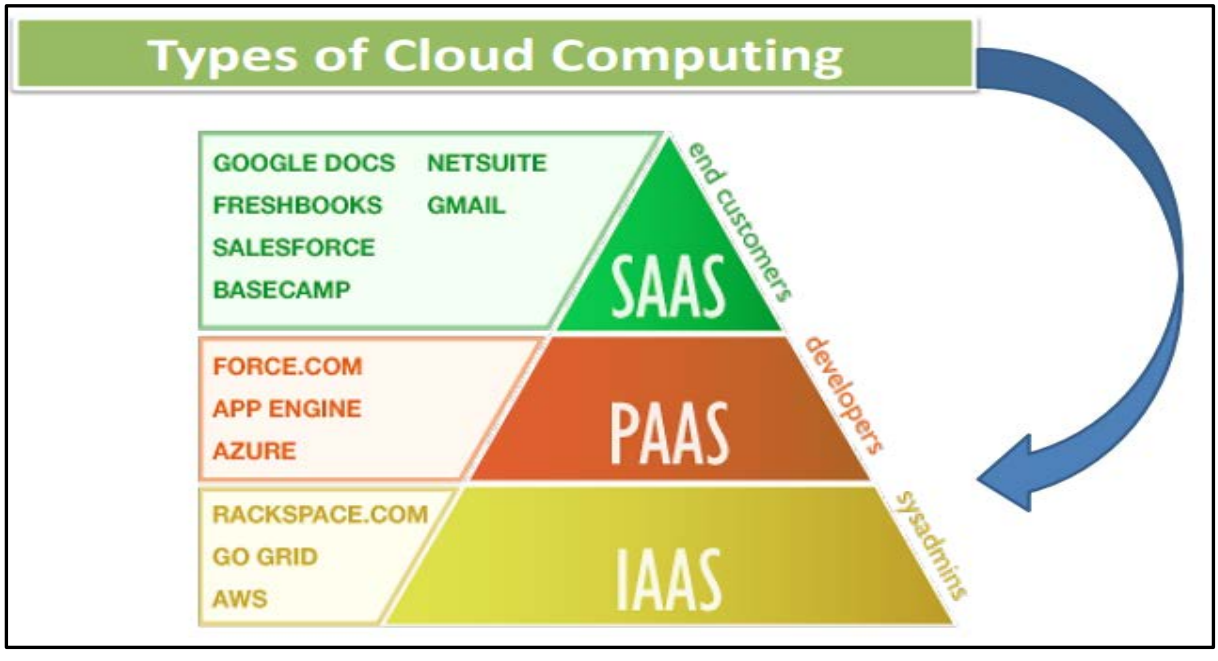

Figure 6.2: Cloud computing services (Mell and Grance,2011)

From figure 6.2 above, the cloud service models are discussed next:

- **Infrastructure as a Service**: a cloud service through the Internet provides computing resources, data storage, and networking as a service. This is a type of service in which organisations can create and manage virtual machines, storage services and backup services. The service provider manages the underlying cloud infrastructure at the IaaS level; end users have more control over the deployed application, storage, and operating systems. Microsoft Azure, IBM Cloud and Amazon Web Services are some examples of Infrastructure as a Service (Tripathi and Jigeesh 2013).
- **Platform as a Service**: A cloud service that is the middle layer and provides the application infrastructure. The services available at the PaaS level are for software application development, management, testing and hosting. The service provider operates the platform at the PaaS level and the end user handles applications and configurations. Some examples of the platform as a Service are Google Apps and Microsoft Azure (Tripathi and Jigeesh 2013).
- **Software as a service**: The cloud of an application. Software products are provided as a service. They are delivered over the Internet on-demand. Emails, word processing and customer relationship software are the resources that are available at the SaaS level. The service provider manages the underlying cloud infrastructure. Microsoft Office365, Google Mail, Dropbox and Google Docs are some examples of Software as a Service (Mathew, 2012; Sharma & Banga, 2013).

The present study found that most of the IT professionals have used the Software as a Service. This is because IT professionals have experience with Software as a Service application such as Microsoft Teams, Microsoft Office365, Google Gmail, Microsoft OneDrive, and Dropbox.

The findings concur with a study by Erdogmus (2009) in that Software as Service was found to be the most suitable service models for individuals and most organisations. IT professionals considered Software as a Service to be the main concept behind cloud computing.

6.3 Drivers of cloud computing for different stakeholders

This section interprets findings that relate to the importance of stakeholder involvement in the adoption and use of cloud computing. This section answers the second sub research question "*what are the drivers of cloud computing for different stakeholders*" Stakeholder theory was

used to address this question. The stakeholder theory describes the value that is being created when stakeholders are working together. The interpretation of stakeholders is aimed at determining the stakeholders regarding adopting and using cloud computing, how each stakeholder derives value out of cloud computing, in what ways stakeholders influence what happens.

In chapter three, the concept of stakeholder was reviewed. Stakeholder theory by Freeman (1984) was used to understand the relationship between organizational management and the stakeholders. The stakeholder theory is seen as a tool for understanding the relationship between management and the organization's behaviour towards the stakeholders.

The stakeholder theory distinguishes two kinds of stakeholders, namely primary and secondary. The primary stakeholders are those stakeholders that are important for the survival of an organization and the secondary stakeholders are those who are not essential for the survival of an organization (Clarkson, 1995).

A stakeholder model was presented and according to the model, stakeholders are influencing the organisation and they have different demands. The stakeholder map is shown in Figure 6.3.

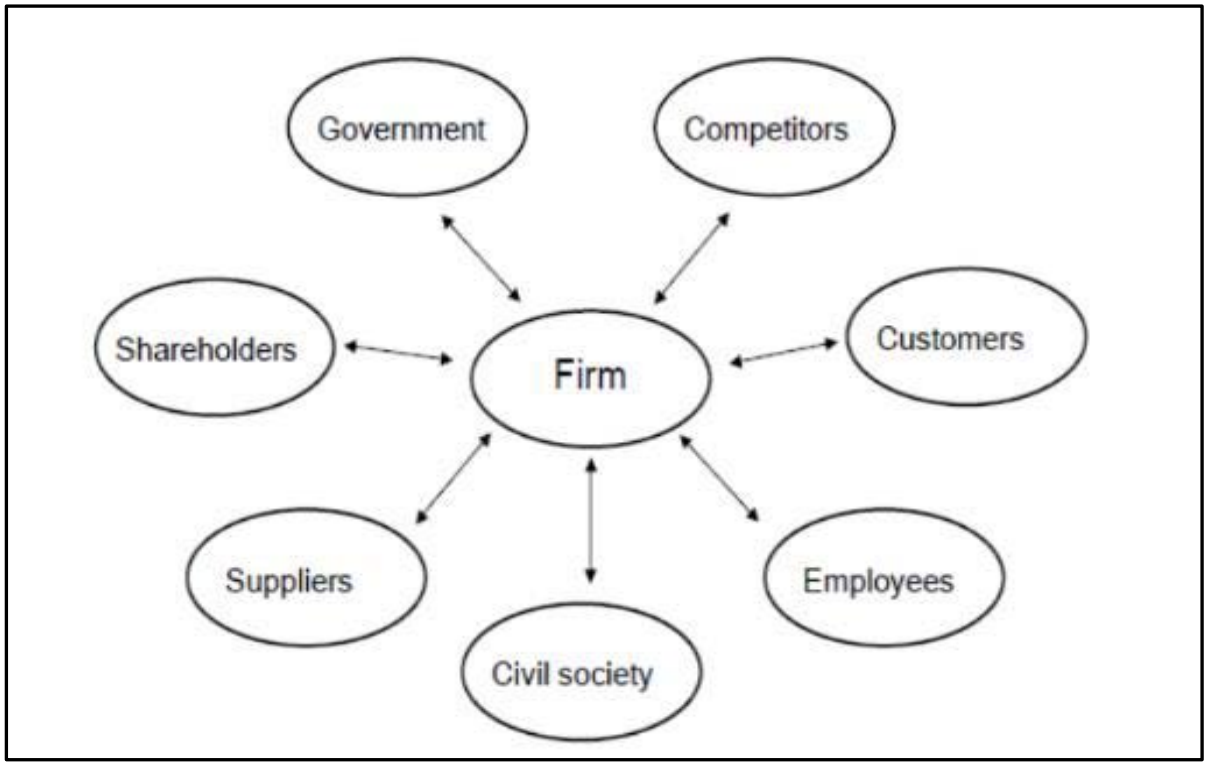

Figure 6.3: The original stakeholder model (Freeman,1984)

The stakeholder analysis is performed to understand the stakeholder's influence on cloud computing adoption and use. The rationale for these questions aimed at determining how stakeholders derive value in cloud computing adoption and use. Furthermore, the questions were asked about how stakeholders influence what happens in an organization.

The IT professionals highlighted the importance of stakeholder management when deciding on the adoption and use of cloud computing within an organisation. Thus, the relevant stakeholders should be identified and involved earlier in the adoption and use of cloud computing. Stakeholder theory (Freeman 1984) pointed out that stakeholders are divided into internal stakeholders (namely owners, consumers, suppliers and employees) and external stakeholders (namely, special interest groups, competitors and government).

The present study identified the internal stakeholders such as business process owners, customers/clients, creditors, suppliers and employees. The external stakeholders were identified such as government regulators, investors, third parties (NGO's, public authorities), and the government. Stakeholder involvement represents the interest of the stakeholders in the organisation. The relationship between stakeholders and the organisation needs to be understood and the role of stakeholders in the organisation decision making is gaining more attention. Stakeholder theory is used to examine managerial decision about balancing stakeholders.

The findings concur with the previous studies on how cloud computing could benefit different stakeholders. For example, cloud computing can offer many potential benefits that will make it appealing and by utilising cloud computing as a cost-saving, flexible resource and pay as use resource (Marston et al, 2011).

6.4 Practical and theoretical contingencies for strategic cloud computing in the South African context?

This section interprets findings that relate to the understanding of practical and theoretical contingencies for cloud computing. This section answers the third sub research question "*what are the practical and theoretical contingencies for strategic cloud computing in the South African context*" Contingency theory was used to address this question. The contingency theory captured and showed the practical contingencies and theoretical contingencies for the adoption and use of cloud computing.

The discussions about the practical and theoretical contingencies were highlighted in chapter 5 as organisation strategy, organization size and structure, organization competencies. The next subsection interprets the organization strategy.

6.4.1 Organisation strategy

A strategy is described as future-oriented strategies to engage with the competitive environment in order to achieve business objectives and goals (Pearce and Robinson, 2000). IT professionals view business strategy as defining the business outcomes of an organization and seeks how an organization is going to achieve them. The best way to achieving an improved adoption and long-term use of cloud computing.

The findings are consistent with Pearce and Robinson (2000), where strategy is described as future-oriented strategies to engage in the competitive environment in order to achieve business goals and objectives. Cloud computing technology can now be incorporated into the strategic goals of organizations.

6.4.2 Organization competencies

IT professionals believe that existing IT skills need to be refined in order to manage cloud computing technologies. The skills set in an organization has an impact on cloud computing adoption and use. Borgman et al. (2013) in their study looking at IT skills/cloud skill of employees and how are they affecting cloud computing adoption and use. The present study found that employees with IT skills/cloud skills could help the organisation in cloud computing adoption and use more easily.

The findings indicated that most IT professionals are fully qualified and have the right skills and qualifications to allow them to perform their roles to the best of their ability. The more IT skills and management knowledge in cloud computing, the better the chances of successfully adopting and using cloud computing.

Cloud computing knowledge and skills, therefore, entail the following:

- Prior knowledge and experience that gives an organization a relative advantage.
- The organization’s IT personnel need to be well versed in cloud computing before an organization moves to the cloud computing environment.

Therefore, knowledge and cloud computing skills, on their own, is not enough. There is also a need for top management support.

6.4.3 Organization size and structure

The size of the organization is defined in terms of personnel at the functional level, which is aimed at achieving organizational objectives. The size of the organisation refers to the number of employees and the scale of investment (Alshamaila and Papagiannidis 2013). The size of an organisation can have an influence on the adoption and use of cloud computing.

Borgman et al. (2013) identified the size of the organisation in their study as a challenge that could impede the adoption and use of cloud computing. The size of an organisation has been identified by IT professionals as one of the important factors for cloud computing adoption and use. IT professionals agree that small companies are more diverse and versatile in order for cloud computing to be implemented and used faster than their large counterparts. According to Rogers (2003), large organisations have invested more in their in-house infrastructure, which may have an impact on embracing cloud computing and using it.

The structure of the organisation determines how roles are maintained in various divisions within the organisation. The adoption and use of cloud computing are influenced by the decision-making of the organizational structures.

The findings concur with the literature, for example, Borgman et al., (2013) in their study listed the organisation size as a factor that could hinder cloud computing adoption and use. Furthermore, the organizational size and structure findings offered a mixed view of whether an organization's structure and size could affect the adoption and usage of cloud computing.

6.4.4 Environmental uncertainty

IT professionals view environment uncertainty as external factors affecting the organisation how an organisation operates. The external factors related to government policies, regulation laws, competitive pressure and trade pressure in which the organisation operates. The environmental context influences the organisation’s decision on cloud computing adoption and use.

The environmental elements used in this study are competition pressure, power outages and bandwidth costs. The interaction of the environmental background is shown in Figure 6.4.

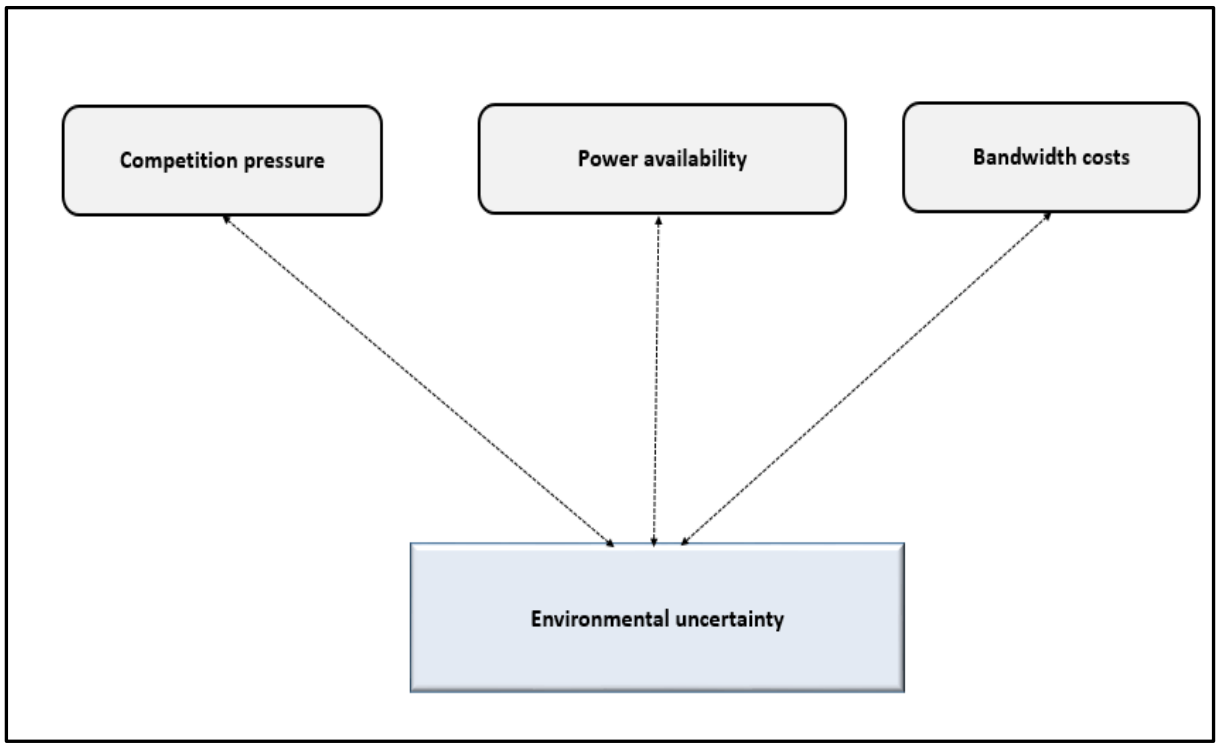

Figure 6.4: Relationship diagram for environment uncertainty (own interpretation)

As illustrated in figure 6.4, the environmental uncertainty elements are competition pressure, power outages and network bandwidth costs. The next subsection interprets the competition pressure.

6.4.4.1 Competition pressure

Competitive pressure refers to the pressure felt by organisations from industry competitors. IT professionals ought to give how they feel these pressures influencing their respective views. The literature and empirical evidence indicate that competitive pressure influences the adoption and use of cloud computing.

The findings are in line with the literature reviewed. Oliveira et al., (2014) in their study found that competition pressure might be more or less significant depending on the environment. Ramdani et al. (2013) found competitive pressure influencing the adoption of technology. Similar results were found in high tech industries. Low et al. (2011) in their study found that competitive pressure influences cloud computing adoption and use.

6.4.4.2 Power availability

The external factor of power availability indicates that it may be appropriate to expand the strategic cloud computing framework to include power availability as an element. Reliable power supplies have been described as a key factor in cloud computing adoption and usage.

IT professionals view the availability of reliable power supply as a critical factor in the adoption and use of cloud computing. The problem of electricity supply constraints or load shedding has also been highlighted as a negative factor affecting cloud computing adoption and use.

Power outages refer to the loss of power that will cause cloud outages, where you would lose network connectivity. The unreliable electricity supply or commonly known as load shedding poses a challenge to the adoption and use of cloud computing.

The study findings on power outages point out that providing the most reliable supply of electricity is critical. The most significant factor in the adoption and use of cloud computing remains the availability of reliable electricity. The unreliable supply of electricity is seen as one of the obstacles to the adoption by South African organisations of cloud computing services.

6.4.4.1 Bandwidth costs

The two factors, which have limited the adoption of cloud computing services by organizations in South Africa, are high broadband prices and very low Internet speed. The speed at which data travels over a network link is known as bandwidth. The bandwidth is the size of the pipe on which the data moves.

The empirical findings on the cost of connectivity or network bandwidth costs suggest that a strategic cloud computing framework may need to be extended by adding the cost of network bandwidth as an element. The cost of network bandwidth refers to the cost of moving the data into the cloud environment (Ingress) and the cost of retrieving the data from the cloud (Egress).

The high bandwidth cost and the low Internet speed in South Africa are seen as one of the hindering factors in the adoption and use of cloud computing services.

IT professional's views is that environmental context can be supported to create a conducive environment for cloud computing adoption and use entails,

- Increased access and availability of services
- Policy on data privacy, data protection and security
- Enhanced network links and reduced bandwidth costs
- Opening of local South African data centres to increase connectivity, boost network latency problems, data compliance rules, and cloud computing reliability. The data centres of companies like Microsoft and Amazon are based in South Africa.
- Affordable and efficient infrastructure for communication networks

The interpretation is that enabling environment is important to grow adoption and use of cloud computing by organisations in South Africa.

6.5 Factors influencing adoption and use of cloud computing

This section interprets findings that relate to the factors influencing the adoption and use of cloud computing. This section answers the fourth sub research question "*what are the factors influencing adoption and use of cloud computing*" The TOE framework was used to address this question.

In chapter 2, the reviewed studies identified and examined factors that influence cloud computing using various theories. The Technology Organization Environment framework is mostly used. The TOE concept was created in 1990 by Tornartzky to investigate how technological innovations are implemented by an organization.

In the research findings in chapter 5, the discussions on the factors affecting cloud computing adoption and use were highlighted. The interpretation of these findings is now carried out in accordance with the organizational and technological context.

6.5.1 Organisation context

Organizational context can influence cloud-computing adoption. Organizational factors include organisation policy, management support and organisation size, which may influence cloud computing adoption and use.

The organisational elements used in this study are top management support and organisation size. The relationship within the organizational context is illustrated in Figure 6.5.

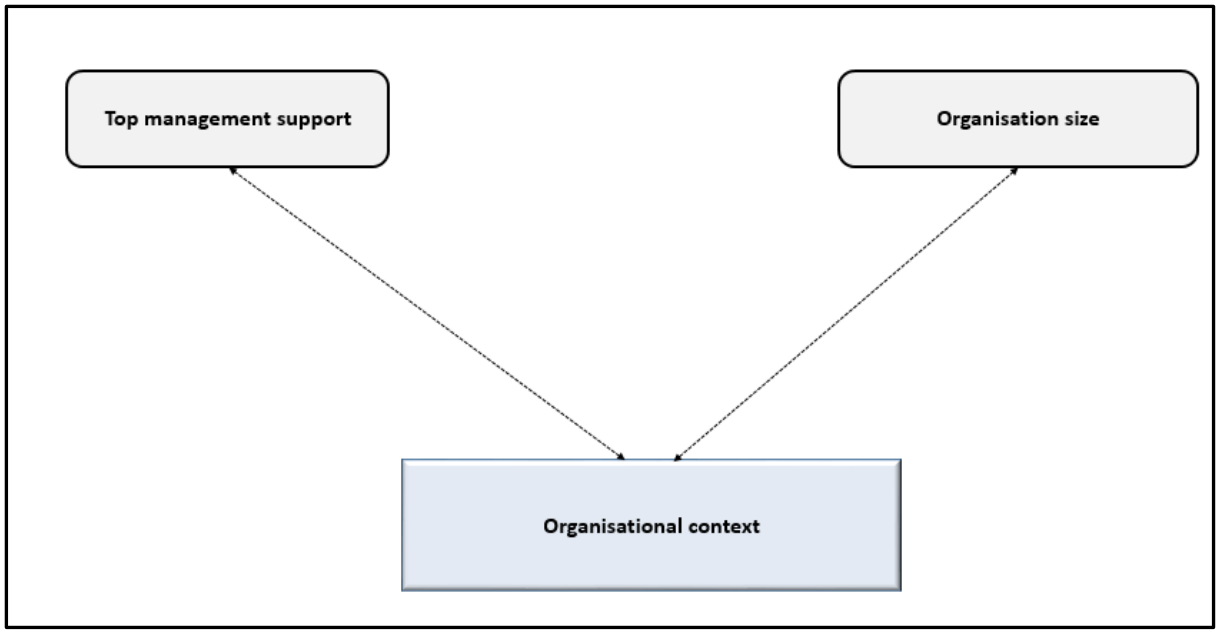

Figure 6.5: Relationship diagram for organisational context (own interpretation)

The next subsection interprets top management support.

6.5.1.1 Top management support

Top management support is the action of devoting financial, political and supervision support from top management to support the adoption of cloud computing. Borgman et al. (2013) refer to top management support as one of the significant elements in the operational aspect of cloud adoption and use. IT professionals gave different views and opinions on the role of top management in shaping the organization's adoption and use of cloud computing.

The power of top management may have a significant influence on the usage and adoption of cloud computing within the organisation. Top management must devote sufficient resources to enable cloud adoption and use.

The findings are consistent with previous studies examining top management support for cloud computing adoption and use (for example, Talmizie, Ibrahim, & Chuprat, 2018; Senyo, Effah & Addae, 2016).

The literature indicates that top management support is crucial in the adoption and use of cloud computing in organisations. The top management support influences cloud computing adoption and use in an organisation. South African organizations should incorporate cloud computing technology in their strategic goals.

6.5.1.2 Organisation size

The size of the organization is defined in terms of personnel at the functional level, which is aimed at achieving organizational objectives. The size of the organisation refers to the number of employees and the scale of investment (Alshamaila and Papagiannidis 2013). The size of an organisation can have an influence on the adoption and use of cloud computing.

Borgman et al. (2013) identified the size of the organisation in their study as a challenge that could impede the adoption and use of cloud computing. The size of an organisation has been identified by IT professionals as one of the important factors for cloud computing adoption and use. IT professionals agree that small companies are more diverse and versatile in order for cloud computing to be implemented and used faster than their large counterparts. According to Rogers (2003), large organisations have invested more in their in-house technology, which could have an impact on cloud computing adoption and use.

The size of an organisation plays an important role in the adoption and use of cloud computing in responding to the changes needed. When adopting and use of cloud computing, small and mid-sized organisations appear to be more creative and innovative.

6.5.2 Technology context

In this section, the technological context is interpreted. In both new and current technologies, the technological context relates to the features applicable to the organization. The sense of technology applies to the technical issues that could influence the decision to use cloud computing and to adopt it. From the literature, the commonly used technological constructs are complexity and compatibility.

IT professionals were asked to examine the constructs of complexity and compatibility on how they can affect the adoption and use of cloud computing. The interaction of technological context constructs can be seen in Figure 6.6.

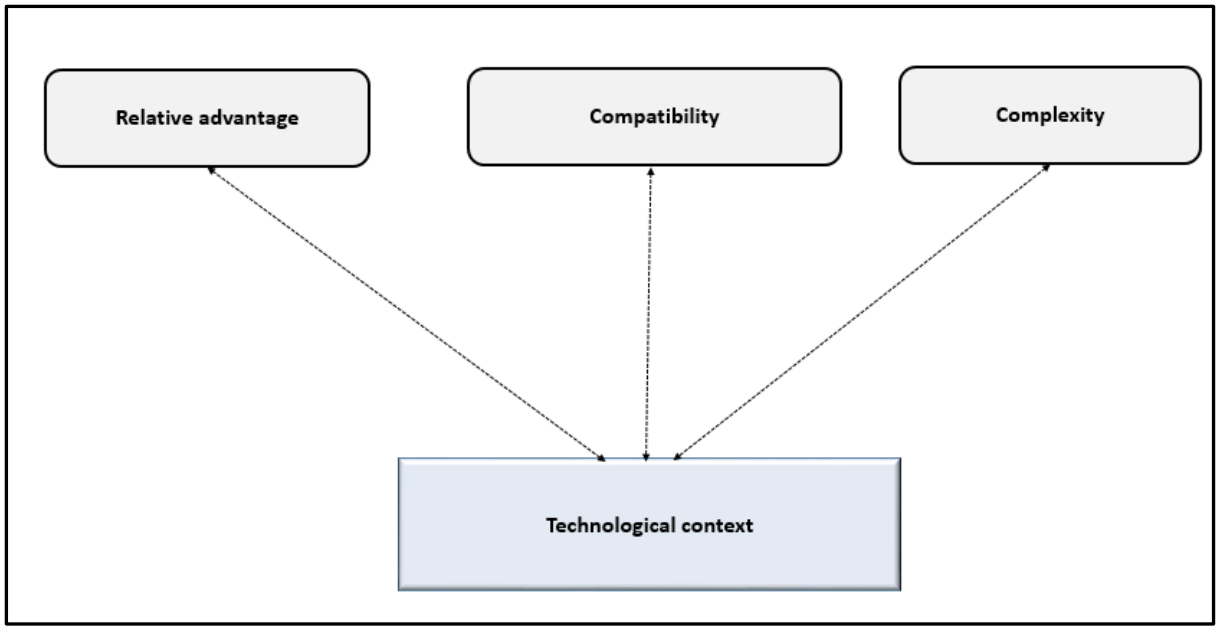

Figure 6.6: Relationship diagram for technology context (own interpretation)

The next subsection interprets relative advantage.

6.5.2.1 Relative advantage

Relative advantage is described as the degree to which creativity is perceived to make people better off than otherwise Roger (2003). Relative advantage is the benefits and advantages that can be gained by using cloud computing over the traditional way of doing the same task. Relative advantage influences the usage and adoption of cloud computing (Jianwen and Wakil (2019); Talmizie, Ibrahim and Chuprat (2018); Senyo, Effah and Addae (2016)).

In this study, the relative advantage relates to evaluating whether the adoption and usage of cloud computing technology will have particular benefits over other technologies. Therefore, IT professionals need to seek information about the relative benefits of the adoption and use of cloud computing.

The benefits of adopting and using cloud computing were illustrated by IT professionals. The benefits of cloud computing proposed by these IT Professionals are access to data using any computer, offering a competitive edge, cost savings on hardware and maintenance of software. The cloud is seen as a hosted data centre that can be accessed through the Internet, saving the operation of a data centre.

The findings are consistent with the literature that relative advantage affects cloud computing adoption and use (Jianwen and Wakil (2019); Talmizie, Ibrahim and Chuprat (2018); Senyo,

Effah and Addae (2016)). The literature states that the relative advantage of cloud computing might be that greater online storage space, the ease of use of technology and mobility.

The technological factor of relative advantage has emerged as the main reasons why people and organisations are embracing and using cloud computing technology to reduce IT costs, ease of use, reliability and enhanced IT services.

6.5.2.2 Compatibility

Compatibility is the degree to which existing infrastructure and system can be used with cloud computing technology. The compatibility factor plays a significant role in the adoption and use of cloud computing.

The finding is that cloud computing compatibility with current organizational culture and technology would have a more positive impact on cloud computing adoption and use. The findings concurred with the literature that technical compatibility influences the usage and adoption of cloud computing (Jianwen and Wakil (2019); Talmizie, Ibrahim and Chuprat (2018); Senyo, Effah and Addae (2016)).

The literature also often points out the effect of compatibility on the implementation of new technology. The study findings revealed that compatibility was consistent; in that cloud, computing is compatible with IT professionals' value and business needs.

6.5.2.3 Complexity

Complexity is defined as the degree to which an innovation is perceived as relatively difficult to understand and use. Complexity is the degree to which cloud computing is difficult to use, recognised and realised (Jianwen and Wakil (2019); Talmizie, Ibrahim and Chuprat (2018); Senyo, Effah and Addae (2016)).

The findings of the study confirmed that one of the main problems may be the difficulty of cloud computing. The greater the perceived difficulty, the greater the uncertainty associated with cloud adoption and use. Cloud computing's complexity appears to affect the adoption and use of cloud computing more negatively.

The findings are in line with previous studies findings that found that complexity has an impact on cloud computing adoption and usage (for instance, Jianwen and Wakil (2019); Talmizie, Ibrahim and Chuprat (2018); Senyo, Effah and Addae (2016)).

6.6 Conceptualising the Strategic Cloud Computing Framework

This section shows how literature and the findings drawn from the previous chapter are used to conceptualise the strategic cloud computing framework in the context of South African information technology professionals. The section addresses the last study objective, which is *"How could cloud computing be strategically adopted and used in the South African context"*.

The initial conceptual research framework for strategic cloud computing is expanded to include both the literature reviews and the empirical findings from the semi-structured interviews. The conceptual research framework for strategic cloud computing in chapter 3 is presented here again for ease of reference, figure 6.7 below.

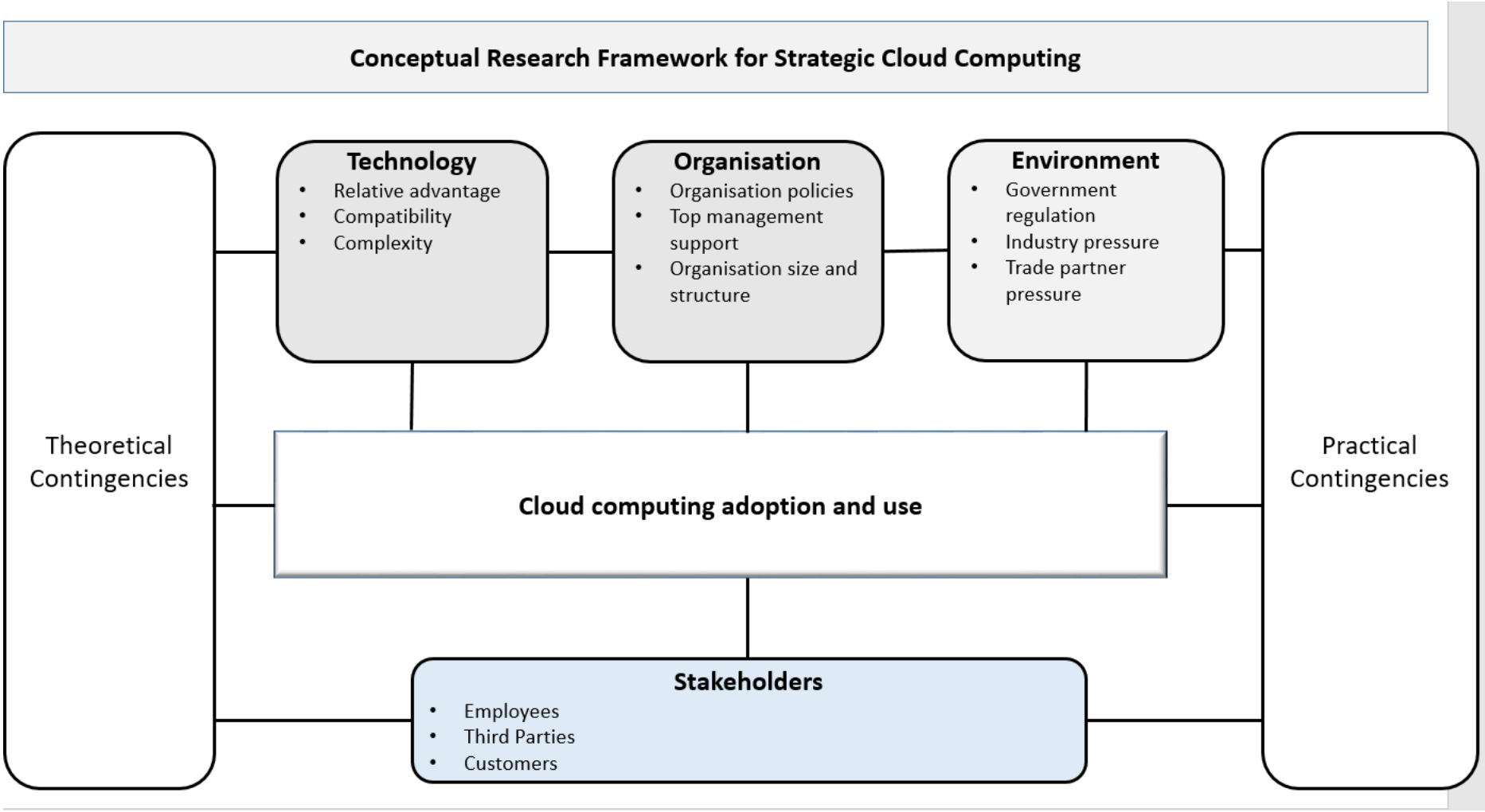

Figure 6.7: Conceptual research framework for Strategic cloud computing

Stakeholder theory (Freeman, 1984), Contingency theory (Blanton, Watson and Moody, 1992) and Technology-organisation-environment (Tornatzky et al., 1990) are the research lenses used to develop a conceptual research framework in figure 6.7 above. The conceptual research framework consists of the following components namely, environmental, stakeholder, contingencies, organisational and technological elements. The conceptual research framework for strategic cloud computing elements are briefly explained.

6.6.1 Environmental context

The environmental context looks at how the organisation operates. The environmental context that influences the organisation's decision for usage and adoption of cloud computing is government regulation, competitive pressure and trade partner pressure:

- **Government regulation**

Government regulation refers to the directives, legislations, acts, and laws that support compliance through cloud computing adoption and use within the South African context.

- **Competitive pressure**

Competitive pressure refers to the pressure felt by organisations from industry competitors. IT professionals ought to give how they feel these pressures influencing their respective views.

- **Trade partner pressure**

Trade partner pressure refers to the pressure felt by the organisation from business partners with whom the business is conducted. IT professionals ought to give how they feel these pressures influencing their respective views and experiences.

6.6.2 Stakeholder elements

The stakeholder elements of the framework ensure that, in the interest of stakeholders in organizations, cloud computing decisions are made. A stakeholder is defined as an individual or group with an organisation who may be affected by decisions taken by the organisation (Freeman, 1984). IT professionals ought to give how they feel these pressures influencing their respective views and experiences.

- **Employee as stakeholder**

In this study, the employees as stakeholders consist of Senior Managers, Middle managers, IT experts and Consultants.

- **Third parties as stakeholders**

In this study, the third parties will include government, regulation bodies, external parties such as suppliers and vendors.

- **Customers as stakeholders**

In this study, the customer as stakeholders will include all the customers that the organisation is trading with or selling goods and services to those customers.

6.6.3 Contingencies elements

Contingency elements describe the external and internal factors, which can affect the decision-making process of management. Senior managers and middle managers in the organisations identify the external and internal factors that may influence the decision-making process. The contingency elements used in this study are briefly explained.

- **Organisation strategy**

Organisation strategy is described as future-oriented strategies to engage with the competitive environment in order to achieve business objectives and goals (Pearce and Robinson, 2000).

In this thesis, strategy refers to what information technology professionals deem as the best way to achieving an improved adoption and long term use of cloud computing

- **Organisation size and Structure**

Organisation size refers to the size of an organisation in terms of employees at the functional level, directed towards achieving the organizational goals. The structure defines how responsibilities in different departments within the organisation are maintained. The decision-making from the organisation structure influences the adoption and use of cloud computing.

6.6.4 Organisational context

Organizational context can influence cloud-computing adoption. Organizational factors include policy, management support and organisation size, which may influence cloud computing adoption and use. The organizational elements used in this study are briefly explained.

- **Organisation policies**

Organisation policies refer to a form of policies to support cloud computing. Policies are created to have a favourable environment that will influence the usage and adoption of cloud computing within the organisation. The organisation policies may be the drivers or hinders for cloud computing adoption and use.

- **Top management support**

Top management support is the action of devoting financial, political and supervision support from top management to support the adoption of cloud computing. The power of top management may have a significant influence on cloud computing adoption and use within the organisation.

6.6.5 Technology context

Technological context can influence cloud-computing adoption and use. Technological factors include compatibility, interoperability, scalability and flexibility can influence cloud computing. The technological elements used in this study are briefly explained next.

- **Relative advantage**

  Relative advantage is the benefits and advantages that can be gained by using cloud computing over the traditional way of doing the same task. Relative advantage influences the usage and adoption of cloud computing (Jianwen and Wakil (2019); Talmizie, Ibrahim and Chuprat (2018); Senyo, Effah and Addae (2016)).

- **Compatibility**

  Compatibility is the degree to which existing infrastructure and system can be used with cloud computing technology. Technical compatibility influences the usage and adoption of cloud computing (Jianwen and Wakil (2019); Talmizie, Ibrahim and Chuprat (2018); Senyo, Effah and Addae (2016)).

- **Complexity**

Complexity is defined as the degree to which an innovation is perceived as relatively difficult to understand and use. Complexity is the degree to which cloud computing is difficult to use, recognised and realised (Jianwen and Wakil (2019); Talmizie, Ibrahim and Chuprat (2018); Senyo, Effah and Addae (2016))

6.7 Building block for the Strategic Cloud Computing Framework

6.7.1 Theme one: How cloud computing manifest in South Africa according to South African IT professionals

The main objective of theme one was to understand the cloud computing landscape through the eyes of IT professionals. Moving to the cloud should be a planned decision. Organisation and cloud users are expecting to receive significant benefits from the new cloud-based technologies. The following emerged based on empirical evidence and the researcher's view and experiences.

6.7.1.1 Strategic perspective elements

The elements that made up the strategic perspective emerged from both the literature and the empirical evidence. The elements are triggered by the organisational needs for adopting and using cloud services. A strategic perspective means that decisions on cloud computing are taken in order to strategically align cloud computing in organizations. Figure 6.8 is provided as a visual guide delineating the strategic perspective elements

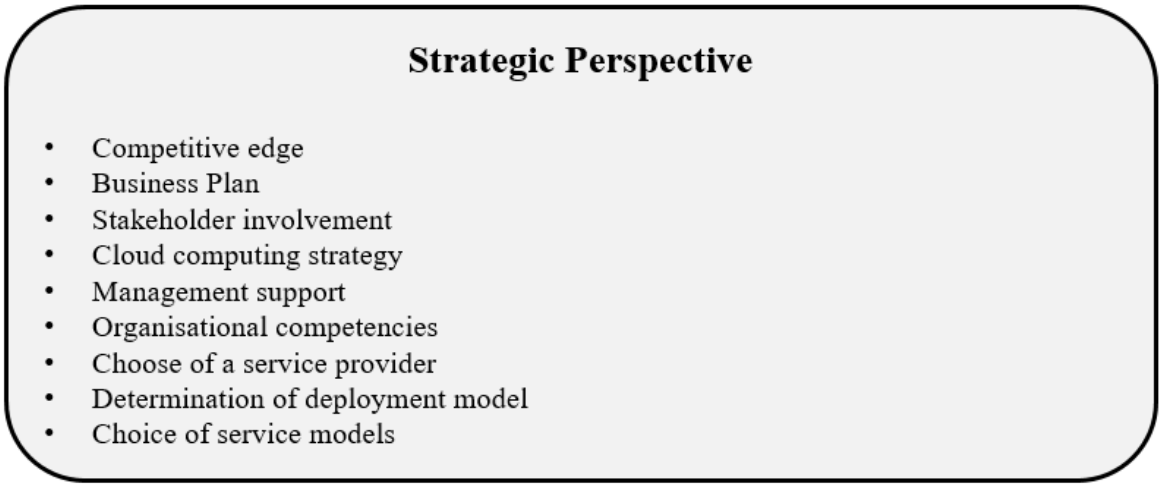

Figure 6.8: Strategic perspective elements

The following elements are included in the final strategic cloud computing framework in the light of strategic perspective elements are:

- **Competitive edge**

An organisation need to be competitive and stay relevant. Competitive and trading partner pressure is faced by organizations to introduce new technology to succeed in the industry. Cloud computing technology adoption will push the organization beyond geographical restrictions. To remain relevant, organizations need to be based on current trends. Technology such as cloud computing provides more possibilities for a business that can be distributed via the Internet (Sultan, 2010).

- **Business plan**

A business plan clearly describes the desired results that your organisation seeks and how they will achieve them by your organization. Clear vision, feedback and ongoing encouragement from top-level leadership will minimize organizational tensions over new technology adoption. IT policy formulation and design must be in agreement with the company strategy for smooth transition and process and technology alignment (O'Reilly, 2003).

According to IT professionals, cloud computing adoption and use should be in line with the organisation’s strategic goals. Cloud computing should be connected to the business strategy.

Cloud computing should not be adopted by organizations only because it is modern technology. Cloud computing can be instead, be used as a way of achieving business objectives.

- **Stakeholder involvement**

This process is intended to ensure that, the process of adopting and using cloud computing includes stakeholders. According to IT professionals, Stakeholders also need an appreciation of the significance of cloud computing adoption for a competitive edge. To reach out to various organizational units, instruments such as strategic communication will be used. This will detail the cloud implementation plans, management of changes and payment for the cloud service.

- **Top management support**

Top management support is the action of devoting financial, political and supervision support from top management to support the adoption of cloud computing. The power of top management may have a significant influence on the usage and adoption of cloud computing within the organisation.

- **Cloud computing adoption plan**

The cloud computing adoption plan would be used to strategically place cloud adoption and use. The adoption strategy of cloud computing should include:

  - The scope of the project, depending on the requirements of the client or customer.
  - It is important to specify the timeline.
  - In the budgets, money must be distributed according to allocated budgets.
  - Identify the matrix of obligation between internal employees and service providers.

- **Organizational competencies**

The existing IT skills would need to be refined in order to manage cloud technologies. An organisation with a professional workforce with an understanding of cloud computing adoption and use is better able to leverage the services available to achieve organizational goals (Khan 2015). Increasing cloud computing technological expertise can improve the chance for an organization to adopt and use cloud computing.

- **Choosing a Service provider**

Cloud service providers should be involved in the progress of the adoption and use of cloud computing to ensure proper communication and consultation. In South Africa, cloud service providers are setting up local data centres, such as Microsoft Azure and AWS. Organizations should have an exit plan, according to IT professionals, to overcome the need to move from one service provider to another.

- **Determining the service model and deployment model**

According to IT professionals, there should be a mechanism for evaluating the required service and implementation model for cloud computing. Mell and Grance (2011) claim that are three kinds of service models and four types of deployment models. The process of determining the service and deployment model depends on organizational capacities, costs and security requirements. Furthermore, it is possible to use the workload as another consideration to evaluate the deployment model.

6.7.2 Theme two: The drivers of cloud computing for different stakeholders

The main objective of theme two was to understand the value in which cloud computing bring to different stakeholders. Stakeholder theory was used to address the objective. The stakeholder theory describes the value that is being created when stakeholders are working together. The findings in chapter 5 are incorporated into the final strategic cloud computing. The elements are discussed below.

6.7.2.1 Stakeholder elements

From the empirical findings, it is established that each stakeholder has its requirements. It is important to also stakeholders who are more into the business processes.

The present study identified the internal stakeholders such as business process owners, customers/clients, creditors, suppliers and employees. The external stakeholders were identified such as government regulators, investors, third parties (NGO's, public authorities), and the government.

The final elements in the final strategic cloud computing framework in the light of stakeholder's elements are

- **Business process owners**.
- **Clients/Customers**
- **Investors**
- **Creditors**
- **Suppliers**
- **Third parties**
- **Government**
- **Employees**

Figure 6.9 is provided as a visual guide delineating the stakeholder elements

Figure 6.9: Stakeholder elements

6.7.3 Theme three: The practical and theoretical contingencies for strategic cloud computing in the South African context

The main objective of theme three was to analyse the contingencies that will enable cloud computing adoption and use. Contingency theory was used to address this objective. The contingency theory captured and showed the practical contingencies and theoretical contingencies for the adoption and use of cloud computing. The findings in chapter 5 are incorporated into the final strategic cloud computing. The elements are discussed below.

6.7.3.1 Contingencies elements

Contingency elements describe the external and internal factors, which can affect the decision-making process of management. Cloud computing strategy is seen enabling the organisations to gain an advantage over their competitors.

The following elements that should be included in the final strategic cloud computing framework in the light of contingencies are:

- **Cloud computing strategy** – a plan that will include new processes or reviews existing ones. Cloud computing will be considered before any others.
- **Bandwidth costs –** The costs of getting the data into the cloud (Ingress) and the data leaving the cloud (Egress).
- **Power-Availability**: lack of reliable power supply that would possibly cause unavailability of cloud computing and loss of access to the network.

Figure 6.10 is provided as a visual guide delineating the contingencies elements

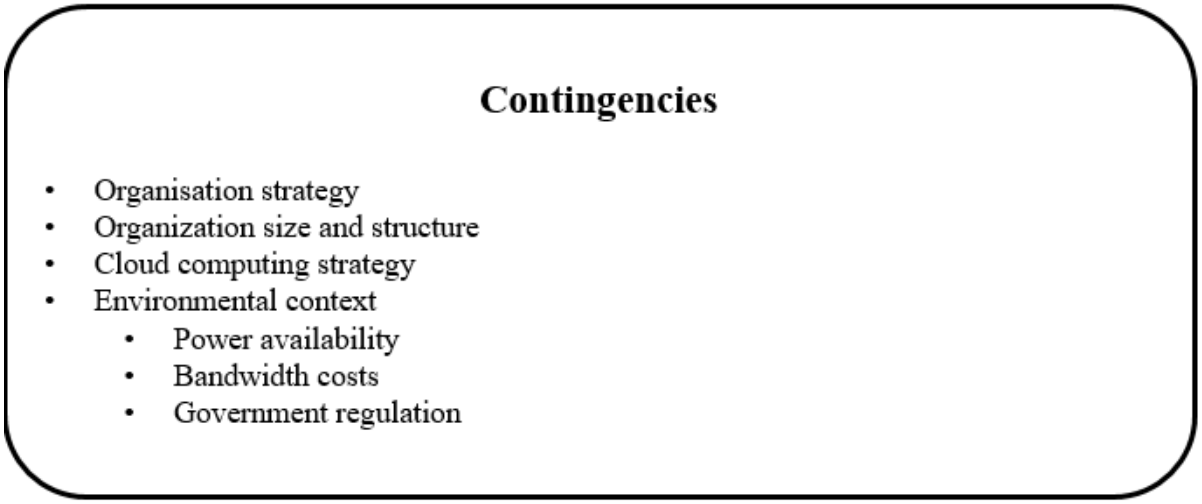

Figure 6.10: Contingencies elements

6.7.4 Theme four: Factors influencing adoption and use of cloud computing

The main objective of theme four was to identify factors affecting the adoption and use of cloud computing. The TOE framework was used to address this objective. The TOE framework was used to describes the factors that influence the adoption and use of cloud computing. The findings in chapter 5 are incorporated into the final strategic cloud computing. The elements are discussed below.

6.7.4.1 Organisation context

Organizational context can influence cloud-computing adoption. Organizational factors include policy, management support and relative advantage, which may influence cloud computing adoption and use.

Cloud computing gives mobility. Mobility is defined as providing flexibility and accessing data from any device, at any time. The new element that should be included in the final strategic cloud computing framework in the light of organisation context is:

- **Cloud Mobility** – Cloud mobility is described as providing flexibility.

Figure 6.11 is provided as a visual guide delineating the organisation elements

Figure 6.11: Organisation elements

6.7.4.2 Technology context

Technological context can influence cloud-computing adoption and use. Technological factors include compatibility, interoperability, scalability and flexibility can influence cloud computing.

The top barriers to cloud computing are a security concern. The following elements are included in the final strategic cloud computing framework in light of the technology context is:

- **Security-** is defined as the level of safety of personal and administrative data on cloud computing.

Figure 6.12 is provided as a visual guide delineating the technology elements

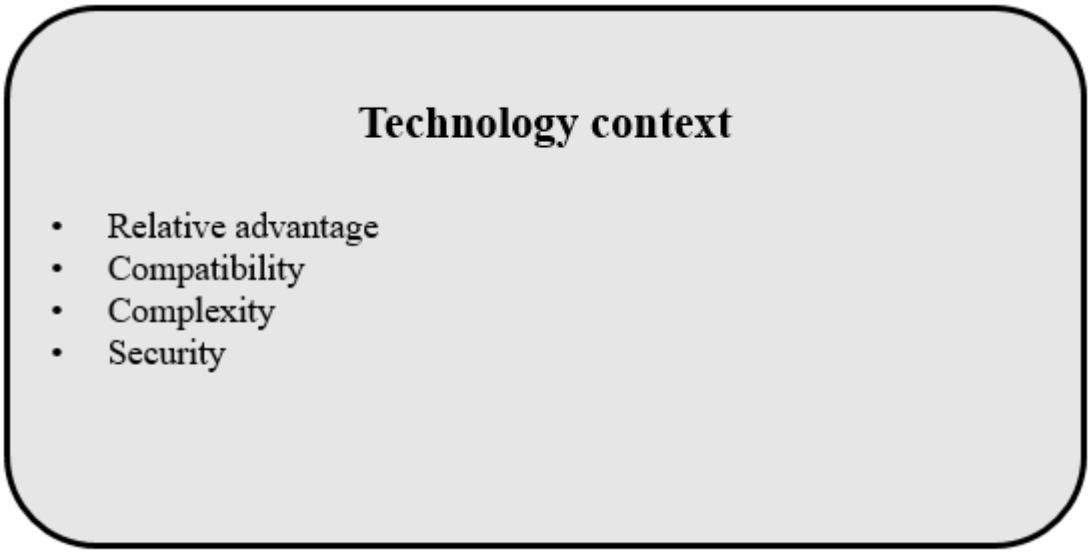

Figure 6.12: Technology elements

6.8 The strategic cloud computing framework in the context of SA IT professionals

This section provides the Strategic Cloud Computing framework, guided by empirical findings and literature. This section addresses the study's purpose, that is, to determine how cloud computing in the South African context could be adopted and used strategically. In Figure 6.13, the framework is presented.

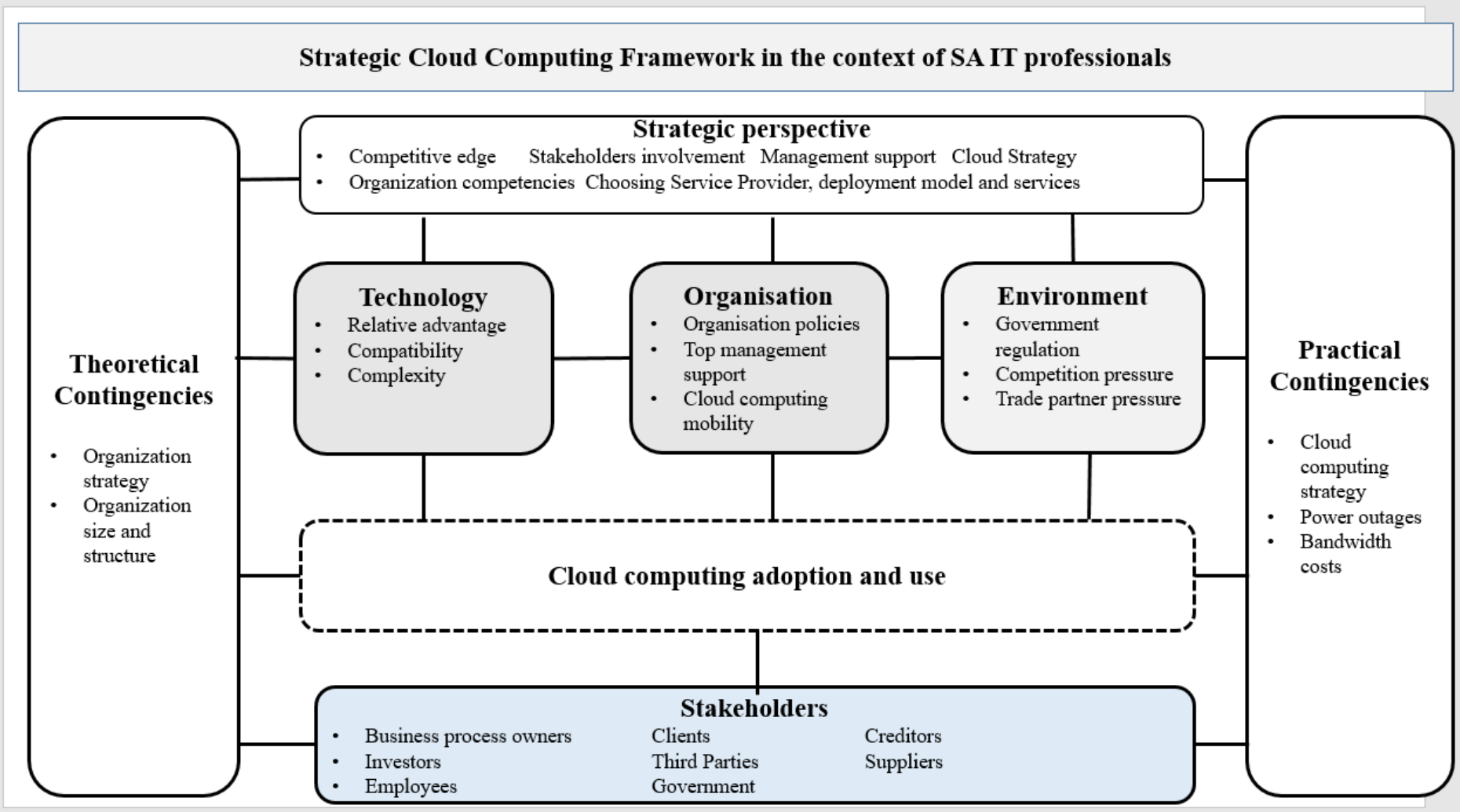

Figure 6.13: Strategic cloud computing framework in the context of South African IT professionals

The strategic cloud computing framework is made up of environment context, stakeholder elements, contingencies elements, organisation context, technology context and strategic perspective elements. The next section discusses how cloud computing could be adopted and used strategically.

6.9 Discussion on how cloud computing could be adopted and used strategically

The goal of this study was to conceptualise a strategic cloud computing framework in the context of South African information technology professionals.

Cloud computing adoption and use is still a theoretical and practical information system business leadership key issue as organisations and individuals strive to find ways on how cloud computing could be strategically adopted and used in a uniformed and coordinated manner. However, the literature on how cloud computing may be strategically adopted and used in the South African context is scant, leaving the preceding knowledge gaps. That is, this phenomenon is inadequately addressed in the literature, with no known study that provides the context of South Africa and the IT professionals' views, opinions and experiences. The cloud computing organisational contexts may be well studied but literature does not adequately provide the individual's point of view. To this point, there was a need to study how cloud computing could be strategically adopted and used sensitive to the South African context from the individual IT professionals' point of views and experiences.

6.9.1 Theme one: How cloud computing manifests in South Africa according to South African IT professionals

The main objective of theme one was to understand the cloud computing landscape through the eyes of IT professionals. Moving to the cloud should be a planned decision. Organisation and cloud users are expecting to receive significant benefits from the new cloud-based technologies. The first theme answers the first research question "*how does cloud computing manifest in South Africa according to South African IT professionals?*

The findings indicated that IT professionals have an understanding of what cloud computing means. The understanding of cloud computing is consistent with Gartner's cloud computing definition. Gartner describes cloud computing as "a computing style in which scalable and elastic IT-enabled capabilities are delivered as a service using Internet technologies to external

customers." (Gartner, 2010). The general understanding of cloud computing is consistent across all IT professionals and the findings are consistent with the literature (for example Hayes, 2008; Mell and Grance, 201; Armbrust et al., 2010) who described cloud computing as a consuming IT resource's via the Internet.

IT professionals are aware of the requirements when moving to the cloud computing environment. Organisations are moving from on-premises data centres to the cloud computing environment. IT professionals managed to identify the requirements to be taken into account when moving into the cloud computing environment. The findings concurred with the literature. A previous study by Scholtz et al., (2016) pointed out the pre-requirements such as regulation requirements, data privacy and data protection as the main factors to consider before switching to the cloud computing environment. Another study by Talmizie et al. (2018) pointed out factors such as security, technology readiness, human readiness and organisational support as factors to consider before moving to the cloud environment.

Cloud computing allows organisations to eliminate the initial upfront investments in infrastructure. As pointed out by Marston et al. (2011), cloud computing entails cost saving, resource flexibility and a pay-as-use model. The findings are consistent with the literature reviewed. The organisations or individuals' users can choose from the four different types of cloud computing deployment model, depending on their business needs or requirements. The findings show that the public cloud is the most common option. IT professionals agree that the public cloud is the most common and is the readily accessible type of cloud. Another type of cloud is a hybrid cloud that is gaining popularity as organisations still retain their data centres and switch some workloads to cloud computing. IT professionals have high levels of awareness about different service models of cloud computing.

The most suitable service models from individuals and most organizations were the software as a service, followed by the infrastructure as a service model. The findings are consistent with the findings of Erdogmus (2009), in which the software as a service is viewed as the core concept of cloud computing. Software as a service may be used regardless of the deployment model.

6.9.2 Theme two: The drivers of cloud computing for different stakeholders

The main objective of theme two was to understand what value cloud computing bring to different stakeholders. The second theme answered the second research question, *what are the drivers of cloud computing for different stakeholders?* Stakeholder theory was used to address this question. The stakeholder theory describes the value that is being created when stakeholders are working together.

The findings indicated that IT professionals manage to identify and list their typical stakeholders. This shows the importance of knowing your stakeholders in cloud computing adoption and use. The relationship between stakeholders and organisations needs to be recognized in order to manage stakeholder groups.

The findings are consistent with the literature, as point out by Freeman (1984), where the stakeholder theory was used to understand the relationship between organizational management and the stakeholders. Stakeholders are aware that any changes to their requirements in terms of cloud computing have both benefits and risks. The role of stakeholders in the decision-making process is accountable.

The findings of this study are that the role of stakeholders is gaining interest in the decision-making process. The stakeholder's theory was used to analyse management decisions regarding managing stakeholders ' interests. In deciding on the adoption and use of cloud technology within the organisation, the participants highlighted the importance of stakeholder management.

The findings demonstrated that the relationship between stakeholders and organisations needs to be recognised in order to manage stakeholder groups. Different stakeholders gain benefit from cloud computing adoption and use. The role of stakeholders is gaining more and more attention to organisational decision making.

6.9.3 Theme three: Cloud computing contingencies

The main objective of theme three was to analyse the contingencies that will enable cloud computing adoption and use. The third theme answered the third research question: *What are the practical and theoretical contingencies for strategic cloud computing in the South African context*? Contingency theory was used to address this question. The contingency theory

captured and showed the practical contingencies and theoretical contingencies for the adoption and use of cloud computing.

The findings indicated that IT professionals assess the contingencies variable such as organization strategy, organization size and environmental uncertainty. The strategy of an organisation also helps in the relationship between organisational goals and technological needs. The study found that the strategy needs to be matched with ever-changing technology to fulfil the objectives and goals of the organization. The findings are consistent with Pearce and Robinson (2000), where strategy is described as future-oriented strategies to engage in the competitive environment in order to achieve business goals and objectives.

Cloud computing has changed the way IT services are consumed in the organization. IT professionals believe that to handle cloud computing technology, current IT skills need to be refined. The present study found that the greater the cloud computing IT expertise and management experience, the greater the chances of adopting and using cloud computing successfully. Assess the kind of organizational size and structure that enables cloud computing to be adopted and used. The findings concur with the literature, for example, Borgman et al., (2013) in their study listed the organisation size as a factor that could unable or hinder cloud computing adoption and use.

The findings on organizational size and organization structure offered a mixed view on whether cloud computing adoption and usage could be influenced by an organization's structure and organization's size. The researcher assumes that by adopting and using cloud computing, small organisations appear to be more willing to adopt and use cloud computing. Environmental variables such as regulatory regulation and external pressure have been considered significant when adopting and using cloud computing. The study found factors such as power availability, bandwidth costs and competition pressure have been considered significant when adopting and using cloud computing.

6.9.4 Theme four: Factors influencing adoption and use of cloud computing

The main objective of theme three was to identify factors affecting the adoption and use of cloud computing. The TOE framework was considered to be an appropriate theoretical framework to identify factors that influences the adoption and use of cloud computing. The

fourth theme answered the fourth question: *What are the factors influencing the adoption and use of cloud computing?* The TOE framework was used to address this question.

The findings indicate that IT professionals assess the factors influencing cloud computing according to the South African Information Technology Professionals. The relative advantage of cloud computing technology has emerged as the reason why cloud computing technology is being implemented and used by organisations to reduce IT costs, ease of use, reliability and enhanced IT services.

Top management support relates to the involvement and support of top management. The findings are that top management involvement and support is essential to cloud computing adoption and use by organizations.

The technology context reflects the technological issues that will influence decisions on the adoption of cloud computing and the use of cloud computing. The complexity element is defined as the degree to which cloud computing is perceived as difficult to use or how easy to use. The finding is that cloud computing complexity affects the acceptance and usage of cloud computing. The main issues may be the difficulty of cloud computing.

The compatibility element is defined as the degree to which cloud computing is compatible with the existing organizational networks and systems. The finding is that cloud computing compatibility with current organizational culture and technology will have a more beneficial influence on the adoption and use of cloud computing.

6.10 Chapter Summary

This chapter presented a detailed interpretation of findings and build the strategic cloud computing framework. The goal of this study was to conceptualise a strategic cloud computing framework in the context of South African information technology professionals. Semi-structured interviews were conducted with thirty-four (34) IT professionals in order to achieve this goal. Five study questions were used to drive the study.

They are five secondary questions that guided the conceptualisation of a strategic cloud computing framework in the context of South African information technology professionals.

The first secondary question is "*How does cloud computing manifest in South Africa according to South African IT professionals?* Stakeholder theory, Contingency theory and TOE framework was found to be the most suitable current theories that would help to explain cloud computing adoption and use. The theories capture the fundamental elements required to conceptualise a strategic cloud computing framework in the context of the South African Information technology professionals.

The second secondary question is "*What are the drivers of cloud computing for different stakeholders?"* Stakeholder theory was used to address this objective. The stakeholder theory describes the value that is being created when stakeholders are working together. One of the major drivers of cloud computing is its ability to deliver the technology needs of a business as a service. The strategic cloud computing framework measures how different stakeholders embrace cloud-based tools such as emails, social networking, cloud-based communication tools, and information collection tools.

The third secondary question is "*What are the practical and theoretical contingencies for cloud computing adoption and use in a South African context?* Contingency theory was used to address this objective. The contingency theory captured and showed the practical contingencies and theoretical contingencies for the adoption and use of cloud computing. Contingency theory was used to describe the influence of contingent elements in an organisation. The strategic cloud computing framework discussed contingency elements that define the external and internal variables that may influence the decision-making process. The framework consists of contingent elements for environmental uncertainty, organisation strategy, organisation size and structure.

The fourth secondary question is "*What are the factors influencing its adoption and use of cloud computing?* The TOE framework was used to address this objective. The TOE framework was used to describes the factors that influence the adoption and use of cloud computing. The TOE framework has made a major contribution to awareness of the factors affecting acceptance and use. Factors from the TOE framework are used in the strategic cloud computing framework. These elements are the context of technology (complexity, compatibility and relative advantage), the context of the organization (policies, top management and organization size), and the context of the environment (completion pressure, regulation of government and best practices). This is in line with the previous studies of

researchers such as Senyo, Effah and Addae, 2016; Gutierrez, Boukrami and Lumsden, 2015) who found factors of technology, organisation and environment to have a significant influence on cloud computing adoption or use.

The strategic cloud computing framework in the context of SA IT professionals helped to achieve the last research question of "*How could cloud computing be strategically adopted and used in the South African context?"*

The strategic cloud computing framework is based on the theoretical lenses of Stakeholder theory by Freeman (1984), Contingency theory by Blanton, Watson and Moody (1992) and Technology-organization-environment by Tornatzky, Fleischer and Chakrabarti (1990). The new elements from the empirical findings were incorporated into the final strategic cloud computing framework.

The purpose and design of the strategic cloud computing framework is thus to position cloud computing adoption and use sensitive to South African organisations strategically, to address the needs of different stakeholders in an organisation and help to adapt and use cloud computing strategically in a uniform, organized manner and focus.

This chapter discussed the primary research findings and their linkages to the literature. This chapter summarised up the main findings of this study. The next chapter evaluates the research and thesis contribution.

CHAPTER 7: EVALUATION OF THE RESEARCH AND THE THESIS CONTRIBUTIONS

7.1 Introduction

In chapter 6, focuses on the interpretation of findings and provided the strategic cloud computing framework. This chapter reflects on the study completed. This chapter provides an overview of the research to ascertain whether the research objectives were met, revisiting the research questions to ascertain whether the research questions have been answered, evaluation of methodology, then the study contributions and conclusion are also provided.

This study gave individual IT professional a voice, to give their views and opinions on how cloud computing in the context of South Africa could be adopted and used. The next section gives an overview of the research.

7.2 An overview of the thesis

The study emanated from realising the research goal. The study was driven by the following primary research question:
"*How should cloud computing be strategically adopted and used sensitive to the South African context*?"

The primary research question was broken down into the following sub-questions:

- How does cloud computing manifest in South Africa according to South African IT professionals?
- What are the drivers of cloud computing for different stakeholders?
- What are the practical and theoretical contingencies for strategic cloud computing in the South African context?
- What are the factors influencing the adoption and use of cloud computing?
- How could cloud computing be strategically adopted and use in the South African context?

The purpose of this research was to describe cloud computing and subsequently determine how cloud computing could be strategically adopted and used sensitive to the South African context.

The Technology-organization-environment framework, the Contingency theory and the Stakeholder theory were adopted as the research lenses to empirically understand and subsequently determine how cloud computing may be strategically adopted and used, from the IT professional's perspective.

The study followed an interpretive philosophy stance and adopted a qualitative research approach and a case study strategy involving semi-structured interviews with purposively selected IT professionals as participants. The responses from IT professionals provided insight, thoughts and experiences into cloud computing adoption and user and contributed towards the framework. The thematic data analysis approach was used to analyse the collected data. The research objectives formed the themes for this study. This s study used a theoretical thematic analysis. That is, data analysis was done according to themes, built from the research objectives.

The thesis was structured into seven chapters and what each chapter represents is outlined below:

Chapter one introduced the study and motivation of why the research was being undertaken. The chapter provided a background to the field of study, a background to the research problem, problem statement, research purpose and goals, stated the research objectives, research questions, significance of the study, research augments and study delineation.

Chapter two, a detailed systematic literature review on the cloud computing concept. This chapter surveyed scholarship and systematically reviews relevant literature that informed and gave foundation to the study.

Chapter three discussed the information system theories of technology adoption and use. The theoretical framework and conceptualized research framework that guided this study are discussed.

Chapter four described the research methodology and research design process. The research epistemological and ontological assumptions are discussed. The research strategy and research design are discussed in details and lastly, research ethics are discussed.

Chapter five discussed the data analysis and discussion of findings. The data analysis is done through a thematic data analysis approach. The discussion of findings is done through the research objectives.

Chapter six focuses on the interpretation of findings and build the strategic cloud computing framework. The chapter interprets the findings in detail and interpreted them in relation to the research objectives.

7.3 Summary of findings and how the study objectives were met

The goal of the study was to conceptualise a strategic cloud computing framework in the context of South African Information Technology Professionals.

This goal was achieved through the following objectives:

- To describe how cloud computing manifest in South Africa according to South African IT professionals.
- To analyse and describe the drivers of cloud computing for different stakeholders.
- To analyse and describe the practical and theoretical contingencies for strategic cloud computing in the South African context.
- To analyse and describe factors influencing the adoption and use of cloud computing.
- To determine how cloud computing could be adopted and used strategically in the South African context.

The first objective is "*To describe how cloud computing manifest in South Africa according to South African IT professionals"* provided the basis to describe the cloud computing definition, the requirements when moving to the cloud environment, benefits of cloud computing. Also, to understand the deployment and service models in the context of individual IT professionals. From the interviews conducted, the data revealed that IT professionals have an understanding of what cloud computing means. The general understanding of cloud computing is consistent across all IT professionals and the findings are consistent with the literature (for example Hayes, 2008; Mell and Grance, 201; Armbrust et al., 2010) who described cloud computing as

a consuming IT resource's via the Internet. IT professionals are aware of the requirements when moving to the cloud computing environment. The findings show that the public cloud is the most common option. The most suitable service models from individuals and most organizations were the software as a service, followed by the infrastructure as a service model. The second objective is "*To analyse and describe the drivers of cloud computing for different stakeholders*" Stakeholder theory was used to address this objective. The stakeholder theory describes the value that is being created when stakeholders are working together. The second objective captured and showed the contributions that individual stakeholders make towards the adoption and use of cloud computing as well as how each stakeholder derives value out of cloud computing, in what ways stakeholders' influence what happens. From the interviews conducted, the data revealed that IT professionals manage to identify and list their typical stakeholders. This shows the importance of knowing your stakeholders in cloud computing adoption and use. The relationship between stakeholders and organisations needs to be recognized in order to manage stakeholder groups. Stakeholders are aware that any changes to their requirements in terms of cloud computing have both benefits and risks. The role of stakeholders in the decision-making process is accountable. The findings of this study are that the role of stakeholders is gaining interest in the decision-making process. In deciding on the adoption and use of cloud technology within the organisation, the participants highlighted the importance of stakeholder management. The findings also demonstrated that the relationship between stakeholders and organisations needs to be recognised in order to manage stakeholder groups. Different stakeholders gain benefit from cloud computing adoption and use. The role of stakeholders is gaining more and more attention to organisational decision making.

The third objective is "*To analyse and describe the practical and theoretical contingencies for strategic cloud computing in the South African context*" Contingency theory was used to address this objective. The contingency theory captured and showed the practical contingencies and theoretical contingencies for the adoption and use of cloud computing. They determined the contingent elements such as IT strategy, organisation size, organisation structure and the environment uncertainty to adopting and use of cloud computing. From the interviews conducted, the data revealed that IT professionals assess the contingencies variable such as organization strategy, organization size and environmental uncertainty. The strategy of an organisation also helps in the relationship between organisational goals and technological needs. There is a need for a strategy to be able to match with ever-changing technology to fulfil the objectives and goals of the organization. Cloud computing has changed the way IT services

are consumed in the organization. IT professionals believe that to handle cloud-computing technology, current IT skills need to be refined. The present study found that the greater the cloud computing IT expertise and management experience, the greater the chances of adopting and using cloud computing successfully.

Assess the kind of organizational size and structure that enables cloud computing to be adopted and used. The researcher assumes that by adopting and using cloud computing, small organisations appear to be more willing to adopt and use cloud computing. The study found factors such as power availability, bandwidth costs and competition pressure have been considered significant when adopting and using cloud computing.

The fourth objective is "*To analyse and describe factors influencing adoption and use of cloud computing***"** The TOE framework was used to address this objective. The TOE framework was used to describes the factors that influence the adoption and use of cloud computing. The research objective showed and described the factors influencing cloud computing according to South African Information Technology professionals. From the interviews conducted, the data revealed that IT professionals assess the factors influencing cloud computing according to the South African Information Technology Professionals. The relative advantage of cloud computing technology has emerged as the reason why cloud computing technology is being implemented and used by organisations to reduce IT costs, ease of use, reliability and enhanced IT services. The findings are that top management involvement and support is essential to cloud computing adoption and use by organizations. The technology context reflects the technological issues that will influence decisions on the adoption of cloud computing and the use of cloud computing. The finding is that cloud computing complexity affects the acceptance and usage of cloud computing. The main issues may be the difficulty of cloud computing. The finding is that cloud computing compatibility with current organizational culture and technology will have a more beneficial influence on the adoption and use of cloud computing.

The last research objective "*To determine how cloud computing could be adopted and used strategically in the South African context*" A combination of Stakeholder theory, Contingency theory and Technology-organization-environment framework was used to address this objective. The last objective aimed at conceptualising a strategic cloud computing framework in the context of South African Information Technology professionals. The strategic cloud computing framework is informed by empirical evidence and literature.

7.4 Evaluation of the research methodology

7.4.1 Why a case study is relevant for this research

This study sought to understand how cloud computing could be strategically adopted and used sensitive to the South African context. The researcher utilised the case study method through a qualitative research design to address the research objectives as presented in the previous section.

The case study strategy was considered the most suitable, considering the interpretive position and the nature of the research question. According to Yin (2016), the research strategy of a case study helps the researcher to understand a phenomenon in detail. The case study research strategy was suitable for the present study. The case study strategy was able to give rich profound empirical evidence about cloud computing in the context of IT professionals. The case study provided an opportunity to obtain IT professionals' opinions, views and experiences.

7.4.2 What is the Research Theme; is it relevant to business information systems leadership?

Given that cloud computing is still in its infancy in South Africa, the theme and the study are still relevant to both practitioners and academics.

7.4.3 Appropriateness of the data collection techniques

The findings of this research study were derived from qualitative data collected using semi-structured interviews. This provided rich profound empirical evidence.

7.5 Relevance of the combination of Stakeholder theory, Contingency theory and TOE framework

The research study is underpinned by Stakeholder theory, Contingency theory, and TOE framework as a research lens in the South African context to develop a strategic cloud computing framework. Triangulation of the three theories was appropriate given the complexity of adopting and using cloud computing. One theory would not be sufficient as a lens to fully understand the complexity of the studied phenomenon.

7.6 Thesis Contributions

This thesis contributes to the current body of knowledge in business information leadership, notably in the cloud computing domains. The thesis contributes in four folds; theoretically, methodologically, contextually and practically.

7.6.1 Theoretical Contribution

The combination of three theories highlights how cloud computing adoption and use is multifaceted and a complex phenomenon. A majority of adoption and use studies adapt the TOE framework as a research lens without triangulation of other theories such as contingency theory and stakeholder theory. Although the three theories namely stakeholder theory, contingency theory and TOE framework are organisational level theories, the theoretical contribution is in bringing out IT professionals' opinions, experiences and views as individuals working in organisations. This contributes to the literature as well as to future research in business IS leadership.

7.6.2 Methodological Contribution

A majority of studies on the adoption of innovation are using survey methods to collect primary research data. The study used a case study research strategy. According to Yin (2016), the research strategy of a case study helps the researcher to understand a phenomenon in detail. The case study allowed IT professionals to give rich descriptive data on cloud computing adoption and use, this contributed to new ideas in theory build.

The study being interpretative and using a case study as a research strategy illustrates an alternative way to understand how cloud computing can be strategically adopted and used in the context of South Africa. By so doing, the study contributes to the business leadership body of knowledge through descriptive views, opinions and experiences.

7.6.3 Practical Contribution

The thesis offered an alternative conceptualisation of cloud computing adoption and use in the South African context. The practical contribution of this study is a strategic cloud computing framework that can be used to help practitioners towards strategically adopting and using cloud computing. The strategic cloud computing framework may assist practitioners and decision-makers on how to address the adoption and use of cloud computing sensitive to the context in

which it takes place. The framework can be used as a guideline and a resourceful practice tool. The new knowledge contributes to the literature as well as to future research in business IS leadership.

7.6.4 Contextual Contribution

This thesis bridges the knowledge gap by bringing out the South African context and IT professionals' views, opinions and experiences. The literature mostly brings out the western and eastern world experiences and not often developing country contexts. The South African climate is not the same as that of developed countries, especially with regard to educational and social backgrounds, politics and culture. The infrastructure is unique to the South African environment. The South African information technology (IT) professionals are not the same as compared to the developed countries. There are differences, for examples, in South Africa, there are scarce skills in IT, the competencies are not the same as compared to developed countries, and IT skills retention is an issue in South Africa due to scarce resource. There is a lack of individual autonomy, IT professionals feel that they are not being appreciated or valued, decisions are being made without their inputs and this leads to IT professionals being frustrated.

The study provides an overview of how South African IT professionals could be considered in the strategic adoption and use of cloud computing

7.7 Recommendations for future research

Recommendations are provided for practical and future research in the area of cloud computing. The current study focused on the adoption and use of cloud computing in the South African context. There is an opportunity to do the same study in other developing country and sector to see if these findings will be consistent. The following are some of the future studies

- A future study could be undertaken on individual views on cloud computing ethical issues in the context of South Africa.
- A future study could be undertaken in the context of South African IT professionals to explore how cloud computing has an impact on change management.
- This study was based on a research strategy for a case study and it indicated that it had limitations. A future study could be conducted based on a survey, which can allow the study results to be applied to a large population.

- A future study could be conducted to explore factors such as the resistance to change by organisational staff and management on the cloud computing adoption and use in an organisation.
- A future study should be conducted to examine the obstacles within South African organizations to cloud computing adoption and use.
- A future study could be undertaken in the context of South African IT professionals using other research strategies such as survey and different sampling technique.
- A future study on cloud adoption and use in the context of other African countries context.
- A future study could be undertaken in the context of South African IT professionals using a longitudinal design. The longitudinal design may have been useful to see if the same IT professionals carry the same views and opinions weeks or months later.
- Finally, a future study could be conducted to develop a framework for staff retention and skills in the cloud computing environment.

7.8 Study Limitations

This study, like other researches, has its limitations. This may be in the form of time constraints, costs, methodology, covid-19 epidemic and data collection. The study was limited to IT professionals to give a real perspective on the adoption and use of cloud computing.

Time and costs are also constraints. The researcher wanted to interview as many IT professionals in South Africa as possible, but the study reached saturation and time constraints prevented the researcher from doing so. Semi-structured interviews were used to gather primary data from thirty-four participants. The number of interviews was reduced due to time and cost constraints. Face-to-face interviews require the conduct interviews by the researcher, indicating that there would be personnel costs.

The methodology is another area of potential limitation. The study used the purposive sampling technique as opposed to other techniques. The limitation is that when purposive sampling is used in a qualitative sample, the data interpretation might not be sufficient to achieve generalizability. The other limitation is the study's unit of analysis was the individual, the IT professionals, other professionals were not involved. This study is limited to a selection

of South African information technology professionals at the empirical level, which may result in the findings applying only to this context.

The COVID-19 epidemic is another area of potential limitation. Due to the covid-19, the researcher had to rely on virtual platforms such as Microsoft Teams, Zoom and Google Meet, to conduct interviews. The constraint there was no face-to-face interviews between an interviewer and an interviewee to obtain accurate details. Furthermore, an online meeting might experience connectivity issues.

Data collection is another area of potential limitations. The following limitations experienced during the research apply to this study:

- Due to covid-19, difficult access to participants
- Online meeting connectivity's issues may lead to delays in data collections
- Time and cost constraints limited the number of interviews.
- The study reached saturation where no new insight surfaced

7.9 Conclusion

In South Africa, the adoption and use of cloud computing are very important for organisations to realise the value of cloud computing. Cloud computing adoption and use is still a theoretical, practical information system and business leadership key issue as organisations strive to find ways on how cloud computing could be strategically adopted and used in a uniformed and coordinated manner.

The basis of this study was that literature on how cloud computing may be strategically adopted and used in the South African context has not yet been adequately addressed in the literature, with known studies conducted in South Africa, from the context of IT professional's opinions, views and experience. The organisational context may be well studied, but there are inadequate studies done from the individual's point of view.

This thesis sought to conceptualise a strategic cloud computing framework in the context of South African information technology professionals. The study goal was achieved through the following objectives:

- To describe how cloud computing manifest in South Africa according to South African IT professionals.

- To analyse and describe the drivers of cloud computing for different stakeholders.
- To analyse and describe the practical and theoretical contingencies for strategic cloud computing in the South African context.
- To analyse and describe factors influencing the adoption and use of cloud computing.
- To determine how cloud computing could be adopted and used strategically in the South African context.

A review of the literature indicated knowledge gaps in how cloud computing may be strategically adopted and used in the South African context. The problem statement highlighted that

- There is a lack of a theoretical framework consisting of stakeholder value on cloud computing for different stakeholders.

This was addressed by using Stakeholder Theory elements to understand the involvement of different stakeholders in the decision-making on the adoption and use of cloud computing. From the research conducted, the study found that stakeholders are aware that any change to their requirements in terms of cloud computing has both benefits and risks. There is accountability for the role of stakeholders in decision-making. The findings further show that the role of stakeholders in decision-making for organizations is gaining more and more attention. In adopting and using the cloud computing environment, the stakeholder derives values.

- There is a lack of a practical or conceptual framework for the adoption and use of cloud computing in the South African context.

This was presented by using elements of Contingency Theory to understand contingencies that can be used in the context of South African Information Technology Professionals to conceptualize strategic cloud computing framework. The study found that the key factors for cloud computing adoption and usage within organizations are economic, linked to budget reductions and the need to improve competitiveness. Organisations are incorporated cloud computing technology into their strategic objectives. The findings further show that the more IT skills and knowledge of cloud computing from management the better chances to adopt and use cloud computing successfully.

- The adoption and use of cloud computing is still a practical key issue as organisations strive to find ways on how cloud computing could be strategically adopted and used in a uniformed and coordinated manner.

The study conceptualized a strategic cloud computing framework for the uniform and coordinated adoption and use of cloud computing strategically. In the context of South African IT professionals, the strategic cloud computing framework was developed from the theoretical research lens of stakeholder theory, contingency theory and technology-organization-environment framework. In the final strategic cloud computing framework, the new elements from the empirical findings were implemented. The framework would help to place the adoption and use of cloud computing in a strategic role. The strategic cloud computing framework will help decision-makers cope with the adoption and use of cloud computing that is sensitive to the context in which it takes place.

- The literature on how cloud computing may be strategically adopted and used in the South African context has not yet been adequately addressed in the literature, with no known study conducted in South Africa in establishing from the context of IT professional's view, opinion and experience.

This study gave the individuals a voice, to give their opinions and views on how cloud computing should be adopted and use in the organisation. The opinions and views of the South African information technology professionals were used to conceptualise a strategic cloud computing framework.

This study bridges the contextual knowledge gap by conducting a study in South Africa. Concerning politics and culture, the climate in South Africa is not the same as in developed countries. The infrastructure is unique to the environment of South Africa. In comparison to developed countries, the South African information technology (IT) profession is not the same. In South Africa, you face scarce IT skills, competencies are not the same compared to the developed countries and retention of IT skills is a problem in South Africa due to scarce resources. There is a lack of individual autonomy, IT professionals feel that they are not respected or appreciated, decisions are taken without their inputs and this leads to frustration among IT professionals.

The value of this thesis is in contributing to the body of academic knowledge to Information Systems, Business Leadership and cloud computing. Notably on cloud computing adoption and use in the South African context. This study gave the individuals a voice, to give their opinions and views on how cloud computing should be adopted and use in the organisation. The opinions and views of the South African information technology professionals were used to conceptualise a strategic cloud computing framework. This research contributes to the domain knowledge of cloud computing and future business leadership research.

7.10 Summary of the chapter

This chapter assesses whether the study goals were reached and research questions were addressed. The research methodology was evaluated and the combination of three theories as research lenses were evaluated. Research contributions were discussed. The recommendations, study limitation and suggestions for future studies have been discussed.

8.0 PEER-REVIEWED PUBLICATIONS FROM THIS STUDY

Journal Article

Andrian Wilby Twala; Ray M Kekwaletswe. (Volume. 5 Issue. 8, August - 2020), "Strategic Cloud Computing Framework: A Case Study of South African IT Professionals", International Journal of Innovative Science and Research Technology (IJISRT), www.ijisrt.com. ISSN - 2456-2165, PP: - 375-386. Retrieved from https://www.ijisrt.com/assets/upload/files/IJISRT20AUG305.pdf

Conference Papers

Twala, A. W., & Kekwaletswe, R. M. (2019). Towards a strategic cloud computing framework: A South African context. In *Proceedings of the 12th IADIS International Conference Information Systems 2019, IS 2019* (pp. 225–231). IADIS Press. https://doi.org/10.33965/is2019_201905l028

Twala, A., & Kekwaletswe, R. (2019). Strategic Cloud Computing Framework: South African Context (Vol. 12, pp. 372–361). EasyChair. https://doi.org/10.29007/p7br

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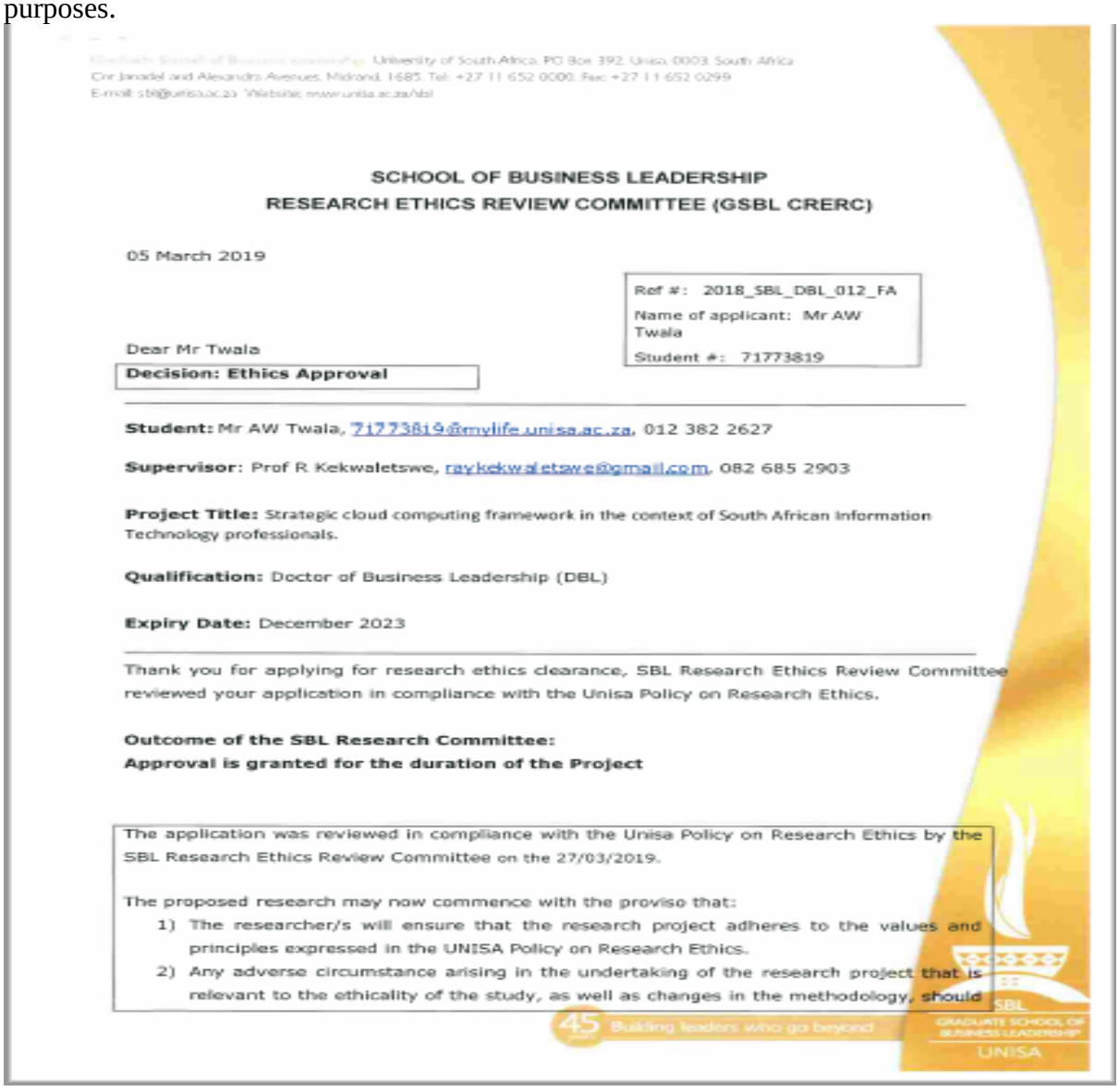
10.0 APPENDICES

APPENDIX A: ETHICAL CLEARANCE CERTIFICATE

A copy of the ethical clearance received for this research has been provided for reference purposes.



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)

05 March 2019

Ref #: 2018_SBL_DBL_012_FA
Name of applicant: Mr AW Twala
Student #: 71773819

Dear Mr Twala

Decision: Ethics Approval

Student: Mr AW Twala, 71773819@mylife.unisa.ac.za, 012 382 2627

Supervisor: Prof R Kekwaletswe, raykekwaletswe@gmail.com, 082 685 2903

Project Title: Strategic cloud computing framework in the context of South African Information Technology professionals.

Qualification: Doctor of Business Leadership (DBL)

Expiry Date: December 2023

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 27/03/2019.

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 relevant to the ethicality of the study, as well as changes in the methodology, should

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SBL GRADUATE SCHOOL OF BUSINESS LEADERSHIP UNISA

University of South Africa, PO Box 392, Unisa, 0003, South Africa
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E-mail: sbl@unisa.ac.za Website: www.unisa.ac.za/sbl

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

Prof R.T Mpofu
Executive Dean (Acting): Graduate School of Business Leadership
011- 652 0256/mpofurt@unisa.ac.za

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UNISA

APPENDIX B: CONSENT TO PARTICIPATION

Graduate School of Business Leadership, University of South Africa PO Box 392 Unisa 0003 South Africa
Cnr Smuts and First Avenue Midrand 1685 Tel: +27 11 652 0000 Fax: +27 11 652 0299
Email: sbl@unisa.ac.za Website: www.sblunisa.ac.za

Informed consent for participation in an academic research project

STRATEGIC CLOUD COMPUTING FRAMEWORK IN THE CONTEXT OF SOUTH AFRICAN INFORMATION TECHNOLOGY PROFESSIONALS

Dear Respondent

You are herewith invited to participate in an academic research study conducted by Andrian Wilby Twala, a student in the Doctor of Business Leadership at UNISA's Graduate School of Business Leadership (SBL).

The purpose of the study is to find out how cloud computing could be strategically adopted and used sensitively to South African context.

All your answers will be treated as confidential, and you will not be identified in any of the research reports emanating from this research.

Your participation in this study is very important to us. You may however choose not to participate and you may also withdraw from the study at any time without any negative consequences.

The study involves semi-structured interviews which will be audio taped. This should not take more than 30–45 minutes of your time.

The results of the study will be used for academic purposes only and may be published in an academic journal. We will provide you with a summary of our findings on request.

Please contact my supervisor, Prof Ray Kekwaletswe, email: Ray.Kekwaletswe@gmail.com if you have any questions or comments regarding the study. Please sign below to indicate your willingness to participate in the study.

Yours sincerely

Andrian Wilby Twala

I, **Mojalefa Jacob Mokoena**, herewith give my consent to participate in the study. I have read the letter and understand my rights with regard to participating in the research.

Respondent's signature

16 September 2019
Date

APPENDIX C: PARTICIPANT INFORMATION SHEET

Graduate School of Business Leadership, University of South Africa PO Box 392 Unisa 0003 South Africa
Cnr Janadel & Alexandra Avenue Midrand 1685 Tel: +27 11 652 0000 Fax: +27 11 652 0299
Email: sbl@unisa.ac.za Website: www.sblunisa.ac.za

PARTICIPANT INFORMATION SHEET

08-Febraury-2019

Title: **STRATEGIC CLOUD COMPUTING FRAMEWORK IN THE CONTEXT OF SOUTH AFRICAN INFORMATION TECHNOLOGY PROFESSIONALS**

Dear Prospective Participant

My name is Andrian Wilby Twala and I am doing research with Ray Kekwaletswe, a professor, in the Graduate School of Business Leadership towards a Doctor of Business Leadership at the University of South Africa. We are inviting you to participate in a study entitled Strategic cloud computing framework in the context of South African information technology professionals.

WHAT IS THE AIM/PURPOSE OF THE STUDY?

The aim of this study is to conceptualise a strategic cloud computing framework in the context of South African information technology professions.

I am conducting this research to find out how cloud computing could be strategically adopted and used sensitively to South African context.

WHY AM I BEING INVITED TO PARTICIPATE?

The participants chosen by their knowledge of cloud computing. The direct benefit to you for participating in this study is that you will have the opportunity to verbalise your understanding of cloud computing adoption and use in the university context

For the purpose of this study, interviews will be conducted until at the point of saturation.

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Email: sbl@unisa.ac.za Website: www.sblunisa.ac.za

WHAT IS THE NATURE OF MY PARTICIPATION IN THIS STUDY /WHAT DOES THE RESEARCH INVOLVE?

The study involves in depth, semi-structured interviews which will be audiotaped.

The expected duration of participation for interviews will be approximately 30 to 45 minutes' duration.

CAN I WITHDRAW FROM THIS STUDY?

You can withdraw from participation at any time, there is no penalty or loss of benefit for non-participation. Being in this study is voluntary and you are under no obligation to consent to participation. If you do decide to take part, you will be given this information sheet to keep and be asked to sign a written consent form. You are free to withdraw at any time and without giving a reason.

WHAT ARE THE POTENTIAL BENEFITS OF TAKING PART IN THIS STUDY?

Your participation will provide critical information for understanding of cloud computing adoption and use in in the context of South African information technology professions.

WHAT IS THE ANTICIPATED INCONVENIENCE OF TAKING PART IN THIS STUDY?

The study involves in depth, semi-structured interviews, approximately 30 to 45 minutes' duration, which will be audiotaped.

APPENDIX D: PILOT STUDY REPORT

Pilot testing is a rehearsal of your research study, allowing you to test your research approach with a small number of test participants before you conduct your main study.

Pilot testing commenced in June 2019. The primary objectives of the pilot testing were to test out the questions drawn up and to determine the duration of the interview. The interview guide evaluated the following:

- The flow of questions on the interview guide
- The ease or difficulty in the questions was responded to by participants
- Interviewing techniques were practised
- Test the recording device

Varied topics were covered during the interview process, including the aspect of cloud computing manifest in South Africa, the drivers of cloud computing for different stakeholders, the practical and theoretical contingencies for strategic cloud computing in the South African context and the factors influencing the adoption and use of cloud computing

The pilot interviews led to the identification of the following issues:

- There was a tendency for people to share their experience when answering questions
- Few participants enquired about the purpose of the entire research exercise
- An hour was usually sufficient for the whole interview
- Unclear questions were rephrased
- All of the sessions were recorded for later reference

The above process enabled the researcher to make the necessary amendment to the questions and format. Subsequently, a few changes were made to the interview schedule to cut the long questions, making them shorter and clearer. The English language was used and all the participants were more comfortable with the language