UNIVERSITY OF KWAZULU-NATAL

Barriers to the adoption of cloud services by SMEs in South Africa

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A dissertation submitted in partial fulfilment of the requirements for the degree of

Master of Business Administration

Graduate School of Business & Leadership

College of Law and Management Studies

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2016

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Acknowledgements

I wish to express my sincere appreciation and gratitude to the following individuals, without whose assistance, this study would not have been possible:

- My dad, mum for being the best parents in the world.
- My wife Pedzy and daughter Mikayla, for being there for me through and through
- My supervisor, Prof Manoj Maharaj for extraordinary patience, and invaluable counsel.
- Aristide Bado, your guidance during analysis was much appreciated.
- Stanley Carries for being there from the start right to the end, encouraging, you were a true friend in this.

I would also like to acknowledge the respondents drawn mainly from SME's based in Durban who took time to complete the survey and ensured I had something to work with.

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Abstract

This research looks at the barriers faced by Small and medium enterprises (SMEs) , in South Africa in accessing cloud computing services. This research is drawn from a survey carried out from a sample drawn from businesses mainly located in Durban. The upswing in entrepreneurship activities experienced in South Africa implies that SMEs have the potential to play an even greater role in driving the economic growth on the country. These gains can only be consolidated if the country can reduce the high failure rate in SME growth. It was asserted that 75% of new SME do not become established firms. Information and communication technology (ICT) is acknowledged as an enabler in the growth of enterprises and some studies have focussed on the role that ICT in general plays in SME growth in South Africa. Few have however delved deeper and looked at ICT adoption in the cloud computing context and the barriers encountered. In this forum, some studies show that strides made in the cloud computing revolution have theoretically levelled the playing field in terms of providing SMEs with access to affordable ICT services, in a way that gives them a competitive advantage similar or beyond that which bigger firms have. The focus of this study was on ascertaining the current uptake of cloud computing services by SMEs in South Africa, with a view of identifying barriers that hinder the full adoption of the same. 210 SMEs were chosen for this study based on their profile. Out of 210 questionnaires sent only 43 responded, representing a response rate of 20 %. The data was captured in a QuestionPro database. From the analysis using the unified theory of acceptance and use of technology (UTAUT) framework, it was found that, Facilitating Conditions (FC) significantly influenced SME Use Behaviour for cloud computing technology while Performance Expectancy (PE), Effort Expectancy (EE) and Social Influence (SI) were statistically insignificant, on influencing Behavioural Intention (BI) to adopt cloud services. However, Behavioural Intention significantly influenced Use Behaviour (UB) for cloud services. The sample used in this study was fairly small, due to resource constraints, it is the researcher’s recommendation that a follow up study with a larger sample be conducted if resources allow. The most significant limitation was on unreliable contact listing for SMEs resulting in many SMEs not being reachable.

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Abbreviations and Acronyms

GDP	-	Gross Domestic Product
GEM	-	Global Entrepreneurial Monitor
ISA	-	Information Systems Applications
SAS	-	Statistical Analysis Software
SPSS	-	Statistical Packages for the Social Sciences
TAM	-	Technology Acceptance Model
TBE	-	Theory of Planned Behaviour
TEA	-	Total Early- Stage Entrepreneurial Activity
SMEs	-	Small to Medium Enterprises

Chapter 1

Introduction

1.1 Introduction

This study seeks to identify the barriers to the adoption of cloud services by SMEs in South Africa. This chapter will discuss the background and context, objectives, research methodology and the limitations to the study.

1.2 Problem Statement

South Africa has seen an upswing in entrepreneurship activities with experts predicting Small to Medium enterprises (SMEs) will play an increasing role in driving growth in the local economy (Berry, von Blottnitz, Cassim et al., 2002a, Mlachila and Takebe, 2011b). SMEs constitute more than 95 percent of all firms in Sub Saharan Africa and are identified as drivers for economic growth on the African continent. Radas and Božić (2009) consider this as an important finding that in turn sets expectations for policy enablers to be put in place to ensure the success of these SMEs

On the other hand according to Von Broembsen, Wood and Herrington (2005), a high failure rate for SME growth implies that 75% of new SME do not become established firms. This finding is also echoed by the Global Entrepreneurship Monitor report for 2014 (Herrington, 2014) which states that South Africa's rate of business discontinuation at 3.9% of the population, is higher than its rate of established business activity which is at 3.2 %, as shown in the Table 1.1.

These findings essentially point to a net loss of small business activity and leading to job losses in the economy. Considering that in 2013, the business discontinuance rate in South Africa was at 4.9 percent, 3.9 percent for 2014 shows a slight improvement Herrington (2014).

		Nascent entrepreneur-ship rate	New business ownership rate	Early-stage entrepreneurial activity (TEA)	Established business ownership rate	Discontinuation of businesses (% of TEA)
Africa	Angola	9.5	12.4	21.5	6.5	15.1
	Botswana	23.1	11.1	32.8	5.0	15.1
	Burkina Faso	12.7	9.7	21.7	17.7	10.8
	Cameroon	26.4	13.7	37.4	11.5	17.7
	South Africa	3.9	3.2	7.0	2.7	3.9
	Uganda	8.9	28.1	35.5	35.9	21.2
	Average (unweighted)	14.1	13.0	26.0	13.2	14.0

Table 1.1: Phases of entrepreneurial activity in GEM economies in 2014
Adapted from HERRINGTON, M. K., J 2014. Global Entrepreneurship Monitor 2014, South Africa: The crossroads–a goldmine or a time bomb? Global Entrepreneurship Monitor. University of Cape Town Centre for Innovation and Entrepreneurship.

Amongst the reasons given by entrepreneurs for business discontinuance, difficulties in accessing financial support, poor profitability and lack of running out of working capital are consistently cited (Simrie, Herrington, Kew et al., 2012, Herrington and Kew, 2013). These results therefore strengthen the need for further investigation into the underlying causes and possible solutions to stem business failure or the reasons behind an observed lower “established business ownership rate” versus the “Early-stage entrepreneurship activity” ratio as compared to other countries in Sub Saharan Africa.

Information and Communication Technology (ICT) is acknowledged as a contributory factor to the growth of enterprises (Kyobe, 2011, Ongori and Migiro, 2010). In the same vein it can be argued that failure to access ICT services can reduce a firm’s competitiveness substantially and can thus be factor towards the high SME failure rate in South Africa. Authors such as Ihua (2009) identified poor accounting and book keeping, financial problems and Infrastructural Inadequacy as some of the factors that contribute to SME failures in Nigeria, a developing country that can compare with South Africa.

The benefits that come with adoption of the cloud model by SMEs to counter some of these challenges are practically relatable considering how the delivery of cloud computing services mirrors the everyday ‘utility’ service provision system with which consumers’ access electricity, water or telephone services. Chief amongst these benefits are:

- The reduction of upfront investments into IT infrastructure for firms to enjoy the same benefits as before (Marston, Li, Bandyopadhyay et al., 2011b, Armbrust, Fox, Griffith et al., 2010).
- Enhanced scalability and elasticity as an organisation will have access to ready computing resources allowing it to scale up or down depending on the organisational needs (Yu, Wang, Ren et al., 2010).
- Increased end user productivity as systems can be accessed from anywhere and from multiple device types (Popović and Hocenski, 2010, Sabharwal and Wali, 2013).
- Reliability since many providers provide redundant sites, facilitating business continuity in case of disasters (Buyya, Yeo, Venugopal et al., 2009, Zissis and Lekkas, 2012) .
- Lower IT costs are also an implied benefit as organisations do not have to worry about the traditional staffing needs of an IT department (Sabharwal and Wali, 2013, Pearson and Yee, 2012)

In light of these benefits it becomes imperative that a study be conducted to identify the barriers that hinder the full adoption of cloud computing services by SMEs in South Africa.

1.3 Motivation for the study

Through conducting the study, the researcher aims to bring to the fore the challenges if any, that SMEs face in adopting cloud computing services for their businesses. This stems from the researcher's strong beliefs underpinned by literature evidence by authors such as Gupta, Seetharaman and Raj (2013), Rath, Kumar, Mohapatra et al. (2012) and Sultan (2011) whose researches show that adopting IT services via the cloud has the benefit of providing SMEs significant operational cost savings. This is a factor that should boost SME profitability and leverage to compete against more established firms who often command higher IT budgets. According to Herrington (2014), In South Africa, most SMEs are financed by the banks or the government through institutes such as Small Enterprise

Development Agency (SEDA), Small Enterprise Finance Agency (SEFA) who on behalf of the government are eager to get good returns for their investments in small businesses (Olawale and Garwe, 2010, Fatoki, 2013). With that in mind, the promise that SMEs will not be called upon to make significant upfront IT investments from start-up onwards implies that they can then focus their operational budgets to other areas such as marketing.

Climate change is a major issue that the world is grappling with, the practical implications of growing economies imply that we cannot simply stop any practices that are contributing towards this undesirable phenomenon without negative economic consequences in the short term (Stern, Peters, Bakhshi et al., 2006). The King III report Governance and Directors (2002) calls for businesses to engage their operations in a sustainable manner and most importantly to report on their efforts towards this in their financial reporting. As such, the efficiencies that come with a model whereby computing resources are pooled together allowing for many users to share server resources, go a long way in improving a firm's energy usage sustainably (Stern, Peters, Bakhshi et al., 2006). Cloud chat services or video conference services such as GoToMeeting also eliminate the need for commutes to meetings and also lower a businesses' carbon footprints.

For cloud service providers in South Africa, and other developing countries, it is important to get an understanding of the untapped market that exists and the unique challenges faced by these SMEs with respect to adopting cloud services (Kshetri, 2010, Murugesan, 2011). This should then provide a platform for these providers and policy makers to come up with innovative solutions and tailor offerings in a way that enables unhindered delivery of the same to these enterprises.

1.4 Focus of the study

The focus of this study will be on ascertaining the current uptake of cloud computing services by SMEs in South Africa, with a view to identifying barriers that hinder adoption of the same.

1.5 Study Objectives

The following are the specific objectives of the study:

1. To ascertain the level of cloud computing services uptake by small, medium enterprises (SMEs) in South Africa
2. To identify barriers in the full adoption of Cloud Computing by SMEs in South Africa
3. To identify gaps and the impact of current ICT policies as enablers /inhibitors to cloud service adoption in the sector.
4. To produce a report that sets a platform for further discussion and research towards improving cloud computing friendly ICT support to the SME sector.

1.6 Hypotheses

Hypothesis 1: Performance expectancy positively affects SME's intentions to use cloud computing technology

Hypothesis 2: Effort expectancy positively affects SME's intentions to use cloud computing technologies

Hypothesis 3: Social influence positively affects SME's intentions to use cloud computing technology

Hypothesis 4: Facilitating conditions of cloud computing technology positively affects SME's behaviour on actually using cloud computing.

Hypothesis 5: SME behavioural intentions to use cloud computing technology positively affects the SME's use behaviour concerning cloud technology.

1.7 Limitations of the study

The limitations to the study were the following:

- Time constraints
- Cost constraints as the study was self-funded.

These impacted on the sample size used for the study thus reducing the power of the study.

1.8 Overview of the study

The objectives set for the study, will be used as a guide for its duration. The study will be presented in the following chapters:

- Chapter One: This is the introductory chapter, providing the background, aim, objectives of the study and the hypothesis.
- Chapter Two: This chapter presents the literature review on the adoption of cloud computing in similar settings and a review of previous work done on the subject area.
- Chapter Three: The chapter discusses the research methodology used and the rationale
- Chapter Four: This chapter discusses the data collection, management and analysis.
- Chapter Five – Concludes the study and identifies areas for further research.

1.9 Summary

This chapter outlined the reasons for the study and the underlying motivation. It also articulated the study aims and objectives, the focus of the study and the hypothesis. The challenges that were experienced in conducting the study are also articulated and the chapter ends by giving an overview of the study.

Chapter 2

THEORETICAL FRAMEWORK

2.1 Introduction

An online search using the key words (cloud computing, SME, barriers to cloud adoption, South Africa) in the South African journals on Sabinet African Electronic Publications (SA ePublications), shows that there is little research undertaken in this regard with respect to barriers to the adoption of cloud services by SMEs in South Africa. Most of the articles Ramgovind, Eloff and Smith (2010), Carroll, Van Der Merwe and Kotze (2011) and Kshetri (2010) examine the readiness of business with regards to adoption, security risks associated with cloud computing and also look at cloud computing as an emerging platform, without quite acknowledging that cloud computing is already here. It is therefore of significance that a research of this nature be undertaken to ascertain the current challenges facing these SMEs with respect to the topic.

In this chapter the focus will be on initially defining the terms SMEs and Cloud Computing. The chapter will then investigate the current state of ICT by SMEs in South Africa with a particular focus on cloud computing adoption. Thirdly the chapter will highlight the current drivers in the adoption of cloud computing, the potential benefits and perceived risks associated with cloud computing and how this compares with the rest of the world. Lastly the chapter will look at the decision making processes with regards to adopting new technologies in enterprises as modelled by the unified theory of acceptance and use of technology (UTAUT) framework.

2.2 Defining an SME in the South African Context

There is no agreed definition for SMEs as different countries or regions have their own specifications as to what constitutes an SME. In South Africa an SME is defined by The National Small Business Act of South Africa of 1996, as amended in 2003 as:

> a separate and distinct entity including cooperative enterprises and non-governmental organisations managed by one owner or more, including its branches or subsidiaries if any is predominantly carried out in any sector or sub-sector of the economy mentioned in the schedule of size standards and can be classified as a SME by satisfying the criteria mentioned in the schedule of size standards (p2, 1996).

A complex set of thresholds is used to classify enterprises in South Africa as micro, very small, small, or medium as can be illustrated in Appendix E. Table 2.1.
This guide will be used for this research project.

2.3 Current use of ICT by SMEs in South Africa

The Global Entrepreneurship Monitor (GEM) report of 2014,(Herrington, 2014) paints what may appear at first to be a gloomy picture with regards to the current state of SMEs in South Africa. A higher rate of business discontinuance compared to business start-ups which implies that there is a net loss of small business activity. However, this points to a marginal improvement from prior years.
In South Africa, SMEs face a barrage of challenges along this spectrum from conception to establishment that is if they succeed at all . Research done on the topic indicates that inefficiencies attributable to government bureaucracy and onerous regulations, a low level of education in the workforce, high crime levels and demanding labour laws as some of the constraints facing SMEs (Herrington, 2014) (SBP, 2014). In what it terms as efficiency enhancers, GEM lists higher education and training, goods market efficiency, labour market efficiency, financial market sophistication, technological readiness and market size as pre-requisites for an efficiency driven economy. ICT usage has been demonstrated by various studies to be a productive factor in increasing labour productivity for SMEs in both formal and informal factors (Chew, Ilavarasan and Levy, 2010, Heeks, 2010, Esselaar, Stork, Ndiwalana et al., 2006a).
While ICT adoption by SMEs has been shown to counterbalance some of these challenges, the upfront investments needed, in the form of infrastructure and/or training is often seen as a hindrance to the full realisation of the benefits provided. The use of ICT by SMEs as an enabler for business in South Africa has been

investigated upon by various authors (Ongori and Migiro, 2010, Wolf, 2001, Esselaar, Stork, Ndiwalana et al., 2006b, Modimogale and Kroeze, 2009). Most of these authors identify Supply Chain relationships as a major factor in pushing SMEs up the ladder in their adoption of ICT services (Gono, Harindranath and Özcan, 2013). The same studies also found a heavy reliance on external sources for ICT skills or expertise.

The World Economic Forum global ICT rankings for 2015 by Dutta, Geiger and Lanvin (2015) and as shown in Figure 2.1, currently place South Africa at number 75 out of 143 participating economies. The significance of this is more evident when we consider that South Africa has actually dropped 5 places when compared with results from 2014. This leaves South Africa positioned at third place in Africa, lagging behind Mauritius and Seychelles whilst other economies such as Kenya and Mauritius which have improved from their positions in 2014 are rapidly climbing up the rankings.

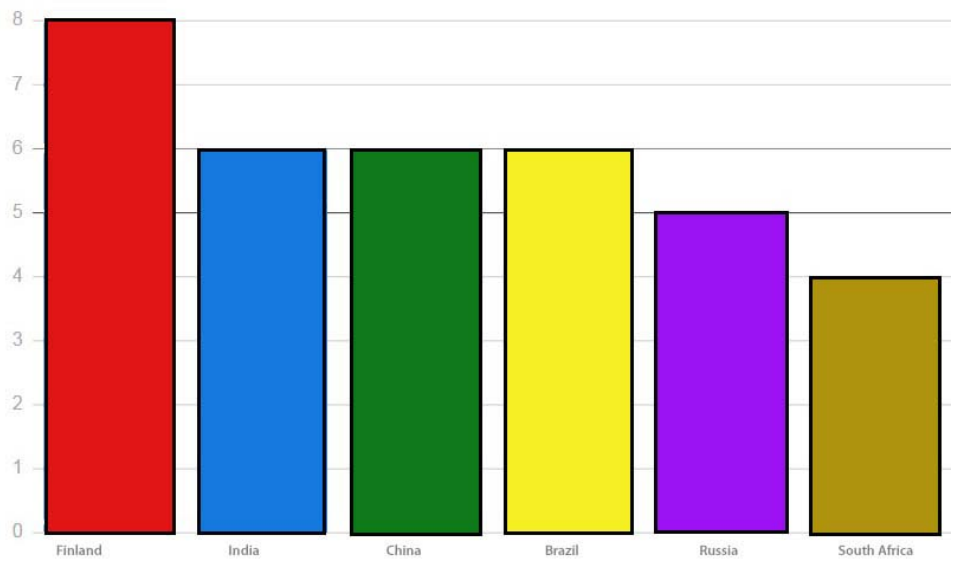

Figure 2.1: ICT Contribution to SME Growth

Adapted from: Jellema, A., Farhan, H., Fourati, K., Lougue, S., Mann, D. & Trodd, G. 2015. Web index report 2014-15: The web & growing inequality. Web Index. Washington DC: World Wide Web Foundation

2.4 Cloud Computing

Cloud computing is a relatively new term to describe an evolving model of technology for enabling the provision of scalable IT capabilities as a service. The model is still evolving and the most accepted definition is that by the National Institute of Standards and Technology's (NIST) which identifies cloud computing as:

> A model for enabling ubiquitous, convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction. (Mell and Grance, 2011)

This definition then goes on to list five essential characteristics

- on-demand self-service,
- broad network access
- resource pooling
- rapid elasticity or expansion and
- measured service

It lists three service models (software, platform and infrastructure). The definition also identifies four deployment models namely

- Private
- Community
- Public and
- Hybrid

(Mell and Grance, 2011)

Figure 2.2 attempts to depict the cloud computing delivery model. From literature it appears most authors and experts have a definition for cloud computing from a business perspective that identifies cloud computing with terms such as *internet*, *delivery of computing services, on-demand, sharing, scalability, metering, rapidly provisioned, operating expense* (Marston, Li, Bandyopadhyay et al., 2011b) (GEELAN, 2009).

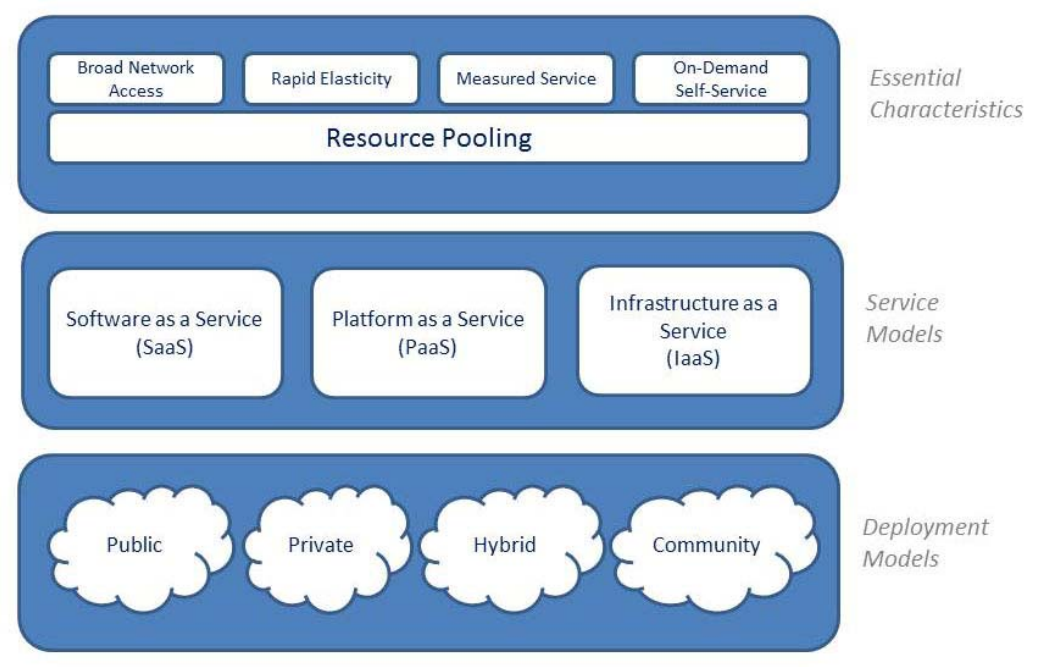

Figure 2.2: Depiction of cloud computing delivery model
Adapted from Picarello, F. 2011. Cloud computing – just right for small business [Online]. Cadence. [Accessed 06 April 2016].

2.4.1 Cloud Computing Capabilities

The benefits that come with this model should are relatable, especially considering how this models the everyday 'utility' service provision model that consumers access electricity, water or telephone services. Chief amongst these benefits is the reduction of upfront investments into IT infrastructure for firms to enjoy the same benefits as before (Sabharwal and Wali, 2013, Saboowala, Abid and Modali, 2013, Pearson and Yee, 2012).

Cloud computing offers enhanced scalability and elasticity as an organisation will have access to ready computing resources allowing it to scale up or down depending on the organisational needs. For example, to use essential services such as emails users only need to know server address record settings for their domain and an internet connection, giving them access to emails that have already been filtered for viruses and spam at the cloud providers. Other types of services, such as fax or voice services can be provided in a similar manner, with access being made through a client application or web browser.

There is a potential ease with which small firms and start-ups can rely on the 'on-demand' and 'scalability' capability of the cloud has been highlighted. An example is, Animoto, a small start-up with limited resources who after publishing an app on Facebook had to harness the cloud to provide computing resources to match massive user demand as the app went viral online (Khajeh-Hosseini, Greenwood and Sommerville, 2010). This demand was massively beyond what their resources could handle but using the cloud, the firm successfully scaled from 50 servers to 3500 servers in the 3 days that demand was doubling every 12 hours. Animoto also subsequently scaled down to match falling demand, all the while without the firm having to buy any additional hardware or layout a new network or storage infrastructure.

Fox, Griffith, Joseph et al. (2009) put this into perspective by comparing the Animoto case to that of CNN website crashing due to unprecedented user demand and going offline shortly after the World Trade centre attacks on September 11, 2001 as traffic was increasing tenfold every 15 minutes. If cloud services as available to Animoto and similar small firms had been available to CNN at the time, it is fair to say such a catastrophe could have been averted.

With the shift towards green energy, cloud computing becomes the model of choice as the technology is predicated on virtualization, which expands the capacity of traditional servers tremendously but running multiple virtual servers on one physical server (van der Molen, 2010). Increased end user productivity is another benefit as systems can be accessed from anywhere and from multiple device types. Reliability is increased in the cloud since many providers provide redundant sites, facilitating business continuity in case of disasters. Lower IT costs are also an implied benefit as organisations do not have to worry about the traditional staffing needs of an IT department.

2.4.2 Case for Usage of Cloud Computing to attain Competitive Advantage

Michael Porter (Porter, 2008) argues that for a business to sustain an above average competitive advantage and superior return on investment it has to either adopt a strategy for low cost leadership or differentiation. On adopting these strategies, a low cost leadership strategy would entail the firm delivering the same value or benefits as its competitors with lower operating costs.

IT costs can adversely affect an enterprise especially when there is no clear IS strategy in place (Ghobakhloo, Hong, Sabouri et al., 2012). According Weill and Olson (1989), 2% of revenue is the nominal figure business enterprises typically invest in IT, they also specifically noted that this estimate was likely to be higher as most organisations decentralised with end user equipment likely to be purchased from revenue rather than capital.

With most SMEs having a limited view towards IT planning, their investment in IT tends to be incremental and driven by specific needs especially towards basic administration and transaction processes (Hashmi and Cuddy, 1990, Naylor and Williams, 1994, Bergeron, Croteau, Uwizeyemungu et al., 2016). The scalable nature of cloud computing therefore provides a natural cost effective solution to what previously would become the albatross to a starting business, whilst enhancing the enterprises' competitiveness.

2.4.3 Drivers of Cloud Computing

As the Internet continues to grow, there are several factors that are driving cloud computing revolution. Authors Saboowala, Abid and Modali (2013) identify a few that are listed below:

Maturing and widespread adoption of virtualization

The maturing of the virtualization technology indicates that more servers that can be run on a traditional physical server leading to ten to hundred-fold increase in a firm's capacity (Hogan, Liu, Sokol et al., 2011, Wang, Von Laszewski, Younge et al., 2010, Dikaiakos, Katsaros, Mehra et al., 2009). Organisations such as Amazon which are regarded as pioneers in the provision of virtualization had suddenly found themselves with too much extra capacity which they needed to sell (Zhou, Zhang, Zeng et al., 2010, Hoefer and Karagiannis, 2010). This led to the exploiting the cloud computing capabilities to launch a business model where a shared infrastructure supplied what appeared to be a dedicated service to consumers (Hogan, Liu, Sokol et al., 2011).

Increased collaboration within and between organisations

The advent of globalisation and complex supply chain networks has called on geographically dispersed organisations, partners and vendors alike or employees to collaborate and share video, documents and multimedia files (Dillon, Wu and

Chang, 2010, Miller, 2008). There has been increased pressure to make this an economical and convenient platform transcending organisational firewalls and boundaries. This could only take place in the cloud, which also drastically reduces the costs involved.

IT as a competitive advantage for business

Agile and faster response by a firm in terms of IT resources is often the difference between success and failure, as a firm's IT resources need to dynamically scale up or down in response to the business needs. The cloud provides that ability as resources are available on the fly(Yu, Wang, Ren et al., 2010, Armbrust, Fox, Griffith et al., 2009).

Rapid growth in the number of high speed internet users

As more and more governments around the world, including Africa are prioritizing IT infrastructure upgrades, a tremendous increase in bandwidth availability to consumers and businesses has been realised. Internet technologies such as 3G, 4G and LTE are increasingly being adopted allowing for media rich services such as video streaming to be offered through the cloud, something that was inconceivable only a decade ago (Zander and Mähönen, 2013, Wu, Talwar, Johnsson et al., 2011). As of 2013, the latest undersea fibre optics cable WACS that landed in South Africa has improved the country's bandwidth capacity by over 500 Gigabits per second (Song, 2014). This implies that Internet Service Providers (ISPs) can increase their subscriber base and offer more connectivity amongst the users. Costs for internet connectivity are also likely to be lowered due to increased competition as more cables that reach the shores. Figure 2.3 illustrates the massive scale of connectivity South Africa has gone through over the past decade. From 1993 to 2002 South Africa had only the SAT-2 , a 560 megabits of bandwidth per second submarine cable servicing the country to the current connectivity where five submarine cables now provide the country with multiple terabits of bandwidth per second (Song, 2014).

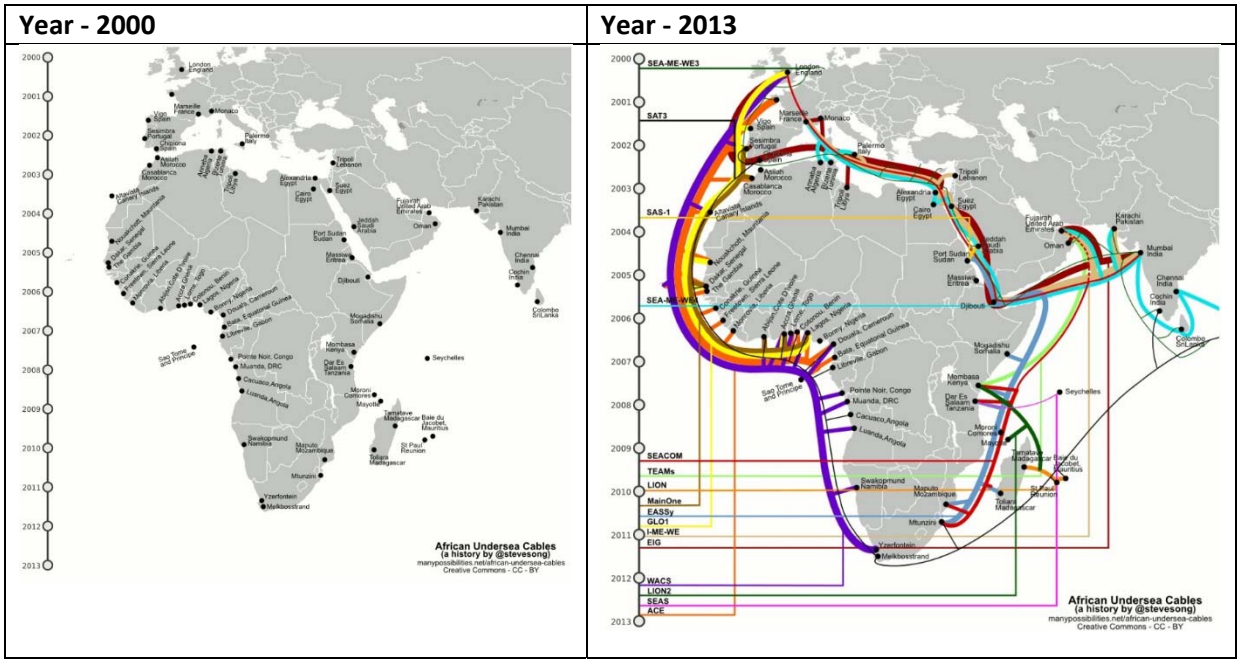

Figure 2.3: Depiction of undersea fibre optics cable connecting South Africa
Adapted from Song, S. *African undersea cables – a history* [Online]. Many Possibilities. Available: https://manypossibilities.net/african-undersea-cables-a-history/ [Accessed 12 March 2016 2016].

2.4.4 Early Adopters of the Cloud

Vendors that are credited as embracing the cloud on the Infrastructure as a service (Iaas) service provision side are Amazon which used the Amazon Web Services (AWB) to provide consumers with virtual servers, network servers, desktops, storage and IP addresses, (Chao, 2013, Marinescu, 2013). The Internet search provider, Google through its Google Apps for Business offers Saas and PaaS, a model also adopted by Microsoft through Azure and Force.com (Marinescu, 2013, Wang, Ranjan, Chen et al., 2012).

A notable provider and success in the SaaS realm of cloud computing is salesforce.com which offers a full Sales and Customer Relationship Management (CRM) applications in the cloud, including a platform to build and customize business applications to suit an enterprise's needs (Chang, Abu-Amara and Sanford, 2010). The important benefit for salesforce.com clients is that constant

communication and interaction with other customers allow for the generation of new business solutions alongside that of other participants business models (Chang, Abu-Amara and Sanford, 2010). On the other hand, big international businesses that have outsourced their software or infrastructure to the cloud include General Electric, Wells Fargo, The Financial Times, and American Red Cross to name but a few (Salesforce, 2013). In South Africa there is still a hybrid adoption of cloud computing with most businesses still keeping their critical data in-house.

2.4.5 Risks associated with Cloud Computing

As with any new technology, the cloud computing platform comes with risks (Brodkin, 2008). New developments in the industry however are likely to focus on reducing those risks. Some of the questions raised by industry experts have been:

1. How data stored at a cloud computing provider will be used by that provider?
2. How such data will be disclosed by the cloud computing provider or to 3rd parties further downstream?
3. Lock in, how easily can the consumer move from one provider to another?
4. How secure the data is, at the provider's facilities and during transmission?
5. The legality (under the consumer's local law) of using cloud computing products?
6. The impact of any disruptions in the provision of the cloud computing service?
7. Legality of some of the contractual agreements as they may not cater for the consumer's future business needs?

   (Hashizume, Rosado, Fernández-Medina et al., 2013, Brodkin, 2008, Armbrust, Fox, Griffith et al., 2010, Ward and Sipior, 2010)

The gravity of these risks is important in light of recent whistle-blower disclosures concerning the extent of the United States government interception of U.S. and European telephone metadata and Internet surveillance programs (Greenwald and MacAskill, 2013). Subsequently companies that have been offering secure encrypted email services such as Lavabit have found themselves shutting down their services rather than comply with US authorities seeking to monitor and spy on their user's emails (von Solms and van Heerden, 2015). It therefore warrants that any company seeking to store data in the cloud has to weigh the benefits against

potential privacy losses. Proponents of cloud computing such as Garrison (2010) and Glisic (2011) argue that the benefits outweigh the risks. This is not a view shared by Babin, Stanoevska-Slabeva and Kropf (2011) who quote an ISACA survey that concluded that, the risks of cloud computing outweigh the benefits for 45% of US businesses and IT professionals. Authors such as Lord and Velez (2013) are quick to attribute some of these concerns as unwarranted since few IT executives can point out to actual security breaches in the cloud, thus basing their views on urban myths. As aptly pointed out by Wall (2016), the cited major security breaches with companies such as Sony, Target and Ashley Madison were subsequently found to have originated from internally hosted databases and not cloud-based ones.

2.4.6 Global Research: Cloud Computing Adoption and Use

Many authors have investigated and written on the adoption of cloud solutions by SMEs around the world. Results on research conducted by PricewaterhouseCoopers (PwC, 2012) reflect utilisation of cloud solutions by a quarter of SMEs in the United Kingdom. The same paper suggests that a third of SMEs in France are expected to have adopted cloud solutions by 2014. Industry analysts such as Sumastre (2013) and (Ayers, 2012), confirm these results and have gone on to predict a doubling of cloud computing usage by SMEs worldwide by the year 2015. This was tested by The Exact 2015 SME Cloud Barometer (Van der Meijden and Fox, 2015), which polled 3000 SMEs across Germany, the Netherlands, Belgium, the United Kingdom (UK), France and the United Stated of America (USA) on cloud usage. The study looked at SMEs that had three or more cloud solutions in place and found out that 29 percent of SMEs in the USA fell into that category, followed by 27 percent in the UK, 25 percent in the Netherlands, Belgium and France with 24 percent with Germany lagging at 10 percent. The results seem to confirm Sumastre's prediction as 47 percent of SMEs in the UK were now using at least one cloud solution by 2015.

From studies by (Alshamaila, Papagiannidis and Li, 2013, Marston, Li, Bandyopadhyay et al., 2011a, Low, Chen and Wu, 2011, Fox, Griffith, Joseph et al., 2009, Mikkilineni and Sarathy, 2009), the ease of use featured strongly as a competitive advantage. Other factors that were identified as influencing cloud

adoption were trading partner pressure, relative advantage, prior experience, trialability, top management support and firm size.

2.5 Antecedents to Technology Adoption

The desired end result on debuting any new technology would be for potential technology adopters to essentially end up adopting the said technology. For this reason, many theories and models exist to try and predict adoption. These include the Diffusion of Innovations Theory (Rogers, 2003), Theory of Reasoned Action (Ajzen and Fishbein, 1980), Theory of Planned Behaviour (Ajzen, 1985), Unified Theory of Acceptance and Use of Technology (Venkatesh et al, 2003). In the following paragraphs, some of these antecedents for technology adoption will be discussed.

2.6 Technology Adoption Models

2.6.1 Diffusion of Innovations theory (DIT)

The diffusion of innovation theory seeks to examine, explain and describe the rate at which new ideas and technology spread (Rogers, 2003). The theory explains innovation diffusion as the process by which an innovation is communicated through certain channels amongst participants in a social system, over time.

The theory proposes four main elements of the innovation itself, communication channels, time, and a social system as influential to the spread of a new idea. Wide adoption and human capital are essential elements for this process to be self-sustaining, until it reaches a saturation level as depicted in Figure 2.4.

The theory notes that as successive groups of user's adopt a new technology (blue), its market share (yellow) will eventually reach a saturation level.

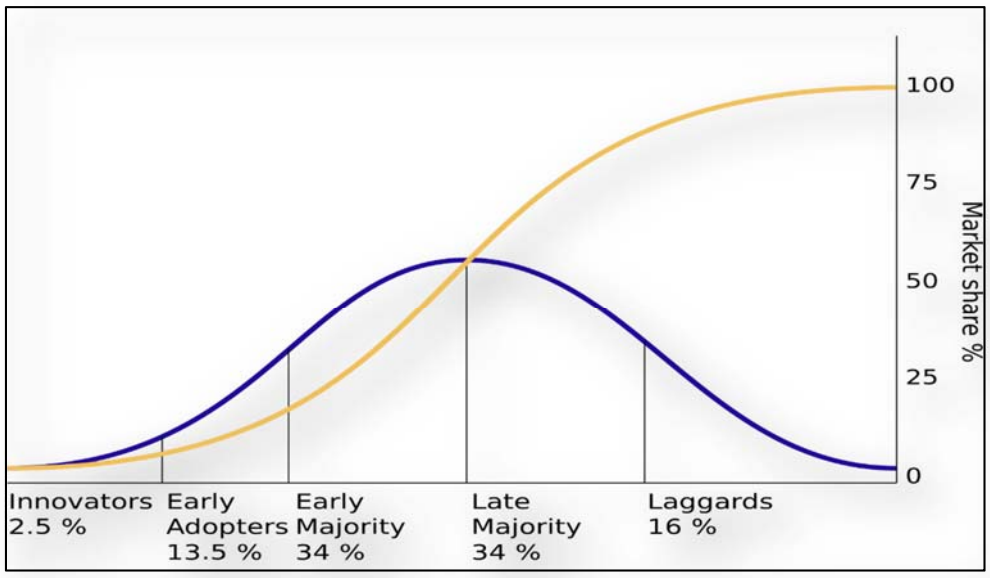

Figure 2.4: The diffusion of innovation curve

Adapted from Rogers, E. M. 2010. Diffusion of innovations, Simon and Schuster.

The theory also identifies characteristics that distinguishes the different types of adopters as shown in the Table 2.1.

User segment	Characteristics
Innovators	Visionary and imaginative, venturesome usually educated and acquire information from multiple sources.
Early Adopters	Social leaders, economically successful. Leap in once the benefits of the innovation start to becomes apparent.
Early Majority Adopters	Pragmatists, need solid proof of innovation benefits, deliberate, many informal social contacts
Late Majority Adopters	Conservative pragmatists, sceptical, risk averse, traditional, lower socio-economic status, influenced by opinions of laggards
Laggards	Driven by fear, highly risk averse, fear of debt

Table 2.1: Characteristics of adopters

Adapted from Robinson, L. 2009. A summary of diffusion of innovations. Enabling change.

In addition, according to Robinson (2009) the characteristics in Table 2.2 describe the innovations.

Core constructs	Definitions
Relative advantage	The extent to which the innovation is perceived as better than what it supersedes
Compatibility	The degree to which the innovation is perceived as meeting the needs, aligned with the values and past experiences potential adopters
Complexity	The perceived ease of use of the innovation
Trialability	The degree to which the innovation can be tried, before a decision to adopt can be made
Observability	The extent to which results on utilisation of the innovation are available and easy to measure.

Table 2.2: Characteristics of Innovations
Adapted from Robinson, L. 2009. A summary of diffusion of innovations. Enabling change.

2.6.2 Theory of reasoned action (TRA)

The TRA (Ajzen and Fishbein, 1980) is a model proposed by social psychologists to study conscious intentional behaviour. The theory was formulated as the authors sought to estimate the incongruity between attitude and behaviour, with the assumption that behaviour was voluntary. Authors like Sheppard, Hartwick and Warshaw (1988) have investigated the effectiveness of the model finding strong evidence for its predictive use, whilst suggesting the inclusion of moderators to improve the effectiveness of the model.

Other authors such as Davis, Bagozzi and Warshaw (1989) also used the model in their studies on computer acceptance finding that perceived usefulness strongly influenced peoples' intentions. These results were consistent with previous studies on moving from behavioural intentions towards acceptance. The core constructs and definitions of the theory are represented in Figure 2.5.

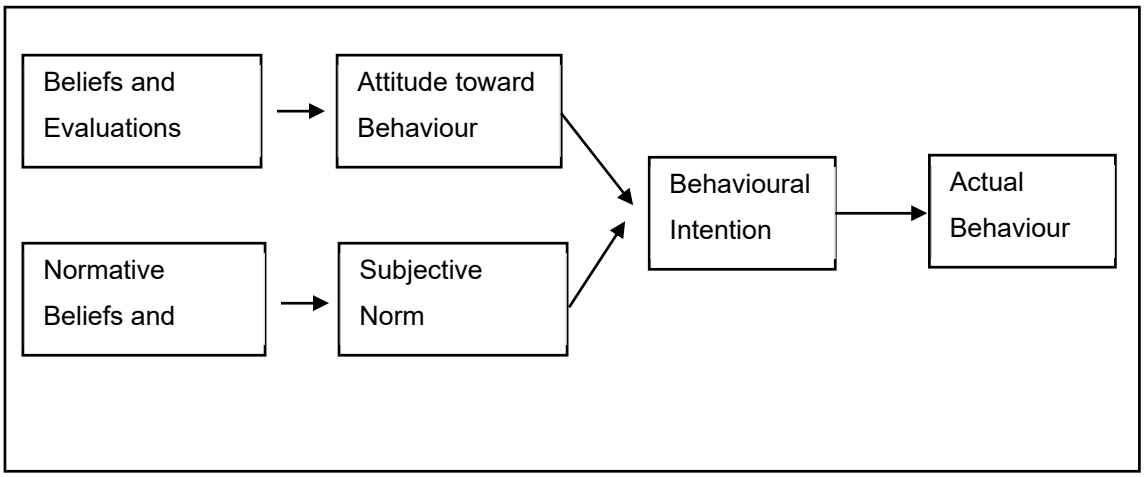

Figure 2.5: Constructs for Theory of Reasoned Action

Adapted from Ajzen, I. and Fishbein, M., 1980. Understanding attitudes and predicting social behaviour.

Subsequent studies and research (Ajzen, 1985) have shown that behaviour is not always 100% voluntary, the authors added an additional construct; perceived behavioural control. This resulted in the Theory of Planned Behaviour.

2.6.3 Theory of planned behaviour (TPB)

The Theory of Planned Behaviour which is the successor to Azjen's Theory of Reasoned Action aims to predict an individual's deliberate behaviour at specific time and place with behavioural intentions being a function of three constructs, attitude towards behaviour; subjective norms; and perceived behavioural control (Ajzen, 1985). These constructs are defined and explored in Table 2.3.

Core constructs	Definitions
Attitude toward behaviour	The degree to which an individual has positive or negative feelings towards the behaviour of interest
Subjective norms	The individual's perception of the social environment and expectations of others on the individual with regards to whether they will perform the behaviour.
Perceived Behavioural Control	The individual's perception on the ease or difficulty of performing the behaviour.

Table 2.3: Core constructs for the Theory of Planned Behaviour

Adapted from Ajzen, I. 1985. From intentions to actions: A theory of planned behaviour. Action control. Springer.

As with the TRA, the TPB places the individual's intention to perform a specific behaviour, behavioural intention as a central feature since there is an underlying assumption that intentions capture the motivating factors, influencing certain behaviour. The likelihood of a behaviour being performed increases, the stronger the intention and if that performance or no performance of the behaviour is perceived by the individual, to be within their control (Ajzen, 1985). The relationship showing how these core constructs influence behavioural intention, which in turn influences behaviour are depicted in Figure 2.6.

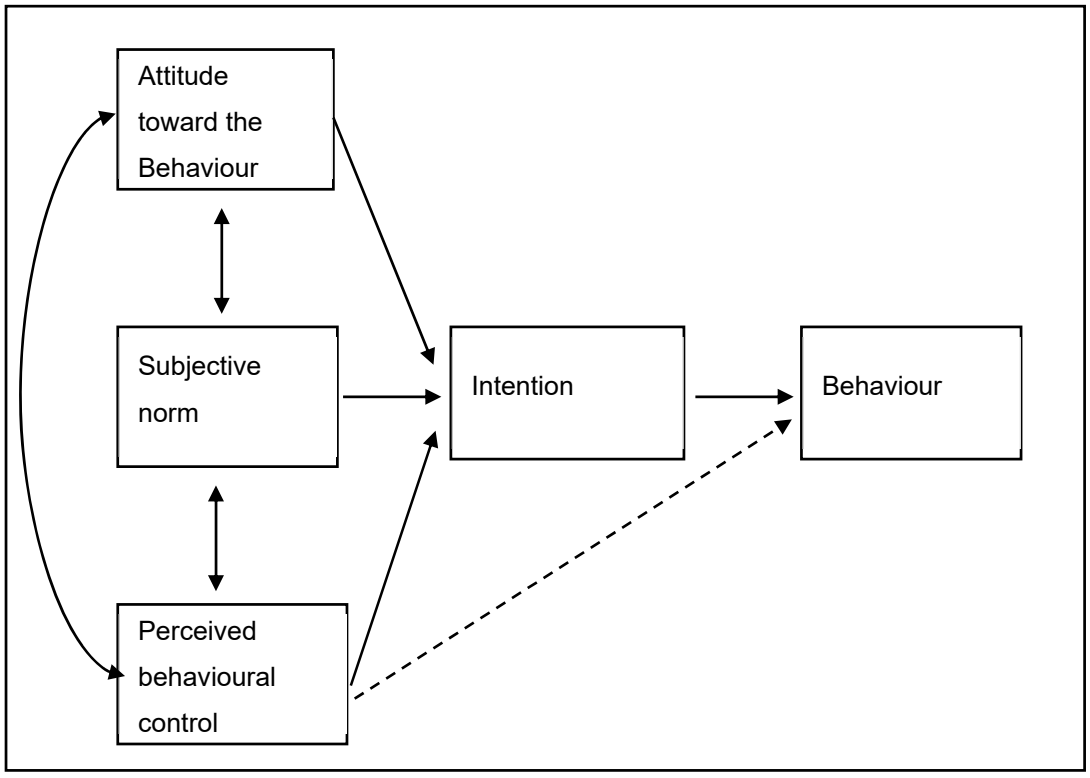

Figure 2.6: Theory of planned behaviour

Adapted from Ajzen, I. 1985. From intentions to actions: A theory of planned behaviour. Action control. Springer.

2.6.4 Technology Acceptance Model (TAM)

TAM is an Information Systems model developed to study the acceptance of the technology by individuals predicated on two factors, the perceived usefulness of the application and the perceived ease of use of the technology as determinants for attitudes to adopt the technology (Davis, Bagozzi and Warshaw, 1989).

TAM is one of the most preferred models for research into the acceptance of new information technology and has thus been tested and applied by researchers to a diverse set of technologies and users, (Szajna, 1996, Davis and Venkatesh, 1996). In their study on predicting user intentions, whilst comparing the model with the Theory of Planned Behaviour (TPB), Mathieson (1991) found out that TAM was easier to apply but did not allow the investigator to get detailed opinions about a system, something the TPB was more specific about. Table 2.4 shows the core constructs for the Technology Acceptance Model.

Core Constructs	Definition
Perceived usefulness	*"the degree to which a person believes that using a particular system would enhance his or her job performance"*
Perceived ease of use	*"the degree to which a person believes that using a particular system would be free of effort"*

Table 2.4: Core constructs for the Technology Acceptance Model

Adapted from Davis, F. D., Bagozzi, R. P. & Warshaw, P. R. 1989. User acceptance of computer technology: A comparison of two theoretical models. Management science, 35, 982-1003.

2.6.5 The UTAUT Framework

The Unified Theory of Acceptance and Use of Technology (UTAUT) is a technology acceptance model developed by Venkatesh and others in 2003. This model integrates eight Technology Acceptance Models (TAMs) which all originate from the communications, psychology and sociology disciplines. These TAMs are namely the Theory of Reasoned Action (TRA), the model of Personal Computer Utilisation, the Motivational Model, the Technology Acceptance Model (TAM), the Theory of Planned Behaviour (TPB), the combined TAM and TPB, the Social Cognitive Theory and the Innovation Diffusion Theory (Venkatesh, Morris, Davis et al., 2003).

At the core of the model are five direct determinants of behavioural intention which are used as a predictor for technology use behaviour. These five are represented in Table 2.5.

Construct	Description
Performance Expectancy	The degree to which an individual believes that using a technology will improve their job performance.
Effort Expectancy	The degree to which the technology is easy to use
Social Factors	The degree to which an individual perceives that important others believe they should use the new technology.
Facilitating Conditions	The degree to which an individual believes organisational and technical infrastructure exist to support the new technology

Table 2.5: Description of the UTAUT determinants

Adapted from Venkatesh, V., Morris, M. G., Davis, G. B. & Davis, F. D. 2003. User acceptance of information technology: Toward a unified view. MIS quarterly, 425-478.

In addition to these determinants, the model also includes the moderating variables: age, gender, education and voluntariness of use (Venkatesh, Morris, Davis et al., 2003). The model predicts that performance expectancy, effort expectancy and social influence have a direct effect on behavioural Intention, which in turn, together with facilitating conditions has a direct effect on use behaviour (Venkatesh, Morris, Davis et al., 2003). Due to the models ability to incorporate conceptual and empirical similarities from the eight TAMs from which it is formed, authors such as AlAwadhi and Morris (2008) ,Thomas, Singh and Gaffar (2013) argue the UTAUT is now the preferred technology model for predicting acceptance. These relationships in the model can then be represented as in Figure 2.7.

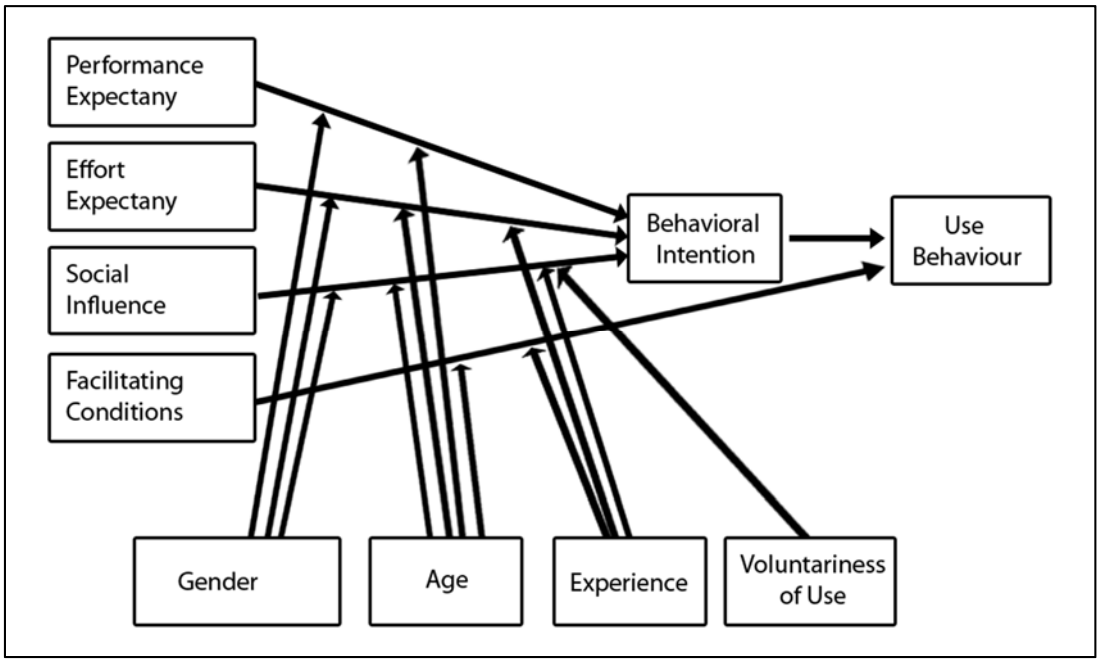

Figure 2.7: UTAUT Model

Adapted from Venkatesh, V., Morris, M. G., Davis, G. B. & Davis, F. D. 2003. User acceptance of information technology: Toward a unified view. MIS quarterly, 425-478.

2.7 Research model used in study

The purpose of this study was to ascertain the strength of the predictors (Effort Expectancy, Performance Expectancy, Social Influence, and Facilitating Conditions) on SME intentions to adopt and use cloud computing technology for running business enterprises. The factors that may influence the adoption of cloud computing technology by SMEs are illustrated in Figure 2.5.

The study was based on the UTAUT model of Venkatesh et al. (2003), which has four key exogenous variables three of which act as direct determinants of usage intention and behaviour with the fourth being a direct determinant of use behaviour. The model also has two endogenous variables and moderating variables but the moderating variable for gender has been excluded from this study as studies by (Al-Qeisi, Dennis, Hegazy et al., 2015, Mohammed, Drew and AlGhamdi, 2012) found no significant moderation effects by gender on technology adoption in non-western settings.

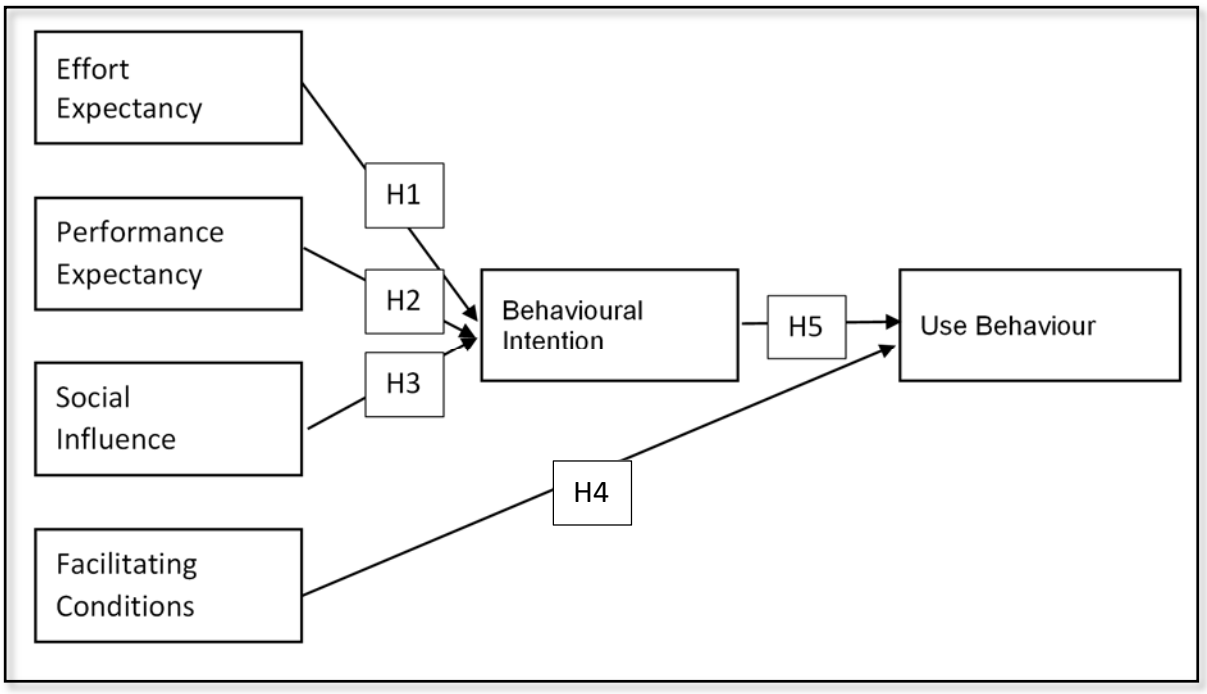

Figure 2.8: Theoretical framework of hypotheses

Adapted from Venkatesh, V., Morris, M. G., Davis, G. B. & Davis, F. D. 2003. User acceptance of information technology: Toward a unified view. MIS quarterly, 425-478.

2.7.1 Global Application of the UTAUT Model

The UTAUT model has been used in many studies all over the world, Wu, Tao and Yang (2007) used the framework in 2007 to study factors that influenced user's adoption of 3G mobile telecommunications. In the study they found out that Performance Expectancy (PE), Social Influence (SI) and Facilitating Conditions (FC) significantly influenced the behavioural intention to adopt 3G telephony services, whilst Effort Expectancy did not. In investigating the determinants in the adoption of internet banking in Jordan, authors AbuShanab and Pearson (2007) used the UTAUT model and also attempted to validate the appropriateness of the tool within the internet banking context. Their findings validated the tool for use in future technology acceptance studies and the authors also found that a customer's intention to use internet banking was significantly influenced by performance

expectancy, social influence and effort expectancy with gender as a moderating variable.

2.8 Research Question

In the last few years, numerous articles on Cloud Computing have appeared, most of these were tracking the evolution of this technology from grid computing, which primarily has been concerned with the provision of computing infrastructure resources on demand (Foster, Zhao, Raicu et al., 2008, Buyya, Yeo, Venugopal et al., 2009, Youseff, Butrico and Da Silva, 2008). Results of surveys and studies on the potential impact of cloud computing on transforming business in the developing world are considered by some authors as having been inconsistent (Nir, 2010). Most of the studies undertaken have been concentrated in Asia Pacific countries such as Brazil, South Korea or Portugal (Mohammed, Drew and AlGhamdi, 2012, Lin and Yen, 2010)

With countries such as Brazil, China and Russia accessing internet at 7.58 Mbps, 11.90 Mbps and 18.78 Mbps respectively, South Africa at 4.01 Mbps has relatively slow internet speeds than most countries in the BRICS group of emerging economies, only beating India to 4th position (Jellema, Farhan, Fourati et al., 2015). South Africa is also ranked in the bottom third in the world rankings with regards to the broadband access per 100 in the population but significantly betters a majority of African countries (Jellema, Farhan, Fourati et al., 2015).

South Africa has seen an upswing in entrepreneurship activities with experts tipping SMEs to play an increasing role in driving economic growth in the country (Mlachila and Takebe, 2011a). Factors that decision makers in these SMEs consider towards adopting technology may very well be worth understanding especially if they are to embrace the cloud for competitive advantage. It is therefore necessary to revisit cloud computing in the context of South Africa as an emerging economy and to investigate on the barriers hindering the adoption of this new standard by Small to Medium Enterprises (SMEs). This has led to the researcher asking the question:

"What are the barriers to the adoption of cloud services by SMEs in South Africa?"

2.9 Summary

In this review, the competitiveness of SMEs in South Africa was discussed. Failure rate for SMEs starting out remains high and is a concern for government as it seeks to encourage entrepreneurial activity and SME growth. The GEM reports points out that South Africa is lagging behind other countries in this regard despite the financial support made available to nature and support the growth of small to medium enterprise, whilst also seeking to enhance their competitiveness. There therefore appears to be a heightened need to encourage the adoption of cloud computing technologies as a means to enhance enterprise competitiveness by reducing ICT costs whilst providing the same benefits enjoyed by more established firms with much greater ICT budgets. Investigations revealed a positive relationship between performance expectancy and behavioural intention, with the argument that if prospective users of a technology perceived its performance in a positive way, this was likely to inform their intention to use the technology. The UTAUT model proposes the idea that effort expectancy, facilitating conditions, social influence and performance expectancy were strong predictors of behavioural intention whilst and behavioural intention could predict usage behaviour. There exists a significant body of work done on ICT usage by SMEs in South Africa, but for the most part this hasn't zeroed in on the usage of cloud computing services by the same.

Chapter 3

RESEARCH METHODOLOGY

3.1 Introduction

This chapter is on research methodology that was used in this study towards answering the research question. The purpose of this chapter is to provide the scientific basis for the research and a rationale for the research methods used. In so doing the researcher will attempt to demonstrate the representativeness of the sample chosen, the sampling techniques and also the fit between the research question and the methods used. Finally, the chapter will provide insight into the construction of the questionnaire and the questions used.

3.2 Aim and Objectives of the Study

The literature review functions as an evaluative report of studies found in the literature related to the researcher's area of interest and aims to provide a theoretical basis for the researcher to go about answering the research question. An aim of a study is defined as general statements of intent or purpose of a chosen area of research. Objectives on the other hand are specific statements that define how the researcher will achieve the aim of the research.

3.2.1 Aim

Despite the gains made by cloud computing in setting a technology service model that in theory should be easily accessible by SMEs in South Africa, the situation on the ground tells a different story.

The aim of the study therefore is to identify barriers to the adoption of cloud services by SMEs in South Africa.

3.2.2 Objectives

The objectives of the study were to:

1. Ascertain the level of cloud computing services uptake by small, medium enterprises (SMEs) in South Africa
2. Identify barriers in the full adoption of Cloud Computing by SMEs in South Africa
3. Identify gaps and the impact of current ICT policies as enablers /inhibitors to cloud service adoption in the sector.
4. Produce a report that sets a platform for further discussion and research by the relevant stakeholders in improving cloud computing friendly ICT support to the SME sector.

3.3 Participants and Location of the Study

3.3.1 Sample size

The schedule of size standards for the definition of an SME in South Africa identifies it as a business with a total of between 1 and 49 employees. This criterion in addition to other criteria was used to identify SMEs to be included in this research with 210 questionnaires sent to SMEs in Durban with the researcher targeting a sample size greater than 40 SMEs to participate. Resource constraints to boost the response rate, limited the researcher to a smaller sample than would have been preferred.

3.3.2 Geographical location

The researcher targeted small to medium enterprises located within the eThekwini municipal area of KwaZulu-Natal drawn from the entire population of small to medium enterprises in South Africa.

3.4 Data Collection Strategies

In this study the researcher used a questionnaire as a data collection instrument. The Merriam Webster dictionary defines a questionnaire as “a written set of questions that are given to people in order to collect facts or opinions about something” , this definition is expanded upon by (Sekaran and Bougie, 2010) who

defines a questionnaire as a “pre-formulated written set of questions to which respondents record their answers, usually within rather closely defined alternatives.” The questionnaire method was used to measure the factors influencing the adoption of cloud computing by SMEs as it is considered more effective considering the limitations faced by the researcher and objectives of the study.

3.4.1 Advantages and disadvantages of questionnaires

Advantages

Questionnaires typically offer marginal advantages over other alternative data collection modes such as oral interviews, which can be telephonic or face to face. As evidenced by Van Deursen (2015), the advantages are more pronounced if these are administered electronically via the Internet, as they noted that data collected via computer questionnaires showed higher concurrent validity than data collected through oral means. The results also showed that there was lower satisficing in computer questionnaire data than telephonic interview data, validating previous findings by Chang and Krosnick (2010).

Other advantages offered by questionnaires are that they are a relatively cheaper data collection tool in terms of time and resources (Gillham, 2008, Leedy and Ormrod, 2005). Questionnaires also have the advantage that a researcher can easily get information from a lot of people in a short space of time without geographical limitations (Mitchell and Jolley, 2009).

Self-administered questionnaires also offer anonymity, which has the benefit of improving honesty in responses. Interviewer bias is also eliminated due to the low contact nature in dispensing the instrument and respondents get to complete the questionnaire at their own convenience (Vowles, 2013).

Disadvantages

Self-administered questionnaires offer a few disadvantages, chief amongst them is unreliable and unmotivated respondents which may lead to a relatively low response rate or poor quality responses (Gillham, 2008, Dörnyei and Taguchi, 2009).

Another notable disadvantage is that questions can be misunderstood with little room for the interviewer to offer clarity thus affecting the quality of the response (Mitchell and Jolley, 2009).

The researcher tried to mitigate the risks posed by using questionnaires in this study by amongst other interventions piloting the questionnaire so that questions can be worded in such a way that they can be easily understood by the respondents. Piloting the questionnaire was envisioned to help the researcher ascertain the optimal order for respondents to answer questions and also test the adequacy of the structured response options.

The data collection tool used was a web based questionnaire, with paper questionnaire used only as a backup. This web based questionnaire approach offers the advantage that responses could be coded as they are received, allowing the researcher to quickly analyse the data. Where paper questionnaires were used, the researcher captured the responses directly into the database to merge with other electronically received responses.

3.5 Research Design and Methods

3.5.1 Description and purpose

Secondary data from books, journals, electronic sources and white papers was reviewed. These formed the basis for developing the interview instruments. Factors influencing the adoption of technology were identified in the literature and thus formed the basis for the analysis framework.

A qualitative set of questions regarding the business activity were asked with the responses used to classify SMEs in terms of International Standard Industrial Classification (ISIC). A quantitative approach was then used to ask these SMEs on the identified indicators for unconstrained access to cloud computing services using the Unified Theory of Acceptance and Use of Technology (UTAUT) model.

3.6 Construction of the instrument

3.6.1 The Questionnaire

The layout of the questionnaire was informed by the UTAUT model upon which the study is modelled. According to Sekaran and Bougie (2010) sound questionnaire design principles calls for a researcher to focus on wording, handling of variables and lastly general appearance of the questionnaire. The researcher used these

principles in designing the questionnaire, which was accordingly sectioned as follows:

- Section A: Introduction: Characteristics of the Enterprise (Questions 1-7).
- Section B: Ascertaining Current and Intended Uptake of Cloud Services (Questions 8-13).
- Section C: Performance Expectancy (Questions 14-17).
- Section D: Effort Expectancy (Questions 18-21).
- Section E: Attitude toward Using Technology (Questions 22-25).
- Section F: Social Influence (Questions 26-29).
- Section G: Facilitating conditions (Questions 30-33).
- Section H: Voluntariness of use (Questions 34-37).
- Section I: Self-efficacy (Questions 38-41).
- Section J: Anxiety (Questions 42-45).
- Section K: Behavioural intention to use the system (Questions 46-49).

3.7 Recruitment of Study Participants

Along with the Gatekeepers Letter granted by the Durban Chamber of Commerce, the researcher was also provided with a member listing of representatives for small to medium enterprises who the researcher can approach. The researcher used the contact details provided to send an email to introduce the study and provided participants with the electronic link to the consent form and questionnaire online. Upon completing the questionnaire, responses were anonymously stored in the database.

3.8 Pretesting and Validation

Pretesting and validation of the data collection instrument is an important step in the design of a questionnaire and a study in general. According to Sekaran and Bougie (2010) pre-testing a questionnaire ensures that the respondents understand the questions appropriately and helps to reduce ambiguity. However quite often this is a part of the research that is often hurried and poorly documented (Hunt, Sparkman Jr and Wilcox, 1982). Pretesting was used to addresses issues with wording and

measurement which would have contributed towards bias if not identified and addressed.

In validating an instrument the researcher was measuring the extent through correctness, completeness and accuracy to which the instrument measures the objective (Sekaran and Bougie, 2010).

The pre-test was conducted by the researcher through distributing this questionnaire to work colleagues who are data managers and information technology administrators to check if the questionnaire used proper terminology and unambiguous wording and instructions. The second round of testing involved distributing the questionnaire to colleagues that are statisticians to check for possible adverse issues with measurement and the relevance of the questions to be asked in meeting the objectives set for the study, thus checking for the validity of the instrument in satisfying the objectives of the study. Finally, the questionnaire was distributed to a test group made up of 8 IT professionals and the researcher's supervisor.

Some of the feedback given was:

1 The language of the questionnaire was unambiguous
2 The questionnaire completion time was on average 16 minutes
3 The researcher needed to add more courtesy in concluding the questionnaire
4 The online questionnaire needed to be split into pages instead of getting respondent to scroll down to access more questions.
5 The organisation and alignment of the questionnaire was appropriate.

3.9 Administration of the Questionnaire

Data collection was done through administering the structured questionnaire to respondents through online means as provided by QuestionPro. QuestionPro is web based software that allows users to create and distribute surveys including the collection of survey data allowing researchers to analyse the data or export it to another system for analysis. An alternative approach was to use a trained fieldworker to administer the questionnaire to the SME representative. The data was then automatically captured into the QuestionPro data management system designed for accurate data capture through logic checks and field validation.

The questionnaire was administered to respondents from the sample of SMEs chosen through sending a link by email to invite responses only from respondents

knowledgeable and authorised to respond on the firm's behalf concerning the subject matter. After clicking on the link respondents were then taken to a QuestionPro website where they could start participation in the study. "

The first batch of invitations for study participation was sent in November 2015 with the last respondent captured on the 31st January 2016.

3.10 Data Handling

The data collected in the study was stored on a secure server with access control restricted through the use of passwords to only the researcher. The data was kept for the minimum allowed time and disposed of through permanent erasure/deletion from the servers. No personal identifying data was collected and to ensure anonymity, participants were allocated a participant identifier number (PID) which was used at all times. At the end of the survey, participants were redirected to a separate web page where they were asked to provide an email address to receive feedback on the research findings. Due to the nature of the two platforms provided, this email address was not, in any way be linked to the responses provided.

3.11 Analysis of the Data

3.11.1 Statistical Methods

The two distinct branches for statistical analysis are descriptive and inferential. Broyles (2006) identifies descriptive statistics as being made up of techniques that rearrange data into useful forms that can then enable the measurement of the distribution representing the set of data. On the other hand, inferential statistics is made up of methods that enable the researcher to draw generalisations or even predictions onto a population on the area of interest based on observations from the sample (Broyles, 2006).

For analysis, the researcher looked at the different methods of analysis available and decided to use both methods. In using descriptive analysis, the researcher used tables, data visualisation techniques that involved graphs and pie charts

3.11.2 Structural Equation Modelling (SEM)

In using inferential analysis Structural Equation Modelling was used. Structural Equation Modelling is a multivariate set of statistical methods designed for statistical

modelling. Structural Equation Modelling is used for causal modelling of complex relationships between variables, in social sciences research (Anderson and Gerbing, 1988, Hoyle, 1995). It is also used in confirmatory factor analysis, second order factor analysis and even regression modelling as it is an extension of linear regression analysis. Structural Equation Modelling is widely used to model constructs as latent variables (non-directly measurable), allowing accurate estimation of the structural relationships between these variables. Structural Equation Modelling then becomes an ideal modelling technique to accompany the UTAUT framework and was used in this study (Hoyle, 1995).

3.11.3 Software Used

Statistical Analysis System (SAS) and STATA were the software systems used for analysis of data in the study. QuestionPro software was used as a database management system to collect responses as they were completed online. This data was provided then downloaded in Comma Separated Value (CSV) format from the QuestionPro database to be used with the analysis software. When data is obtained through questionnaire, it needs to be coded, keyed in and edited (Sekaran and Bougie, 2010). In setting up the questionnaire in QuestionPro, before any responses had been obtained the researcher ensured that all responses were numerically coded, which made it relatively easier to use with the analysis software.

3.12 Summary

Chapter Three described the research methods and statistical techniques used in this study. The chapter also covered the data collection strategies, administration of the survey instrument and how the data collected via the online self-administered questionnaire will be handled. Finally, the chapter also provided an overview of the data analysis and the statistical software that will be used for this study. Chapter Four will present and discuss the research results from the questionnaire responses.

Chapter 4

RESULTS AND DISCUSSIONS

4.1 Introduction

This chapter presents, interprets and summarises the primary data that was gathered from SME representative drawn primarily from Durban. The chapter starts by outlining the demographic profile of the respondents and then proceeds to focus on the findings related to each objective of the study. Discussions and conclusions presented in the literature review in Chapter Two will then be used to validate the research findings, where applicable. Of the invitations sent, 210 of were sent via email with the rest shared via Facebook Groups and LinkedIn. Overall, 49 participants responded and started the survey but only 44 respondents managed to complete, giving an 89.79 % completion rate which is not a sufficient sample size to generalise the research findings. The average time taken to complete the survey was 10 minutes. **The 5 respondents, who started but did not complete the survey, had their enterprise and descriptive characteristics included but were only excluded for the final structural equation modelling analysis**. Skip patterns depended on responses given to some of the questions meant varying totals in terms of the number of responses. The average time to complete the questionnaire was double the amount of time estimated by the researcher. The challenges the researcher faced was the unreliability of contact information for respondents provided by the Durban Chamber of Commerce as most businesses were unreachable. A number of those who were contacted would require further follow up telephone calls to encourage them to respond. The sample size for this study limits the generalisation of the study findings to the rest of the population. A follow up study with more resources may be able to improve on the reliability of these findings.

4.2 Demographics

This section gives a brief overview of the characteristics of the participating enterprises and covers the company type, the number of years that the company has been in operation for, the industries that the enterprises operated in, *inter alia*. Summaries of these characteristics are captured in the following tables and figures.

Section A. Type of enterprise	No.	%	Section B. Years of Experience	No.	%
Sole proprietorship	16	36.36	Less than a year	5	11.40
Partnership	14	31.82	1-5 years	20	45.50
Incorporated enterprises	14	31.82	More than 5 years	19	43.20
Total	44	100.00	Total	44	100.00
Section C. Age of owner/principal decision maker			**Section D. Market reach**		
18-34	10	22.70	Local	11	25.00
35-44	20	45.50	Regional	20	45.50
45-54	10	22.70	National	6	13.60
55-64	3	6.80	International	7	15.90
Over 64	1	2.30	-	-	-
Total	44	100.00	Total	44	100.00

Table 4.1: Enterprise Characteristics

As seen in Table 4.1, there was an almost even spread of enterprise registration types with sole proprietors having only 2 more representations as compared to both partnerships and incorporated enterprises as in Table 4.1 (Section A).

Of the 44 enterprises that responded to this question 45.5% had been in operation between 1 and 5 years, with 11.4% being in business for less than a year (see Table 4.1 (Section B). The remaining 43.2% of enterprises had been in operation for more than 5 years. This is comparable to the numbers from the Agenda for ABSA SME index (ABSA, 2012), which found that 45% of all businesses being between 1 and 5 years old with 14 % of SMEs being less than 5 years old.

Table 4.1 (Section C) also shows that the owner/principal decision maker for most of the enterprises was within the 35 to 44 years old bracket (44.5%), with only a few over 64 years old (6.8%). Almost 23% of enterprise owners are in the youth age bracket defined as the 18 to 34 age bracket. This is encouraging as this demographic is seen as vital to reducing unemployment and in stimulating economic growth through entrepreneurship, a vision of the National Youth Development Plan (Herrington, 2014). In contrast the Agenda for ABSA SME index (ABSA, 2012)

showed 29% of business owners in the 35 to 44 age bracket, the higher number experienced by the study could be due to the inclusion of decision makers as surrogates for business owners. The ABSA Index also showed a higher representation of youth ownership but this could be explained by their using a wider age bracket of 15 to 34 years than used in this study (ABSA, 2012).

As evidenced in Table 4.1 (Section D) most enterprises had a regional footprint (45.5%) with 13.6% having a national footprint. Enterprises catering for international clients were just 2% higher than the number of SMEs with only a national footprint. In the Figure 4.1, the enterprises are classified into the relevant industrial sectors that they serve. Of these 44 respondents to this question, the majority (63.64%) had from 1 up to 9 employees, this is comparable to the 76% figure ascertained by the Agenda for ABSA SME index (ABSA, 2012). The remaining 16 enterprises had either 10 to 49 employees (22.73%) or 50 to 250 employees (13.64%), figures that are also comparable to the Agenda for ABSA SME index findings which had 20 % for the 10 to 49 employees category (ABSA, 2012).

As depicted in Figure 4.1, the technology sector accounted for most of the 16% of the represented enterprises, followed by the legal and professional services (11%) and entertainment and leisure (9%). The construction sector had 5% representation together with consumer products, financial services, education, hospitality & tourism. The least represented sectors were research and development, healthcare, consulting and plumbing, each having representation of only one enterprise interviewed. In comparison the Agenda for ABSA SME index findings had construction industry represented by 13% of the business owners (ABSA, 2012).

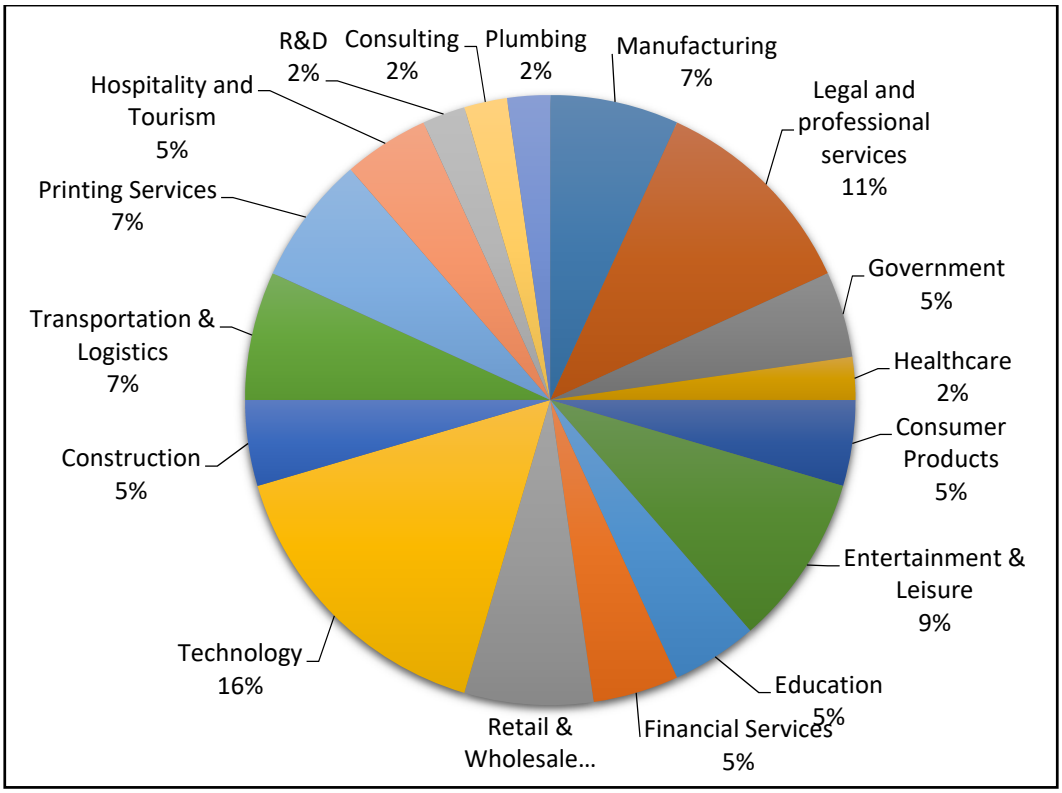

Figure 4.1: Represented Industries

4.3 Ascertaining Current and Intended Uptake

To get an overview of the popularity of information systems applications (ISA) used by the participating enterprises, each was asked to select as many as were applicable to their enterprises from a predetermined list of ISAs. A total of 44 selections were made. Responses are illustrated in Figure 4.2.

Based on Figure 4.2, it is evident that basic internet services (i.e. email and web) were the most often used ISA, accounting for 44% of total hits. This was followed by websites with no ecommerce functions (30%). The more advanced ISAs, such as CRM systems and ERP systems, had the least uptake receiving 8% and 6% of total hits respectively

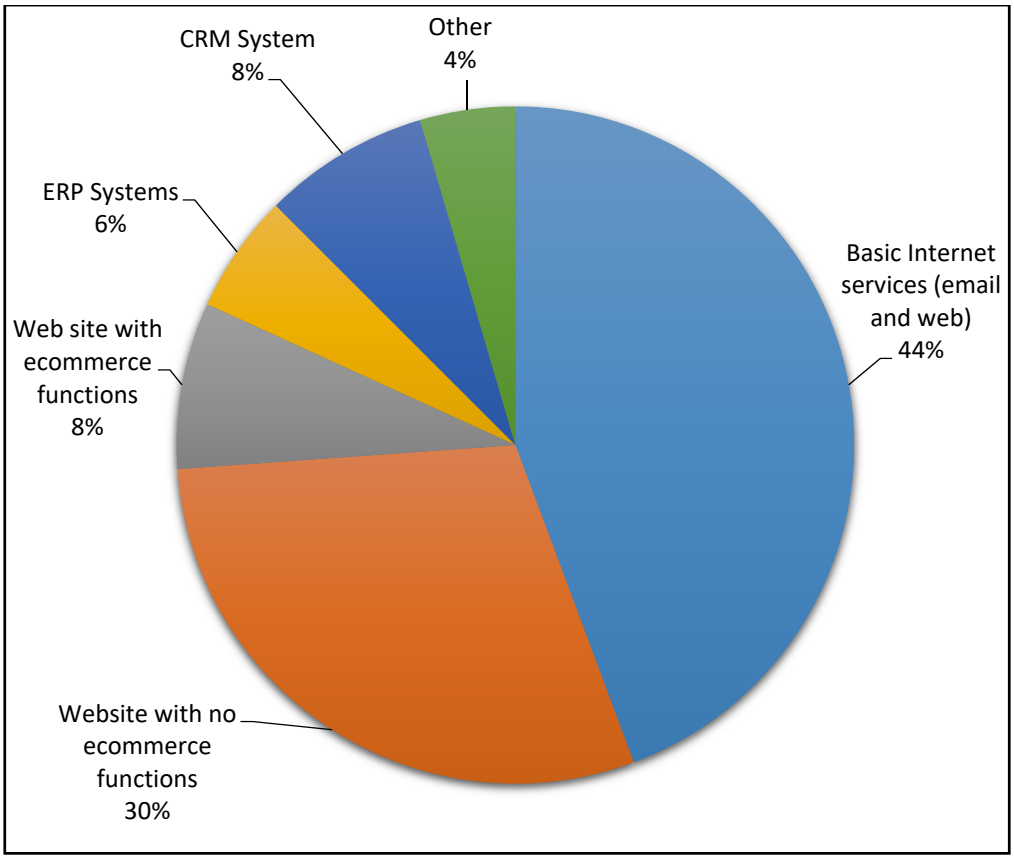

Figure 4.2: Overview of Information Systems Applications Used

In contrast, findings by Ismail, Jeffery and Van Belle (2011) showed that 80.8% of the SMEs in South Africa at the least had basic internet access, whilst 96.2% of the SMEs used email with 48% having an organisation website.

A more detailed analysis contained the adoption of ISAs by each of the 44 enterprises is presented in Table 4.2.

n=44	n	%
Basic Internet services (email and web)	19	43,18%
Website with no ecommerce functions	13	29,55%
Web site with ecommerce functions	4	9,09%
ERP Systems	3	6,82%
CRM System	4	9,09%
Other	1	2,27%
	44	

Table 4.2: Enterprise-specific Information Systems Applications uptake.

As can be seen in Table 4.2 43% of the respondents to this question were using basic internet services such as email and the web. Of the 17 that had websites, only 4, (9%) of them had e-commerce functionality incorporated into their websites. Around 9% of the enterprises applied CRM systems and only 3% used ERP systems. A lowly 2% of the respondents also used other ISAs including data management, vehicle tracking and customer invoicing ISAs.

In evaluating the potential benefits of cloud computing to respondents' enterprises only 29 respondents answered this group of questions with the exception of one were there were 30 responses. These results as tabulated in Table 4.3 indicate that almost all the listed benefits were important or very important to respondents' enterprises.

	Least Important	Not so important	Kind of important	Important	Most Important
Increased collaboration (n=29)	2	7	5	8	7
	6.90%	24.14%	17.24%	27.59%	24.14%
Flexibility in pricing (n=29)	1	3	6	9	10
	3.45%	10.34%	20.69%	31.03%	34.48%
Savings in software costs (n=29)	2	5	3	6	13
	6.90%	17.24%	10.34%	20.69%	44.83%
No upfront investments (n=29)	2	3	3	6	15
	6.90%	10.34%	10.34%	20.69%	51.72%
Scalable capacity management (n=30)	4	5	4	6	11
	13.33%	16.67%	13.33%	20.00%	36.67%
Easy deployment of new services and products (n=29)	8	1	4	7	9
	27.59%	3.45%	13.79%	24.14%	31.03%
Reduced operational costs (n=29)	2	2	3	8	14
	6.90%	6.90%	10.34%	27.59%	48.28%
Hardware cost savings (n=29)	2	2	0	8	17
	6.90%	6.90%	0.00%	27.59%	58.62%

Table 4.3: Perceived benefits of cloud computing to enterprise

The most important benefit was the savings that would accrue to the enterprises through the cutting on hardware costs. This was selected by almost 60% of the respondents as a very important benefit. In contrast Mohlameane and Ruxwana (2014) found out that 16% of SMEs in South Africa perceived cost savings as a

benefit. The ease of deploying new services and products and services was the least important benefit with 27.6% of the respondents ranking it as such.

4.4 Measurement of Reliability and Construct Validity

STATA statistical software was used to assess the reliability of the instrument and to also measure the construct validity.

Component	Item	Factor Loadings	Reliability (alpha)
Performance Expectancy	q14	0.7088	0.6638
	q15	0.8683	
	q16	0.7544	
	q17_1	0.5206	
Effort expectancy	q18	0.8106	0.8878
	q19	0.9117	
	q20	0.8106	
	q211	0.7437	
Attitude towards using Technology	q22	0.9355	0.8382
	q23	0.8697	
	q24	0.5122	
	q25_1	0.8697	
Social Influence	q26	0.6967	0.6148
	q27	0.5025	
	q28	0.7572	
	q29_1	0.8107	
Facilitating conditions	q30	0.6658	0.5866
	q31	0.5694	
	q32	0.5975	
	q33	0.5948	
	q34_1	0.4578	
Voluntariness of use	q35	0.5944	0.6529
	q36	-0.5944	
	q37_1	0.5328	
Self-efficacy	q38	0.7909	0.5347
	q39	0.5256	
	q40	0.5140	
	q41_1	0.7618	
Anxiety	q42	0.4623	0.8230
	q43	0.8174	
	q44	0.9002	
	q45_1	0.7773	
Behavioural intention to use	q47	0.8959	0.8439
	q48	0.6166	
	q49	0.9036	

Table 4.4: Composite Reliability and Average Variance Extracted

According to Hair (2010) , it is necessary to measure the extent to which the variables actually represents the theoretical latent construct they are design to evaluate. The validity of the constructs and indicators were assessed with respect to convergent validity and discriminant validity as recommended by Jöreskog and Sörbom (1993). The results of factor loadings and construct reliability extracted are shown in Table 4.4. These provide adequate evidence of validity and reliability, since the factor loadings exceed 0.5 for all components as suggested by Bagozzi and Yi (1988). Some of the construct reliability figures exceeded the level of 0.7 as recommended by Nunnally and Bernstein (1994).

The reliabilities of 5 of the 9 constructs, are questionable as the alpha value falls below 0.7. These constructs ideally would not form part of the analysis as per their alphas. However, since the information richness of individual factors comprising the constructs is critical to the present study, these constructs were used in the analysis. The constructs that were considered reliable for their intended purposes were “effort expectancy”, “attitudes towards using technology”, “anxiety” and “behavioural intention to use”.

4.5 Evaluation of the Structural Model

Through the use of SEM technique and STATA software, the structural model was assessed. This also included the testing of the hypothesis to determine the predictors which provide significant contributions towards explaining the dependent variables (Hair, Anderson, Tatham et al., 1998). Relationships between the latent constructs provided were also assessed. Table 4.5 represents the results and lists the path coefficients, the p-value and their significance. The significance between these relationships are later discussed when testing the hypothesis.

The Relationship of Variables	Path Coefficient	Critical Ratio (z)	P-value	Significance
Performance Expectancy → Behavioural Intention	-0.0666667	-	-	Not Significant
Effort Expectancy →Behavioural Intention	0.32	1.56	0.118	Not Significant
Social Influence →Behavioural intention	-7.08e-09	-0.00	1.000	Not Significant
Facilitating Conditions →Use behaviour	0.7751196	0.0750954	0.00	Significant
Behavioural intention →Use behaviour	-0.8810663	-9.98	0.00	Significant
Performance Expectancy →Use Behaviour	0.0587377	-	-	Not Significant
Effort Expectancy →Use behaviour	-0.2819412	-1.56	0.118	Not Significant
Social Influence →Use behaviour	6.24e-09	0.00	1.000	Not Significant

Table 4.5: The Modified SEM Study Framework

4.6 Objectives of the Study

This study and questionnaire were designed to achieve the objectives as set up in Chapter one, findings corresponding to each objective are discussed below. The responses to these questions were analysed using frequency analysis. Through structural equation modelling, relationships between variables were studied.

4.6.1 Objective one: To ascertain the level of cloud computing services uptake by small, medium enterprises (SME's) in South Africa

To assess the level of cloud computing services utilised by participating enterprises, participants were asked to indicate what their current state of cloud computing was. Participants, however, were first asked what their understanding of cloud computing was.

n=43	n	%
I do not understand what cloud computing is	16	37.21%
Poor	4	9.3%
Average	10	23.26%
Good	7	16.28%
Very Good	6	13.95%
	43	

Table 4.6: Grading knowledge of cloud computing

As shown in Table 4.6, almost 47% of the participants who responded to this question indicated that their knowledge was at best poor, with the remaining 53% indicating that their knowledge was at the least average

In ascertaining cloud computing uptake and intentions results shown in Table 4.7, show there was an awareness of cloud computing services with 40% of the 30 respondents signalling an intention to adopt some cloud services within the next 3 years.

n=30	n	%
We do not intend to adopt any cloud services for the foreseeable future	3	10.00%
We intend to adopt cloud services in the next 3 years	12	40.00%
We are implementing cloud services now	2	6.67%
We have already adopted some cloud services	13	43.33%
Total	30	

Table 4.7: Cloud computing intentions and uptake

Only 10 percent indicated they did not have any intentions of adopting cloud services in the foreseeable future. However, what is encouraging is that 43.33% of SMEs surveyed had already implemented some form of cloud services.

n=44	n	%
Individual software packages (Google Drive, DropBox etc.)	22	48.89%
Infrastructure as a services (Private cloud, Windows Server and System Centre, VMWare, Hosted PBX)	6	15.56%
Software as a Service; e.g. Exchange Online, Business Productivity Online Suite, CRM Online, Salesforce.com	6	13.33%
Platform as a Service e.g. Windows Azure, SalesForce.com, Google App Engine etc.	5	11.11%
None	4	8.89%
Other	1	2.22%
Total	44	

Table 4.8: Cloud computing used by enterprises

A further interrogation on the type of cloud services adopted reveals that it is mostly individual software packages offering cloud storage that have been adopted by these SMEs, with nearly 50 percent of the respondents using cloud storage platforms such as Google Drive or Dropbox (see Table 4.8). The uptake of Infrastructure as a service (Iaas) offering was at 15.56% and software as a service (Saas) at 13.33%.

n=45	**n**	**%**
Individual software packages	4	8.89%
Infrastructure services such as storage, network capacity etc.	17	37.78%
Software package available via cloud services	13	28.89%
Security services in the cloud	9	20.00%
None	2	4.44%
Total	45	

Table 4.9: Intentions towards adopting cloud computing services in next 3 years.

As can be seen in Table 4.9, almost 96% of the respondents to this question indicated that their companies had intentions of adopting some form of cloud computing service within the next 3 years. Most frequently participants indicated that their companies would adopt infrastructural services such as storage and network capacity. This group represented 37.78% of the intended cloud services earmarked for adoption. The second highest service selected was software packages available via cloud services with almost 30% of respondents indicating that their enterprises are looking at making use of in the immediate to very near future. Only 2(4.4%) of

respondents did not foresee their enterprises adopting any of the listed cloud services.

n=34	n	%
Public cloud	15	44.12%
Private cloud	6	17.65%
Hybrid cloud	9	26.47%
N/A	4	11.76%
Total	34	

Table 4.10: Intentions towards adopting cloud computing types in next 3 years

With relevance to the types of cloud computing that the enterprises were either using or intended to use in the next three years, 44.12% of the responses received indicated that their enterprises leant towards public cloud services (see Table 4.10). Eighteen percent indicated that their enterprises would focus on the private cloud, while slightly more than 26% were considering a hybrid between private and public cloud computing.

In the sections that follow, the remaining objectives of the study will be addressed. This comprised a series of constructs aimed at extracting the information necessary for meaningful discussion.

4.6.2 Objective two: To identify barriers in the full adoption of cloud computing by SME's in South Africa

Venkatesh et al. (2003) suggested with the UTAUT model, that Behavioural Intention was directly influenced by the three variables Effort Expectancy (EE), Performance Expectancy (PE), and Social Influence (SI) with Behavioural Intention in turn directly influencing Use Behaviour. In trying to identify the barriers to the full adoption of cloud computing by SME's in South Africa the author used these variables to ascertain if they played a significant role in hindering adoption.

Performance Expectancy

As shown in Table 4.11, the degree to which individuals believed that using cloud computing would help them attain gains in the performance of their enterprises was overall very positive.

Performance Expectancy Factors	n=29	Disagree	Agree	Average Agree (%)
	I would find cloud computing useful in my job	3.45%	96.55%	92.24%
	Using cloud computing enables me to accomplish tasks more quickly	6.90%	93.10%	
	Using cloud computing increases my productivity.	13.79%	86.21%	
	If I use cloud computing services, I will increase my chances of being profitable	6.90%	93.10%	

Table 4.11: Performance expectancy constructs.

This is evidenced by more than 92% of the average responses for the construct agreeing that they thought it would. Almost 97% felt that cloud computing would be useful to their jobs. These results are supported by Mohlameane and Ruxwana (2014) who found that performance expectancy influenced technology adoption.

Effort Expectancy

Table 4.12 tabulates the factors making up the effort expectancy construct. It shows that, on average, almost 80% of respondents indicated that there was a great degree of ease associated with the use of cloud computing.

Effort expectancy Factors	n=29	Disagree	Agree	Average Agree (%)
	My interaction with cloud computing would be clear and understandable.	20.69%	79.31%	79.31%
	It would be easy for me to become skilful at using cloud services.	13.79%	86.21%	
	I would find cloud services easy to use.	20.69%	79.31%	
	Learning to operate in the cloud is easy for me.	27.59%	72.41%	

Table 4.12: Effort expectancy construct

Relative to other factors, learning to operate in the cloud appeared to be the only factor that was a bit challenging to respondents.

Social Influence

Table 4.13 shows that on average almost 79% of respondents perceived that others believed that they / their enterprises should use cloud computing systems and/or technology.

	n=29	Disagree	Agree	Average Agree (%)
Social Influence	People who influence my behaviour think that I should adopt cloud services	13.79%	86.21%	78.45%
	People who are important to me think I should use the cloud.	17.24%	82.76%	
	The senior management of this business has been helpful in the use of cloud computing.	31.03%	68.97%	
	In general, the organisation has supported the use of cloud computing.	24.14%	75.86%	

Table 4.13: Social influence factors construct

The least performing factor was the helpfulness of senior management in the use of cloud computing, with 31.03% of participants expressing that they did not really receive senior management support.

The above constructs (i.e. effort expectancy, performance expectancy and social influence), according to the UTAUT model, are thought to influence the behavioural intentions of ICT uptake. Based on the above findings, it appears that the respondents and / or their enterprises are primed towards embracing the adoption of cloud computing. These 3 constructs together with the facilitating conditions construct (see Table 4.14) are thought to lead to behavioural actualisation i.e. the actual use of cloud computing.

Facilitating conditions

	Facilitating conditions (n=29)	Disagree	Agree	Average Agree (%)
Facilitating conditions	I have the resource necessary to use cloud computing.	31.03%	68.97%	61.21%
	I have the knowledge necessary to use cloud computing.	31.03%	68.97%	
	Cloud computing services are not compatible with other systems I use.	48.28%	51.72%	
	A specific person (or group) is available for assistance with difficulties encountered whilst using the cloud.	44.83%	55.17%	

Table 4.14: Facilitating conditions construct

As seen in Table 4.14, the perceptions of the availability of resources and support to positively affect performance were not very convincing relative to the average responses of the 3 aforementioned constructs that influenced behavioural intention (i.e. effort expectancy, performance expectancy and social influence).

Facilitating conditions are thought to directly impact on technology uptake and use according to the UTAUT model. Based on the overall average for this construct, over 60% of respondents agreed with the statements or factors comprising this construct. The compatibility of cloud computing services with other systems used by the enterprises posed the highest challenge with slightly less than 50% of respondents highlighting this is a potential problem area.

Attitudes towards using technology

In terms of attitudes towards using the technology (Table 4.15), slightly more than 80% of respondents had a positive attitude towards using the cloud computing.

	Attitude toward using technology factors (n-29)	Disagree	Agree	Average Agree (%)
Attitude toward Using Technology	Using the cloud is a good idea	10.34%	89.66%	80.17%
	Using the cloud makes work more interesting	13.79%	86.21%	
	Working with the cloud is fun.	41.38%	58.62%	
	I like working with the cloud	13.79%	86.21%	

Table 4.15: Attitudes towards using technology construct

The overwhelming majority (89.66%) of respondents felt that cloud computing was a great idea. However, not a convincing majority (58.62%) felt that cloud computing was fun.

Voluntariness of use

As evidenced in Table 4.16, almost 76% of respondents thought that cloud computing, although potentially helpful, was not really necessary in their jobs / industry.

	Voluntariness of use factors (n=29)	Disagree	Agree	Average Agree (%)
Voluntariness of use	Although it might be helpful, using the cloud is certainly not compulsory in my industry/job	24.14%	75.86%	62.07%
	My boss does not require me to use services in the cloud	58.62%	41.38%	
	My superiors expect me to use the cloud	41.38%	58.62%	
	My use of cloud services would be voluntary	27.59%	72.41%	

Table 4.16: Voluntariness of use construct

A little less than 60% indicated that their bosses required and / or expected them to use cloud services. Many respondents (72.41%), however, indicated that they used cloud services voluntarily.

Self-efficacy

Based on Table 4.17, it is apparent from the average reading of the four self-efficacy factors that study participants believed in their abilities to use the cloud. This is evidenced by the 77.49% average of the combined factors.

	Self-efficacy factors (n=29)	Disagree	Agree	Average Agree (%)
Self-efficacy	I could complete a job or task using the cloud if:			
	There was no one around to tell me what to do as I go.	37.93%	62.07%	77.49%
	I could call someone for help if I got stuck.	10.71%	89.29%	
	I had a lot of time to complete the job for which the software was provided.	20.69%	79.31%	
	I had just the built-in help facility for assistance.	20.69%	79.31%	

Table 4.17: Self-efficacy construct

The overwhelming number of participants (89.29%) felt that they could complete tasks using the cloud if there was someone to help them when they encountered challenges that they could not resolve on their own. Seventy-nine percent felt that they could complete tasks using the cloud if they had sufficient time to apply the cloud software to the task and if there was a built in facility to assist them as they

performed their task or job. Only 62.2% of the respondents felt confident that they could perform their tasks to completion without any assistance.

Anxiety

As seen in Table 4.18, participants exhibited low levels of anxiety with anxiety factors averaging to 38.79%.

	Anxiety factors (n=29)	Disagree	Agree	Average Agree (%)
Anxiety	I feel apprehensive about using the cloud.	55.17%	44.83%	38.79%
	It scares me to think that I could lose a lot of information using the cloud by hitting the wrong key.	58.62%	41.38%	
	I hesitate to use the cloud for fear of making mistakes I cannot correct.	68.97%	31.03%	
	The cloud is somewhat intimidating to me.	62.07%	37.93%	

Table 4.18: Anxiety construct

This is very positive as it indicates that overall respondents were not apprehensive about cloud computing and were relatively comfortable with interfacing in the cloud.

Behavioural intention to use the system

As shown in Table 4.19, 53.5% of respondents indicated that they were already using cloud computing.

	Behavioural intention to use the system	No	Yes
Behavioural intention to use the system	I am currently using cloud services (n=43)	46.51%	53.49%
		Average number of months	
	I intend to use cloud services in the next "X" months (n=6)	17	
	I predict I would use cloud services in the next "X" months (n=9)	9	
	I plan to use cloud services in the next "X" months (n=6)	13	

Table 4.19: Behavioural intention to use the system construct

This is perhaps not very inspiring because cloud computing, although fairly new, has been around for a few years. Perhaps reasons for its poor uptake include

privacy and security concerns. This may be the case since not much information is available on how the cloud works to the average lay person, the benefits, regulations or security measures that are in place to ensure that people's sensitive information is kept safe.

The average number of months for the intended use of cloud services by 6 participants that were not yet using cloud computing (personally or in their enterprises) was 17 months. Nine months was the predicted average time that 9 participants felt that they would use cloud services. A further 6 participants' average responses was the planned use of cloud services within 13 months.

4.6.3 Objective three: To identify gaps and the impact of current ICT policies as enablers /inhibitors to cloud service adoption in the sector.

In analysing the gaps that exist in cloud computing adoption it is essential to refer to Table 4.20 which shows how respondents fared in their knowledge of cloud computing.

		n	%
Grade your knowledge of cloud computing	I do not understand what cloud computing is	17	38.64%
	Poor	4	9.09%
	Average	10	22.73%
	Good	7	15.91%
	Very Good	6	13.64%
	Total	44	100%

Table 4.20: Grading knowledge of cloud computing

Almost 39% of the respondents interviewed did not understand what cloud computing is. It is possible that some of these respondents could be using cloud services and yet do not have an understanding of the fact, since almost all interviewed enterprises were using some form of Information Systems Application (ISA). This demonstrates a gap in terms of raising awareness on the technology within and external to the organisation.

From analysing the UTAUT construct on Voluntariness of Use and referencing Table 4.16 a majority of respondents at almost 72 percent indicated that their using cloud

computing would have be a voluntary. Within the same construct a significant percent 41% indicated there was no expectation from their superiors to use cloud computing.

It is encouraging to note that almost 76 percent of respondents generally believe that their organisation supports their use of cloud computing, whilst 24 percent of respondents decry a lack of organisational support on the adoption/use of cloud computing.

4.6.4 Objective four: To produce a report that sets a platform for further discussion and research by the relevant stakeholders on improving cloud computing friendly ICT support to the SME sector.

A further research will have to be undertaken to satisfy this objective. The author proposes a qualitative study that will further investigate the reasons for the lack or poor uptake of cloud services by the SMEs.

4.7 Confirmation of Hypotheses

Among the 5 hypotheses, Hypothesis 1 to Hypothesis 3 were rejected, these are explored below

Hypothesis 1: Performance expectancy positively affects SME's intentions to use cloud computing technology

The direct interpretation of this result being that, for cloud computing users, performance expectancy did not positively correlate with the behavioural intention to use cloud computing technology. Whilst on average 92.24% of the respondents who professed an understanding of cloud computing had a favourable expectancy for performance in the technology, it does not appear this had a direct influence on their behavioural intentions to use the technology, perhaps suggesting other factors being at play. It will be worth exploring these with a further follow up study. These findings are at odds with those by Mohlameane and Ruxwana (2014) who found that performance anxiety affected users perceptions of cloud computing.

Hypothesis 2: Effort expectancy positively affects SME's intentions to use cloud computing technologies

The results showed that "effort expectancy" did not significantly influence the respondents behavioural intentions towards adopting cloud computing. It is interesting to note that despite 79.31% of respondents felt cloud computing would not constitute an effort for them to use, this does not directly influence their intentions to use the technology. It can then be argued that effort expectancy is not a barrier to the adoption of cloud computing.

Hypothesis 3: Social influence positively affects SME's intentions to use cloud computing technology

The results showed that social influence did not positively affect users' intentions to use cloud computing technology ($p = 1.00$, $z = 0.00$). This implies that despite strong support and positive influence from peers, senior management or the organisation on adoption of cloud computing, SME's are still not likely to have strong intentions towards adopting the technology.

Hypothesis 4: Facilitating conditions of cloud computing technology positively affects SME's behaviour on actually using cloud computing.

The results showed that there was a positive effect on SME's use behaviour for cloud computing technology by the facilitating conditions provided by the technology ($p < 0.05$). This implies that when SME's are exposed to more facilitating conditions to use cloud technologies, they would use the cloud more frequently.

Hypothesis 5: SME behavioural intentions to use cloud computing technology positively affect the SME's use behaviour of actually using cloud technology.

The results showed that behavioural intention to use positively affects SME's use behaviour of cloud computing technology therefore supporting the author's hypothesis. ($\beta = .098$, $p < 0.05$). This implies that when SME's have an intention to use cloud computing technology they are likely to use the technology more frequently. These results are supported by Tan (2013) who also found that behavioural intentions to use a technology positively affected use behaviour.

The confirmation of the hypothesis is summarised in Table 4.21.

Study Assumption	Result
Hypothesis 1: Performance expectancy positively affects SME's intentions to use cloud computing technology	Reject
Hypothesis 2: Effort expectancy positively affects SME's intentions to use cloud computing technologies	Reject
Hypothesis 3: Social influence positively affects SME's intentions to use cloud computing technology	Reject
Hypothesis 4: Facilitating conditions of cloud computing technology positively affects SME's behaviour on actually using cloud computing.	Do not reject
Hypothesis 5: SME behavioural intentions to use cloud computing technology positively affect the SME's use behaviour of actually using cloud technology.	Do not reject

Table 4.21: The Results of SEM Structural Assumption

4.8 Summary

A total of 43 SMEs participated in the study, with a majority of these enterprises being more than a year old. The average age of the principle decision maker for these enterprises was. The popular age category for the principal decision maker in these enterprises was in the 35 to 44 years, age category. In terms of market reach, most of the businesses catered for the region in which their business is located, with only a few having a national footprint. Interestingly though, for this study the businesses with an international market reach outnumbered those catering just for the national market but only by 1.5 percentage point.

All the respondents were graded on their knowledge of cloud computing, with 38% of the respondents professing to not having an understanding of cloud computing. This group was excluded from further questions regarding cloud computing usage but were still asked On the other hand 14% of the respondents had a very good understanding of cloud computing.

In ascertaining current uptake of cloud computing, the study showed that 10 % of the respondents had no intention to adopt any cloud services in the next foreseeable

future, whilst 53.5% (n=23) had adopted cloud services. In terms of ICT usage, all of the enterprises were using one form or another of an information systems application, with almost 89% using basic internet services and email, which is very encouraging. Enterprise attitudes towards conditions necessary for cloud computing adoption revealed that favourable facilitating conditions positively influenced the enterprises' usage behaviour in terms of cloud computing. The next chapter discusses the recommendations and conclusions.

Chapter 5

RECOMMENDATIONS AND CONCLUSIONS

5.1 Introduction

This chapter discusses and summarises the study findings. It is organised around the findings from the study and how these compare and align with study aim and objectives. Subsequently, the benefits of the study, research limitations, and the recommendations for future research are presented.

5.2 Study Outcomes

This study sought to ascertain the current levels of cloud adoption by SMEs in South Africa in addition to the barriers that exist in further uptake of the technology through using the UTAUT model. This study investigated the cloud computing ecosystem in SMEs in the Durban area. It had as its main objective to ascertain the current uptake status of cloud computing services by SMEs with a view of identifying barriers that hindered the full adoption of this technology. In addition, the study also sought to identify gaps in respect to current ICT policies as enablers/inhibitors to cloud service adoption in the sector and to create a platform for discourse on improving cloud computing in the SME sector. In terms of the cloud computing ecosystem, it was found that a little over 53% of participants actually used cloud computing within their enterprises. Almost 45% of the participants were apprehensive about using the cloud and 41% feared that they could lose all their valuable information by the stroke of a key.

The study revealed that one of the most prominent barriers to the adoption of cloud computing was the lack of knowledge about it. Almost 40% of respondents basically had no knowledge as to what cloud computing was. This is important because it is unrealistic to expect the uptake and use of a system or technology that one has no knowledge, understanding or conception of. These results are supported by similar findings by Adeniran and Johnston (2011), Ismail, Jeffery and Van Belle (2011) and Ongori and Migiro (2010) on ICT adoption in South Africa. It is more likely that the lack of knowledge will result in resistance to the technology. Cloud computing compatibility concerns were also raised with more than half the respondents

indicating that cloud computing services were incompatible with the other systems that they used. A slight majority of respondents also felt that the unavailability of technology-savvy individuals or groups to assist and guide them while using the cloud was potentially in barrier to their full adoption of the technology.

Research-based on technology acceptance models and theories has been undertaken for more than three decades giving various results for each of those models. Some of the results have been consistent with the author's original postulations whilst for some the results have not quite confirmed the postulations brought forward.

With the UTAUT model, the authors Venkatesh et al. (2003) suggested that Behavioural Intention was directly influenced by the three variables Effort Expectancy (EE), Performance Expectancy (PE), and Social Influence (SI) with Behavioural Intention in turn directly influencing Use Behaviour together with Facilitating Conditions.

The study found that the vast majority of participants responded favourably towards the three antecedents of behavioural intention (i.e. effort expectancy, performance expectancy and social influence). On the surface, this is suggestive of positive intentions towards using cloud computing. However, co-relation and significance results painted a different picture. According to these latter findings cloud computing users' effort expectancy, performance expectancy and social influence did not positively correlate with the behavioural intention to use cloud computing technology.

Whilst on average very positive responses were received towards cloud computing services, there seemed to be reluctance towards respondents' intentions to use them. The findings thus refuted the three hypotheses that related to these 3 building blocks of the intention component of the UTAUT model as no significant positive relationships were identified between these building blocks and the intention to use cloud computing. The results, however, did show the existence of significantly positive relationships between SMEs' use behaviour for cloud computing technology by the facilitating conditions provided by the technology ($p<0.05$) as well as the behavioural intention to use ($p<0.05$). These findings supported the authors hypotheses that significantly positive relationships would exist between these constructs and behaviour actualisation (i.e. the actual use of cloud computing). The implication, therefore, is that when SME's are exposed to more facilitating conditions

to use cloud technologies, they would use the cloud more frequently. Additionally, when SME's have behavioural intentions to use cloud computing technology they are likely to use the technology more frequently.

5.3 Study Implications

This study attempts to bridge the gap in the understanding of the constraints that hinder the successful adoption and use of cloud computing by SMEs in South Africa. Due to resource constraints, leading to a smaller sample, the results obtained cannot be generalised to the rest of the population nor to another province. However, should a resourced study targeting the rest of South Africa were done, representative results may be obtained. The application of such study findings would be of benefit to SMEs and economic policy makers in South Africa. Identified gaps can be used to make informed decisions on whether to adopt this technology or to seek out alternatives. Whilst results of this study cannot be generalised, what does emerge is that cloud computing has tremendous gains for SMEs (e.g. scalability, infrastructural cost savings, global reach and innovation). Knowing what the hurdles are, could dispel potential myths about cloud computing and allow for it to be embraced by SMEs and their staff.

Policy makers concerned with the growth of SMEs and in stimulating economic growth for the country may benefit by gaining insight of the technology, its adoption rate and hurdles to its use. Equipped with this knowledge, they could direct policy towards the adoption of cloud services (or even provide cloud services) by SMEs to spur their growth.

5.4 Recommendations to Solve the Research Problem

This study only examined the barriers to the adoption of cloud computing by SME's in South Africa by primarily using a sample in Durban, the results may not be generalised to other, cities, provinces or with other technologies or SMEs in South Africa due to the small sample size used. The author suggests that a future researcher uses a larger sample size drawn from cities across South Africa. This should have the effect of providing more representative results.

The study identified the lack of knowledge and / or awareness of cloud computing as one of the barriers of its adoption. These findings are supported directly by Mohlameane and Ruxwana (2014) who found that 40% of SMEs in South Africa

have a very low knowledge of cloud computing and indirectly by Ismail, Jeffery and Van Belle (2011) and Ongori and Migiro (2010), who also found that “lack of awareness to the benefits of ICT” remains a critical barrier to ICT adoption in South Africa. It is therefore, recommended that SMEs be made aware of the operations and benefits of cloud computing to their bottom line (e.g. through savings on hardware, software, virtual offices, etc.). This could be achieved through awareness campaigns, spearheaded by leadership, in which their IT departments could inform staff in even other departments on how the cloud works and potential risks and benefits of it. Information Technology champions could also play an important role in allaying fears that employees might have concerning the cloud. Leadership and staff should undergo basic cloud computing training so that they are more comfortable with it and are more likely to be more receptive towards the technology. It is vital that both employee and leadership buy-in be obtained for cloud computing to be adopted and used.

Information Technology departments and SME owners should assess the compatibility of current enterprise technologies with services that are available in the cloud. This will ensure that cloud services sourced will be compatible with enterprise systems requirements. It is also recommended that enterprises that do not presently require cloud computing in their industries should re-evaluate their stance and begin familiarising themselves with the technology because it is foreseeable that the winds of change in such industries are inevitable. Small businesses would need to have the flexibility to adapt to change as it happens.

It is also recommended that policy makers make cloud computing a feature in their agendas as a possible mechanism to keeping SMEs afloat. This could be incorporated into information and training guides for SMEs.

5.5 Recommendations for Future Studies

This study was conducted to examine the barriers to the adoption of cloud computing by SME’s in South Africa by primarily using a sample in Durban. Due to the small sample size used, the author suggests that a future researcher uses a larger sample size drawn from cities across South Africa. This should have the effect of providing more representative results.

The study did not focus on the impact of moderators such as age, gender, experience and voluntariness of use. This may have subtracted from the power of

the UTAUT model. Authors Oshlyansky, Cairns and Thimbleby (2007) found that these moderators strongly influenced the Social construct of the UTAUT model. In developing countries such as South Africa gender and age are thought to play a role in influencing intention to use, a study by Park, Roman, Lee et al. (2009) using the Technology Acceptance Model could only confirm that age may play a role in the acceptance of technology.

The study also failed to satisfy an objective to produce a report that sets a platform for further discussion and research by the relevant stakeholders on improving cloud computing friendly ICT support to the SME sector. The author suggests a qualitative study be conducted to further explore the barriers from identified themes where lack of knowledge on the technology or facilitating conditions are leading to non-adoption of cloud services.

5.6 Conclusion

Adoption of cloud computing by SMEs in South Africa as an alternative to traditional ICT services model is a critical for the growth of the SMEs in the economy. It is important that awareness to the benefits of cloud computing be raised, whilst also the technology model itself needs to improve on issues such as privacy and security concerns which may have contributed to a low intention to adopt the technology. The study also presented on how the research objectives were realised. This was shown through the discussion of results and attempt by the author to explain barriers to the adoption of cloud computing by SMEs in South Africa.

The results showed that cloud computing users' effort expectancy, performance expectancy and social influence did not positively correlate with the behavioural intention to use cloud computing technology.

This study has added to the understanding of technology adoption within theories of technology acceptance research, in developing countries such as South Africa and in cloud computing contexts.

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APPENDIX A: INFORMED CONSENT

Informed Consent Letter 3C

UNIVERSITY OF KWAZULU-NATAL
GRADUATE SCHOOL OF BUSINESS AND LEADERSHIP

Dear Respondent,

MBA Research Project
Researcher: Day Munatsi (031-260 4825)
Supervisor: Prof Manoj Maharaj (031-260 8003)
Research Office: Ms P Ximba 031-2603587

I, **DAY MUNATSI** am an MBA student, at the Graduate School of Business and Leadership, of the University of KwaZulu Natal. You are invited to participate in a research project entitled

"**Identifying Barriers to the adoption of cloud services by SMEs in South Africa**. "

The aim of this study is to measure the current uptake of cloud computing services by SMEs in South Africa, with a view of identifying barriers that hinder the full adoption of the same.

Through your participation I hope to understand:

- The factors that are influencing the adoption or non-adoption of cloud computing services by small to medium enterprises (SMEs) in South Africa
- The gaps if any and the impact of current Information Communication Technology (ICT) policies as enablers /inhibitors to cloud service adoption in the sector.

The results of the survey are intended to contribute to a report that sets a platform for further discussion and research by the relevant stakeholders in improving cloud computing service friendly ICT support to the SME sector.

Your participation in this project is voluntary. You may refuse to participate or withdraw from the project at any time with no negative consequence. There will be no monetary gain from participating in this survey/focus group. Confidentiality and anonymity of records identifying you as a participant will be maintained by the Graduate School of Business and Leadership, UKZN.

If you have any questions or concerns about completing the questionnaire or about participating in this study, you may contact me or my supervisor at the numbers listed above.

The survey should take you about **5** minutes to complete. I hope you will take the time to complete this survey.

Sincerely

Investigator's signature_____ Date_____

This page is to be retained by participant
UNIVERSITY OF KWAZULU-NATAL

GRADUATE SCHOOL OF BUSINESS AND LEADERSHIP

MBA Research Project
Researcher: Day Munatsi (031-260 4825)
Supervisor: Prof Manoj Maharaj (031-260 8003)
Research Office: Ms P Ximba 031-2603587

CONSENT

I……(full names of participant) hereby confirm that I understand the contents of this document and the nature of the research project, and I consent to participating in the research project.
I understand that I am at liberty to withdraw from the project at any time, should I so desire.

SIGNATURE OF PARTICIPANT DATE

……

This page is to be retained by researcher

APPENDIX B: ETHICAL CLEARANCE APPROVAL

UNIVERSITY OF KWAZULU-NATAL
INYUVESI YAKWAZULU-NATALI

28 October 2015

Mr Day Munatsi (212522654)
Graduate School of Business & Leadership
Westville Campus

Dear Mr Munatsi,

Protocol reference number: HSS/1548/015M
Project title: Identifying barriers to the adoption of Cloud Services by SMEs in South Africa

Full Approval – Expedited Application

In response to your application received on 20 October 2015, the Humanities & Social Sciences Research Ethics Committee has considered the abovementioned application and the protocol have been granted **FULL APPROVAL.**

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment/modification prior to its implementation. In case you have further queries, please quote the above reference number.

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

The ethical clearance certificate is only valid for a period of 3 years from the date of issue. Thereafter Recertification must be applied for on an annual basis.

I take this opportunity of wishing you everything of the best with your study.

Yours faithfully

[redacted]

.....

Dr Shenuka Singh (Chair)

/ms

Supervisor: Professor Manoj Maharaj
Academic Leader Research: Dr Muhammad Hoque
School Administrator: Ms Zarina Bullyraj

Humanities & Social Sciences Research Ethics Committee
Dr Shenuka Singh (Chair)
Westville Campus, Govan Mbeki Building
Postal Address: Private Bag X54001, Durban 4000
Telephone: +27 (0) 31 260 3587/8350/4557 **Facsimile:** +27 (0) 31 260 4609 **Email:** ximbap@ukzn.ac.za / snymanm@ukzn.ac.za / mohunp@ukzn.ac.za
Website: www.ukzn.ac.za

APPENDIX C: QUESTIONNAIRE

Cover Page of Questionnaire / Interview Schedule 3B

UNIVERSITY OF KWAZULU-NATAL
GRADUATE SCHOOL OF BUSINESS & LEADERSHIP

MBA Research Project
Researcher: Day Munatsi (0312604825/0718477510)
Supervisor: Manoj Maharaj (031 260 8023)

Research Office: Ms P Ximba 031-2603587

Title of Survey

The purpose of this survey is to solicit information from you regarding the usage of cloud computing services in your enterprise. The information and ratings you provide us will go a long way in helping us identify barriers that prevent you from fully exploiting the benefits offered by the cloud computing platform. The questionnaire should only take **5-10** minutes to complete. In this questionnaire, you are asked to indicate what is true for you, so there are no “right” or “wrong” answers to any question. Work as rapidly as you can. If you wish to make a comment please write it in the spaces provided for comments. Make sure not to skip any questions. Thank you for participating.

Introduction: Characteristics of the Enterprise

1. How many employees does your enterprise have?
   - 1-9
   - 10-49
   - 50-250

2. How many years has your enterprise been in operation:
   - Less than a year
   - 1-5 years
   - More than 5 years

3. Please describe the type of enterprise

   - Sole proprietorship
   - Partnership
   - Incorporated enterprises

4. How old is the owner/principal decision maker of the enterprise

   - 18-34
   - 35-44
   - 45-54
   - 55-64
   - Over 64

5. In which industry does your enterprise operate?
   - Manufacturing
   - Legal and professional services
   - Government
   - Healthcare
   - Consumer Products
   - Entertainment & Leisure
   - Education
   - Financial Services
   - Retail & Wholesale
   - Technology
   - Energy
   - Transportation & Logistics
   - Other (please specify)

     _____

6. What is the market reach of your enterprise?

   - Local

- ☐ Regional
- ☐ National
- ☐ International

7. Are you in a strategic alliance with another enterprise?
   - ☐ Yes
   - ☐ No

Ascertaining Current and Intended Uptake

8. What "Information Systems Applications" has your enterprise adopted?

   - ☐ Basic Internet services (email and web)
   - ☐ Website with no ecommerce functions
   - ☐ Web site with ecommerce functions
   - ☐ ERP Systems
   - ☐ CRM System
   - ☐ Other (please specify)

9. At what stage is your enterprise in relation to cloud services adoption?

   - ☐ We do not intend to adopt any cloud services for the foreseeable future
   - ☐ We intend to adopt cloud services in the next 3 years
   - ☐ We are implementing cloud services now
   - ☐ We have already adopted some cloud services

10. Which of these types of cloud computing is your enterprise currently using?

    - ☐ Individual software packages (Google Drive, DropBox etc.)
    - ☐ Infrastructure as a services (Private cloud, Windows Server and System Centre, VMWare, Hosted PBX)
    - ☐ Software as a Service; e.g. Exchange Online, Business Productivity Online Suite, CRM Online, Salesforce.com
    - ☐ Platform as a Service; e.g. Windows Azure, SalesForce.com, Google App Engine etc.
    - ☐ None
    - ☐ Other (please specify)

11. Does your enterprise intend to adopt any type of the Cloud services in the next 3 years?
    - ☐ Individual software packages
    - ☐ Infrastructure services such as storage, network capacity etc.
    - ☐ Software package available via cloud services
    - ☐ Security services in the cloud
    - ☐ N/A
    - ☐ Other (please specify)

12. Which of the following cloud computing types has your enterprise adopted or intends to adopt in the next 3 years?
    - ☐ Public cloud
    - ☐ Private cloud
    - ☐ Hybrid cloud
    - ☐ N/A

13. What does your enterprise view as the most important benefits of the cloud? (Rank from 1 to 5)

	1	**2**	**3**	**4**	**5**
Increased collaboration					
Flexibility in pricing					
Savings in software costs					
No upfront investments					
Scalable capacity management					
Easy deployment of new services and products					
Reduced operational costs					
Hardware cost savings					

Factors influencing adoption

Performance Expectancy

14. I would find cloud computing useful in my job
    - ☐ Agree
    - ☐ Disagree
15. Using cloud computing enables me to accomplish tasks more quickly
    - ☐ Agree
    - ☐ Disagree

16. Using cloud computing increases my productivity.
    - ☐ Agree
    - ☐ Disagree
17. If I use cloud computing services, I will increase my chances of being profitable
    - ☐ Agree
    - ☐ Disagree

Effort Expectancy

18. My interaction with cloud computing would be clear and understandable.
    - ☐ Agree
    - ☐ Disagree

19. It would be easy for me to become skilful at using cloud services.
    - ☐ Agree
    - ☐ Disagree

20. I would find cloud services easy to use.
    - Agree
    - Disagree

21. Learning to operate in the cloud is easy for me.
    - Agree
    - Disagree

Attitude toward Using Technology

22. Using the cloud is a good idea
    - Agree
    - Disagree
23. Using the cloud makes work more interesting
    - Agree
    - Disagree
24. Working with the cloud is fun.
    - Agree
    - Disagree
25. I like working with the cloud
    - Agree
    - Disagree

Social Influence

26. People who influence my behaviour think that I should adopt cloud services
    - Agree
    - Disagree
27. People who are important to me think I should use the cloud.
    - Agree
    - Disagree
28. The senior management of this business has been helpful in the use of cloud computing.
    - Agree
    - Disagree
29. In general, the organisation has supported the use of cloud computing.
    - Agree
    - Disagree

Facilitating conditions

30. I have the resource necessary to use cloud computing.
    - Agree
    - Disagree

31. I have the knowledge necessary to use cloud computing.
    - Agree
    - Disagree

32. Cloud computing services are not compatible with other systems I use.
    - Agree
    - Disagree

33. A specific person (or group) is available for assistance with difficulties encountered whilst using the cloud.
    - Agree
    - Disagree

Voluntariness of use

34. Although it might be helpful, using the cloud is certainly not compulsory in my industry/job
    - Agree
    - Disagree
35. My boss does not require me to use services in the cloud
    - Agree
    - Disagree
36. My superiors expect me to use the cloud.
    - Agree
    - Disagree
37. My use of cloud services would be voluntary
    - Agree
    - Disagree

Self-efficacy

I could complete a job or task using the cloud.

38. If there was no one around to tell me what to do as I go.
    - Agree
    - Disagree

39. If I could call someone for help if I got stuck.
    - Agree
    - Disagree

40. If I had a lot of time to complete the job for which the software was provided.
    - Agree

- Disagree

41. If I had just the built-in help facility for assistance.
    - Agree
    - Disagree

Anxiety

42. I feel apprehensive about using the cloud.
    - Agree
    - Disagree
43. It scares me to think that I could lose a lot of information using the cloud by hitting the wrong key.
    - Agree
    - Disagree
44. I hesitate to use the cloud for fear of making mistakes I cannot correct.
    - Agree
    - Disagree
45. The cloud is somewhat intimidating to me.
    - Agree
    - Disagree

Behavioural intention to use the system

46. I intend to use cloud services in the next _____ months.
47. I predict I would cloud services in the next _____ months.
48. I plan to use cloud services in the next _____months.
49. I am currently using cloud services

End of the Questionnaire

Thank you for taking the time to complete the questionnaire.

APPENDIX D: THE MODIFIED SEM STUDY FRAMEWORK

THE MODIFIED SEM STUDY FRAMEWORK

```
Structural equation model                       Number of observations      =
44
Estimation method = ml
Log likelihood    = -211.57776

------------------------------------------------------------------------------
             |                 OIM
             |      Coef.   Std. Err.      z    P>|z|     [95% Conf.
Interval]
-------------+----------------------------------------------------------------
Structural   |
  perform <- |
         age |   .0017411   .0757483     0.02   0.982    -.1467228
.1502051
       _cons |   .6552525   .1816381     3.61   0.000     .2992483
1.011257
  ---------- +----------------------------------------------------------------
  effort_exp <- |
         age |   .1039159   .0932565     1.11   0.265    -.0788634
.2866953
          Q2 |  -.0781488   .1319996    -0.59   0.554    -.3368632
.1805655
       _cons |   .5202577   .2692333     1.93   0.053      -.00743
1.047945
  ---------- +----------------------------------------------------------------
  social <-  |
         age |    .003825   .0278011     0.14   0.891    -.0506642
.0583141
          Q2 |  -.0222453   .0394292    -0.56   0.573    -.0995252
.0550346
      volunt |   .9354114   .0457323    20.45   0.000     .8457777
1.025045
       _cons |   .1069655   .0867946     1.23   0.218    -.0631488
.2770798
  ---------- +----------------------------------------------------------------
  facilitating <- |
         age |   .0371249   .0899672     0.41   0.680    -.1392075
.2134573
          Q2 |  -.0915409   .1273437    -0.72   0.472      -.34113
.1580481
       _cons |   .7894558    .259737     3.04   0.002     .2803807
1.298531
  ---------- +----------------------------------------------------------------
  behinti <- |
     perform |  -.0666667          .        .       .            .
.
  effort_exp |        .32   .2049538     1.56   0.118    -.0817021
.7217021
      social |  -7.08e-09   .2141698    -0.00   1.000     -.419765
.419765
       _cons |   .0666667   .0982678     0.68   0.498    -.1259347
.2592681
  ---------- +----------------------------------------------------------------
---
```

```
  Use_behav <-     |
     facilitating |   .7751196   .0750954    10.32   0.000     .6279353
.9223039
          behinti |  -.8810663   .0882476    -9.98   0.000    -1.054028   -
.7081042
            _cons |   .1920711    .059387     3.23   0.001     .0756747
.3084674
------------------+------------------------------------------------------------
---
     var(e.perform)|   .2246874   .0479035                      .1479456
.3412365
  var(e.effort_exp)|   .2386152   .0508729                      .1571163
.3623889
      var(e.social)|   .0211335   .0045057                      .0139154
.0320958
var(e.facilitating)|   .2220792   .0473475                      .1462282
.3372755
     var(e.behinti)|   .1448485   .0308818                      .0953756
.2199838
   var(e.Use_behav)|    .052383   .0111681                      .0344916
.079555
------------------------------------------------------------------------------
---
convergence not achieved
r(430);

end of do-file

r(430);

. do "C:\Users\bado\AppData\Local\Temp\STD02000000.tmp"

.   estat teffects
```

Direct effects

```
------------------------------------------------------------------------------
--
                 |                 OIM
                 |      Coef.   Std. Err.      z    P>|z|     [95% Conf.
Interval]
-----------------+------------------------------------------------------------
--
Structural       |
  perform <-     |
             age |   .0017411   .0757483     0.02   0.982    -.1467228
.1502051
  ---------------+------------------------------------------------------------
--
  effort_exp <-  |
             age |   .1039159   .0932565     1.11   0.265    -.0788634
.2866953
              Q2 |  -.0781488   .1319996    -0.59   0.554    -.3368632
.1805655
  ---------------+------------------------------------------------------------
--
  social <-      |
             age |    .003825   .0278011     0.14   0.891    -.0506642
.0583141
              Q2 |  -.0222453   .0394292    -0.56   0.573    -.0995252
.0550346
          volunt |   .9354114   .0457323    20.45   0.000     .8457777
1.025045
  ---------------+------------------------------------------------------------
--
  facilitating <- |
             age |   .0371249   .0899672     0.41   0.680    -.1392075
.2134573
```

```
              Q2 |  -.0915409   .1273437    -0.72   0.472      -.34113
.1580481
  ----------------+-----------------------------------------------------------
--
  behinti <-      |
         perform |  -.0666667          .        .       .            .
.
       effort_exp |        .32   .2049538     1.56   0.118    -.0817021
.7217021
           social |  -7.08e-09   .2141698    -0.00   1.000     -.419765
.419765
              age |          0  (no path)
               Q2 |          0  (no path)
           volunt |          0  (no path)
  ----------------+-----------------------------------------------------------
--
  Use_behav <-    |
         perform |          0  (no path)
       effort_exp |          0  (no path)
           social |          0  (no path)
     facilitating |   .7751196   .0750954    10.32   0.000     .6279353
.9223039
         behinti |  -.8810663   .0882476    -9.98   0.000    -1.054028   -
.7081042
              age |          0  (no path)
               Q2 |          0  (no path)
           volunt |          0  (no path)
-------------------------------------------------------------------------------
--


Indirect effects
-------------------------------------------------------------------------------
--
                  |                 OIM
                  |      Coef.   Std. Err.      z    P>|z|     [95% Conf.
Interval]
------------------+------------------------------------------------------------
--
Structural        |
  perform <-      |
              age |          0  (no path)
  ----------------+-----------------------------------------------------------
--
  effort_exp <-   |
              age |          0  (no path)
               Q2 |          0  (no path)
  ----------------+-----------------------------------------------------------
--
  social <-       |
              age |          0  (no path)
               Q2 |          0  (no path)
           volunt |          0  (no path)
  ----------------+-----------------------------------------------------------
--
  facilitating <- |
              age |          0  (no path)
               Q2 |          0  (no path)
  ----------------+-----------------------------------------------------------
--
  behinti <-      |
         perform |          0  (no path)
       effort_exp |          0  (no path)
           social |          0  (no path)
              age |    .033137    .036627     0.90   0.366    -.0386506
.1049246
               Q2 |  -.0250076   .0440175    -0.57   0.570    -.1112803
.0612651
```

```
           volunt |  -6.62e-09   .2003368    -0.00   1.000     -.392653
.392653
  ----------------+-----------------------------------------------------------
--
  Use_behav <-    |
          perform |   .0587377  (constrained)
       effort_exp |  -.2819412   .1805779    -1.56   0.118    -.6358674
.0719849
           social |   6.24e-09   .1886978     0.00   1.000    -.3698408
.3698408
     facilitating |          0  (no path)
          behinti |          0  (no path)
              age |  -.0004196   .0769203    -0.01   0.996    -.1511807
.1503414
               Q2 |  -.0489218   .1062625    -0.46   0.645    -.2571926
.159349
           volunt |   5.84e-09     .17651     0.00   1.000    -.3459533
.3459533
------------------------------------------------------------------------------
--


Total effects
------------------------------------------------------------------------------
--
                 |                 OIM
                 |      Coef.   Std. Err.      z    P>|z|     [95% Conf.
Interval]
-----------------+------------------------------------------------------------
--
Structural       |
  perform <-     |
             age |   .0017411   .0757483     0.02   0.982    -.1467228
.1502051
  ---------------+------------------------------------------------------------
--
  effort_exp <-  |
             age |   .1039159   .0932565     1.11   0.265    -.0788634
.2866953
               Q2 |  -.0781488   .1319996    -0.59   0.554    -.3368632
.1805655
  ---------------+------------------------------------------------------------
--
  social <-      |
             age |    .003825   .0278011     0.14   0.891    -.0506642
.0583141
               Q2 |  -.0222453   .0394292    -0.56   0.573    -.0995252
.0550346
           volunt |   .9354114   .0457323    20.45   0.000     .8457777
1.025045
  ---------------+------------------------------------------------------------
--
  facilitating <- |
             age |   .0371249   .0899672     0.41   0.680    -.1392075
.2134573
               Q2 |  -.0915409   .1273437    -0.72   0.472      -.34113
.1580481
  ---------------+------------------------------------------------------------
--
  behinti <-     |
          perform |  -.0666667  (constrained)
       effort_exp |        .32   .2049538     1.56   0.118    -.0817021
.7217021
           social |  -7.08e-09   .2141698    -0.00   1.000     -.419765
.419765
             age |    .033137    .036627     0.90   0.366    -.0386506
.1049246
```

```
               Q2 |  -.0250076   .0440175    -0.57   0.570    -.1112803
.0612651
           volunt |  -6.62e-09   .2003368    -0.00   1.000     -.392653
.392653
  -----------------+------------------------------------------------------------
--
  Use_behav <-     |
          perform |   .0587377  (constrained)
       effort_exp |  -.2819412   .1805779    -1.56   0.118    -.6358674
.0719849
           social |   6.24e-09   .1886978     0.00   1.000    -.3698408
.3698408
     facilitating |   .7751196   .0750954    10.32   0.000     .6279353
.9223039
          behinti |  -.8810663   .0882476    -9.98   0.000    -1.054028   -
.7081042
              age |  -.0004196   .0769203    -0.01   0.996    -.1511807
.1503414
               Q2 |  -.0489218   .1062625    -0.46   0.645    -.2571926
.159349
           volunt |   5.84e-09     .17651     0.00   1.000    -.3459533
.3459533
------------------------------------------------------------------------------
--
```

APPENDIX E: THRESHOLDS FOR THE CLASSIFICATION FOR MICRO, VERY SMALL AND MEDIUM ENTERPRISES.

Sectors or sub-sectors in accordance with the Standard Industrial Classification	Site or Class	Total full-time equivalent of paid employees (Less than)	Total annual turnover (Rm) (Less than)	Total gross asset value (fixed property excluded) (Rm) (less than)
Agriculture	Medium	100	5.00	5.00
	Small	50	3.00	3.00
	Very small	10	0.50	0.50
	Micro	5	0.20	0.10
Mining and Quarrying	Medium	200	39.00	23.00
	Small	50	10.00	6.00
	Very small	20	4.00	2.00
	Micro	5	0.20	0.10
Manufacturing	Medium	200	51.00	19.00
	Small	50	13.00	5.00
	Very small	20	52.00	2.00
	Micro	5	0.20	0.10
Electricity, Gas and Water	Medium	200	51.00	19.00
	Small	50	13.00	5.00
	Very small	20	5.10	1.90
	Micro	5	0.20	0.10
Construction	Medium	200	26.00	5.00
	Small	50	6.00	1.00
	Very small	20	3.00	0.50
	Micro	5	0.20	0.10
Retail and Motor Trade and Repair Services	Medium	200	39.00	6.00
	Small	50	19.00	3.00
	Very small	20	4.00	0.60
	Micro	5	0.20	0.10
Wholesale Trade, Commercial Agents and Allied services	Medium	200	64.00	10.00
	Small	50	32.00	5.00
	Very small	20	6.00	0.60
	Micro	5	0.20	0.10
Catering, Accommodation and Other Trade	Medium	200	13.00	3.00
	Small	50	6.00	1.00
	Very small	20	5.10	1.90
	Micro	5	0.20	0.10
Transport Storage and Communications	Medium	200	26.00	6.00
	Small	50	13.00	3.00
	Very small	20	3.00	0.60
	Micro	5	0.20	0.10
Finance and Business Services	Medium	200	26.00	5.00
	Small	50	13.00	3.00
	Very small	20	3.00	0.50
	Micro	5	0.20	0.10
Community, Social and Personal Services	Medium	200	13.00	6.00
	Small	50	6.00	3.00
	Very small	20	1.00	0.60
	Micro	5	0.20	0.10

Note. Adapted from National Small Business Act, No. 102 of 1996, Republic of South Africa