

**UNIVERSITY OF KWAZULU-NATAL**

**Determinants of ICT adoption by small and medium enterprises in Pietermaritzburg**

**By**

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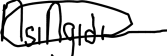
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**2019**

## DECLARATION

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## **LIST OF ABBREVIATIONS**

DoAFF - Department of Agriculture, Forestry, and Fishery  
DoC - Department of Communication  
DoTPS - Department of Telecommunications and Postal Services  
DOI – Diffusion of Innovation Framework  
DTI – Department of Trade Industry  
E-Commerce – Electronic Commerce  
E-government – Electronic Government  
E-Mail – Electronic Mail  
GDP – Gross Domestic Product  
GEM – Global Entrepreneurship Monitor  
ICT – Information and Communication Technology  
ICT4D – Information and Communication Technology for Development  
IoT – Internet of Things  
IT – Information Technology  
ITU – International Telecommunication Union  
IS – Information Systems  
NDP - National Development Plan  
R & D – Research and Development  
SMEs – Small and Medium Enterprises  
SEDA – Small Enterprises Development Agency  
SEM – Structural Equation Modelling  
SGD9 - Sustainable Goal Development 9  
SPSS – Statistical Package for Social Science  
TAM – Technology Acceptance Model  
TBASA - The Banking Association South Africa  
TOE – Technology, Organisation and Environment Framework  
UK – United Kingdom  
UKZN – University of KwaZulu-Natal  
UN – United Nations  
UNCTAD – United Nations Conference on Trade and Development  
VoIP - Voice over Internet Protocol

## ABSTRACT

Information and Communication Technology (ICT) has been a major contributor to world economic growth. ICT plays a vital role when it comes to the growth of Small and Medium Enterprises (SMEs). In developed countries, SMEs are making use of ICTs to support their business functions although this has not been the case in most developing countries. The Global Entrepreneurship Monitor (GEM) argues that the survival rate of start-up businesses is generally poor with SMEs in developing countries performing even worse than the standard survival rates. ICT can be used as a tool to improve the performance and survival rate of SMEs in developing countries. SMEs in developing countries are lacking behind when it comes to the adoption of ICT. This study aims to investigate the determinants that influence the intention to adopt ICT by SMEs in Pietermaritzburg, South Africa.

The study made use of quantitative methods as its fundamental research approach. 227 SME owners in Pietermaritzburg were surveyed using a closed-ended questionnaire. The Technology, Organisation and Environment framework was used as a lens through which to understand the study. The TOE theoretical framework is largely used as a process to study the adoption of innovation at a firm level.

Structural Equation Modelling (SEM) approach was applied in order to analyse the data from the respondents. The study revealed that Technology Context and Organisation Context (-0.221) are significant determinants that influence the intention to adopt ICT amongst SMEs. Technology Context is the most influential determinant with a regression weight of 0.938, and the Environment Context is an insignificant determinant due to the lack of government support.

The study contributes towards the understanding on the important determinants that influences the adoption of ICTs in Pietermaritzburg. The results of this study can assist service providers and government on how to help uplift SMEs. It further shines the light on the lack of the government support towards SMEs.

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# **CHAPTER 1: INTRODUCTION TO THE STUDY**

## **1.1 Introduction**

In this section, the researcher introduces the study by giving the background of Information and Communication Technology (ICT) and Small and Medium Enterprises (SMEs) and this chapter further discuss the research problem that the study aims to investigate. The research problem section provides a discussion about the problems that are faced by SMEs in developing countries and it looks at the possibilities that ICT promises to provide to businesses. The research problem provides four research questions that the study aims to answer. This section further provides a preliminary literature review of the study and the research theoretic framework that is used as the lens to study the research.

## **1.2 Background of the Study**

Information and Communication Technology (ICT) have revolutionised the way people communicate, market businesses, do shopping, etc. These ICT functionalities are now made available cheaper and simple through ICT. ICTs are available in all corners of the world and they serve different purposes but mostly they simplify people's lives. The majority of people in the world are able to access some sort of ICT, it could be a computer, internet, ICT applications, mobile device, transport, etc. ICT has become part of the world population in such a way that society can no longer function without it (Gërguri-Rashiti, Ramadani, Abazi-Alili, Dana and Ratten, 2017). A lot of infrastructures in the world utilises some sort of ICT so much that if the ICT is down many business transactions will cease. There are many different definitions of ICTs, according to Ying and Lee (2016, p3) "ICT is defined as all those technologies that enable the handling of information and facilitate different forms of communication between human beings and electronic systems".

The number of ICT adoption grew rapidly in the previous years throughout the world, in 2017 there were about 4.77 billion people that have access to mobile devices in the worldwide (Statista, 2017). The mobile phone is one of the ICTs that are being adopted a lot lately due to the capabilities that they now possess. Mobile phone usage in South Africa has increased significantly since 2010, and in 2017 it is estimated that approximately 18.48 million people use mobile phones (Statista, 2017). ICT diffusion has increased rapidly in developing countries,

reaching even low-income populations (Makore, 2014). ICTs are capable of different activities, some of those activities are to communicate, access internet, process and manipulate data, etc.

ICTs are now considered to be the core drivers of economic development (Kossai and Piget, 2014). Organisations use different types of ICTs to do their daily processes like maximising production or for communication. According to Kossai and Piget (2014), ICTs are employed as an innovation to enhance work efficiency and coordination inside the organisations. ICTs have become part of the society in such a way that the adoption of ICT has increased rapidly in the past years because of ICT's portability. ICTs can be found everywhere in education there is electronic learning (e-learning), businesses have electronic businesses (e-business), and in government, there is electronic government (e-government) and in health, there is electronic health (e-health). These types of applications are made possible through the internet and they enable connection of these organisations to the people.

“ICT has been widely recognised as a significant solution to improve the productivity and efficiency of information generating, transmitting, processing and managing” (Samuelson and Björk, 2014, p2). According to Miraz and Habib (2016), at this age, a lot of businesses in the world are influenced by ICT and they utilise ICT applications to do processes in their businesses. ICT application has simplified a lot of business processes, business transactions, and communication processes. The usage of ICT is changing the global production, business strategies and work strategies, it also changes the consumption patterns between customers and enterprises (Miraz and Habib, 2016). ICT gives organisations different strategies on how to conduct business in order to gain more revenue by increasing production while decreasing expenses. A lot of organisations adopt ICT from public sectors, private sectors, and Small and Medium Enterprises due to the benefits that come with the adoption of ICTs. ICTs enable SMEs to bridge the gap between small businesses and large cooperation, it gives a chance to SMEs to compete at a larger stage.

According to Awa, Ojiabo, and Emecheta (2015) , ICTs have widened access for SMEs to the world level. ICT has granted SMEs a chance to widen their marketplace, it enables them to communicate with clients on different corners of the world. Mutula and van Brakel (2006), argue that SMEs are important drivers of the economy and they are the core providers of employment, flexibility, and they are the innovators. Ramdani, Kawalek, and Lorenzo (2009)

suggest that about 99 percent of businesses that are in Europe and North America are classified as SMEs. The main survival and growth strategy that the SMEs can apply is to create changes in their industries and also adapt to changes by coming up with different innovative strategies (Ramdani et al., 2009). Finding simpler ways to do business is always important, it gives the company a chance to grow and outsmart the competition. Asian businesses are in favour of using Electronic commerce (E-commerce) solutions while there are countries in Africa that are still behind (Awa et al., 2015). The majority of countries in Africa are still struggling with the adoption of ICT due to the lack of the appropriate infrastructure.

Provided the important role that is played by SMEs towards economic development, it is important to understand SME owner's perspective towards the adoption of ICT. South Africa invests a lot in growing SMEs, this research aims to understand how these SMEs intend to maximise production and communication through the adoption of ICTs and also increase their chance of survival. According to the researcher, there are studies that focus on ICTs but there is a notable gap when it comes to ICT studies in small cities like Pietermaritzburg.

### **1.3 Research Problem**

SMEs play a major role when it comes to the improvement of national economies. SMEs are important drivers of the economy as they are significant when it comes to reducing unemployment in South Africa (The Banking Association South Africa, 2018) . The South African government sees the potential that SMEs bring to the local economy that is why the government invests in SMEs and promotes their development. Even though the government is involved in developing SMEs they still struggle. According to the Department of Trade and Industry (2008) , a lot of SMEs fail at an average of 3.5 years after their development. The Global Entrepreneurship Monitor (GEM) argue that most start-up business hardly survive and the survival rate of SMEs in developing countries are even less (Small Enterprises Development Agency, 2016). According to TBASA (2018), the failure of SMEs in South Africa is mainly caused by the lack the appropriate technology, the production capacity and the access to the markets. The rate of SME failure and the deficiency of SME growth in South Africa is hindering the economic growth of the country.

The adoption of ICTs is known to improve the status quo of SMEs by giving them a competitive advantage (Pillay, 2016, Kilangi, 2012). The adoption of ICT in Africa has been increasing at

a rapid rate recently (International Telecommunications Union, 2016). The benefits of ICT could assist with the sustainability of retail SMEs in South Africa. South Africa is amongst the developing countries in the world that have a high penetration of ICT adoption (ITU, 2016). According to Nuamah-Gyambrah, Agyeiwa, and Offei (2016), ICT has helped many businesses in lowering the communication cost, lowered the transaction cost, increased production, and widen the market base. The United Nations (UN) believes that technological progress is the solution to world economic problems (SGD9, 2017). SMEs must be educated about the benefits of using ICT as part of their business strategy. There is a need for SMEs to take advantage of the benefits provided by ICTs thereby maximising their potential (Modimogale and Kroeze, 2011). There are a number of researches that investigate the adoption or acceptance of ICTs although few have been done that focus on investigating the determinants of adoption by SMEs in South Africa. This study aims to investigate the determinants of ICT adoption by SMEs.

## **1.4 Theoretical Framework**

### **1.4.1 Technology, Organisation, and Environment Framework**

The TOE framework is a well-established theoretical framework that is mostly used when the adoption of Information Systems (IS) is happening at an organisation level. Tornatzky, Fleischer, and Chakrabarti (1990) proposed the TOE theoretical framework, a classical framework that is used to predict the firm's intention to adopt an IS. According to Oliveira and Martins (2011a), the TOE framework can be employed to investigate the determinants that influence the adoption of the new technology innovation by an organisation. The three aspects of the TOE framework, namely technology context which looks at the technological aspect of the firm, organisation context which looks at the firm's organisation structure, and lastly the environmental context that looks at factors and stakeholders that surrounds the firm. "TOE framework suggests that the adoption of technology by firms is influenced by technology development, organisational conditions and, the industry environment" (Chatterjee, Grewal, and Sambamurthy, 2002, p33). The author's decision to use the TOE theoretical framework is influenced by studies that were conducted by (Oliveira and Martins, 2011a, Awa et al., 2015, Baker, 2012, Lippert and Govindarajulu, 2006).

#### **1.4.1.1 Technology context**

“Technology context refers to the firm's perceptions of existing and emerging characteristics of the innovative technology” (Wang and Wang, 2016, p831). Technology context is concerned about the internal technology knowledge that the employees have. According to Chiu et al. (2017), the technology context looks at the usefulness of the technology and the characteristics of the technology. Technology context is an important variable that the majority of theoretical frameworks look at when they study the adoption of technology innovations. The relationship between technology and the enterprise is always an interesting topic in IS studies (Lin, 2014). Understanding the technology perspective of an organisation helps determine their readiness of adopting new technology innovation. The researcher focuses on the three technology context variables namely, relative advantage, compatibility, and complexity.

#### **1.4.1.2 Organisation context**

“The organisational context relates to descriptive characteristics of the organisation, such as size, scope, resources available and organisation structure” (Wang and Wang, 2016, p831). The organisation context consists of four variables, top management support, ICT knowledge, financial resources, and firm size.

#### **1.4.1.3 Environmental context**

The environmental context is about the firm surroundings, the stakeholders that influence the business. The environment context consists of three variables, government support, external support, and competitive pressure.

### **1.5 Research Questions**

The following are the main questions that this research aims to give answers to:

1. What are the determinants that influence the intention to adopt ICT by SMEs in Pietermaritzburg?
2. Which determinant is most influential when it comes to intention to adopt ICT by SMEs in Pietermaritzburg?
3. How suitable is the proposed model for studying intention to adopt ICT by SMEs in Pietermaritzburg?
4. What relationship exists between the determinants of ICT adoption for SMEs?

These questions will be investigated with the use of a theoretical framework TOE by (Tornatzky, Fleischer, and Chakrabarti 1990). This framework is well known as a preferred choice of the framework when it comes to investigating the adoption of innovation at firms' level.

## **1.6 Research Objectives**

The study's objectives are as follows:

1. To investigate determinants that influence the intention to adopt ICT by SMEs in Pietermaritzburg.
2. To investigate the most influential determinant that influences the intention to adopt ICT by SMEs in Pietermaritzburg.
3. To investigate the suitability of the proposed model for intention to adopt ICT by SMEs in Pietermaritzburg.
4. To investigate the relationship between the determinants of ICT adoption for SMEs.

This study aims to research the determinants that influence the intention to adopt ICT by SMEs in Pietermaritzburg. The study is aiming to provide a comparative ranking of the determinants that influence the intention to adopt ICT.

## **1.8 Structure of the Study**

### **Chapter 1**

This chapter introduces the study by providing a background of ICT and SMEs. It also discusses the research problem of the study. This section formulates the research objectives and the questions of the study. This chapter further gives the preliminary literature review of ICT and the TOE theoretic framework that the research chose as the lens to study the topic.

### **Chapter 2**

This chapter's main focus is to discuss previous literature that is related to the adoption of ICT. It starts with defining ICT and the different definitions of SMEs around the world. This chapter discusses different kinds of ICTs, old and new ICTs. It further discusses the adoption of ICTs from developed countries to developing countries, in developing countries its main focus in Africa then to South Africa where the study happens. This chapter also discusses different



technology adoption theoretical frameworks with the main focus in the TOE framework which is used in the study.

### **Chapter 3**

In this chapter, the researcher looks at the methodology that was applied to answer the research question about the intention of SMEs to adopt mobile marketing. In this chapter, the researcher discusses the roadmap that is followed as a guideline on how to conduct the study. The study makes use of a research onion method and the researcher chose different choices that help to answer the question that is posed by the study. The researcher elaborates on the philosophy, research approach, strategy, choice, time horizon, and data collection and analysis. This chapter also looks at the ethical consideration of the study.

### **Chapter 4**

This is an analysis chapter it provides elaborate details of the research results. This section looks at the descriptive of the collected data, information about socio-demographics like gender, age, education and IT knowledge of the participant. It further looks at the company details like years of existence, the number of employees, and annual revenues of the company. It moves further and provides the findings of the SEM analysis and then there is a discussion of the research results.

### **Chapter 5**

This chapter concludes the research, it provides a summary of the literature and it answers the research questions. It further discusses the limitations of the research and the research recommendations and then the final conclusion of the study.

## **1.9 Chapter summary**

Different studies have shown that ICT adoption is growing rapidly and that it is a viable cheap option compared to the old traditional processes. This research intends to understand the determinants that influence the adoption of ICTs adoption by small and medium enterprises. The following chapter will discuss the literature of the study and different technology adoption frameworks.

## **CHAPTER 2: LITERATURE REVIEW**

### **2.1 Introduction**

This chapter aims to shed some light on the foundation of Information and Communication Technology, by looking at the previous studies regarding this research topic. This chapter will look at the definition of ICT and the kind of ICTs that pave the way for the ICTs in general and the new ICTs that are in existence. This chapter will further discuss the previous literature that discusses the adoption of ICT by developed countries and developing countries and looks at the barriers of ICT adoption by SMEs. It will further look at the definition of SMEs. SMEs are defined differently from country to country, this literature will look at the European SMEs definition, United State of America's SMEs definition then look at the South African definition of SMEs.

This chapter will further discuss the different technology adoption theoretical frameworks that are used to study the adoption of technology innovation. The researcher focuses on Technology, Organisation and Environment Framework as the framework is mainly when the adoption of the technology innovation is happening at the firm level (Al-Hujran et al., 2018, Awa et al., 2015, Baker, 2012, Borgman et al., 2013, Chiu et al., 2017). TOE framework will be used to answer the research questions that are posed by the study. The adoption of ICT is important for SMEs in developing countries like South Africa because they are the cornerstone of the country's economic growth, and the South African government invest a substantial amount of money on SMEs, that why it is important for SMEs to grow in order for the country's economy to grow as well.

### **2.2 ICTs in Development**

ICTs can help South Africa to reduce poverty by helping the society to have access to education, health, financial and government services. ICTs have an important indirect and direct impact on the society, education, governance, economy, politics, culture and day to day life of many people in the developing world (Garcia, 2014). "ICTs have proven to be a tremendous accelerator of economic and social progress" (Mansell, 2014, p3). These technologies give people economic growth and they also give them access to information which develops societies. According to the World Bank Group (2016) , there are three ways that the world can stop poverty by using ICTs: facilitating empowerment, promoting opportunity and

financial risk moderation. ICTs are influencing societies towards transforming the culture, social lives, economy (Mansell, 2014).

The newer technologies like mobile telephony, communication platforms, internet networks, and the mobile broadband infrastructure have an impact on international trade and production (UNCTAD, 2017). Access to the trade industry for businesses and the way businesses trade is highly influenced by the ICTs that the businesses use. This impacts the development of the economy and society. The governments must not focus on the ICT infrastructure in order to see the development of the country's economy, there other important factors that they must focus on. The governments have to create policy, legal and institutional frameworks and also teach the society, businesses, and governments the necessary skills to operate ICTs (UNCTAD, 2017).

There is a number of researches that aims to understand the potential benefits that ICTs can bring towards the development of Africa (Adera et al., 2014, Ssuuna, 2014). ICTs have been highly linked with the development throughout the world there is even a new area of study known as ICT for Development (ICT4D), this field is based on the idea that ICTs will be able to create a sustainable development (Anwar, 2018). The African continent needs to improve and enhance the connectivity infrastructure on the global, local and regional scale so that the development can be efficient, effective and innovated (World Bank Group, 2016) . According to the national development plan “By 2030, ICT will underpin the development of dynamic and connected information society and a vibrant knowledge economy that is more inclusive and prosperous” (National Development Plan, 2011, p190) . The South African government is investing a lot on ICT as it sees ICT as a tool to develop the economy and the society.

The core of ICT4D discourse is that if ICTs are properly managed they can play a vital part in economic development and they eradicate poverty but they also come with risks (Anwar, 2018). Murphy (2015), argue that ICT4D has created an image that it can help to develop Africa. According to Friederici, Ojanperä, and Graham (2017), the evidence that exists about ICTs being the transformation tool for African development is inconclusive. In South Africa, there is a growing number of researches that are finding that there is a positive relationship between ICTs and development (Adera et al., 2014, Rey-Moreno et al., 2016, Bornman, 2016). Infrastructure connectivity and ICTs are found to be important when it comes to development,

most of the evidence is found in high-income countries rather than in low and middle-income countries (Friederici et al., 2017). According to Anwar (2018), Improving connectivity can reduce the uneven development of the African continent. The connectivity of the African continent can improve the economy of the continent.

### **2.3 Information and Communication Technology (ICT)**

ICTs are regarded as the most important innovation of the century, there are a lot of activities that ICTs offers and there is still a lot that it has to offer. ICT is derived from combining the two technologies that are known as Information Technology (IT) and Communication Technology (Cuevas-Vargas, Estrada, and Larios-Gomez, 2016). ICTs are defined in many different ways but this study chose the definition by Djatikusumo (2014, p11), "ICT can be defined as internet technology that primarily consists of some activities such as collecting, maintaining, organizing, processing, storing and sharing the information both inside and outside the organisation". The world's population functionality is now dependent on some sort of ICT innovation, from doing business, communication, agriculture, health centers, trades markets, education, etc. The economy of the world is pretty much dependent on ICTs so much that the interruption of certain ICT innovations like the internet can be catastrophic to the world's economy. In this millennium there are so many technologies that do one or more of the above-mentioned activities, which shows that ICTs can be found all over the world, from businesses, hospitals, banks, and government sectors, homes, schools, etc. ICT is advancing so much that in the near future a lot of things will be running some sort of ICT like the Internet of Things (IoT) innovation. The IoT is part of the fourth industrial revolution which is influencing businesses to change strategies and their ways of conducting business.

ICT gives people an opportunity to make precise decisions and the ability to come up with effective and efficient ways to solve problems (Talukder, Quazi, and Djatikusumo, 2013). ICTs have the reputation of being precise and more accurate than humans with minimal error. This enables people who use ICT to have an assurance that their activities are what they expect them to be. "The benefits of using ICT is that it has the ability to create new services, revenue, markets, and employment opportunities, it also increases productivity while it reduces cost" (Basak, 2015, p4). Findik (2013) also supports that the objectives of using ICT are to reduce cost, improve productivity, improve quality and gain flexibility. These ICT objectives help the government sector to be effective and businesses to reach great economic developments. ICT

helps businesses to grow by providing the opportunities to explore new markets and that creates new opportunities that lead to business growth (Runevad and Olofsson, 2014). “SMEs are motivated to adopt appropriate ICTs due to the improvement of their internal processes, improvement of their products through the use of faster communication to their customers, and the better promoting and distribution of their goods and services through online presence” (Agboh, 2015, p2).

ICT provides people with the ability to communicate and also gives them access to information from all over the world. ICT has different applications that compute day to day activities, this simplifies the lives of many people. ICTs enables people to do different activities in the comfort of their home or any remote location they are in, this is made possible by service providers that install cellular towers throughout the world. Some of the ICT innovations are affordable since there is high competition between the companies that develop these platforms. According to Djatikusumo (2014), ICT can be dated back to 1800 just after the end of the industrial era. ICT has advanced since then, it shifted from wired technology and large systems to wireless devices that are mobile and can fit one’s pocket. ICT is now an important infrastructure that connects the world as a whole and they are vital for economic growth. There are different kinds of ICTs like, telephones, internet, computers, mobile devices, applications, broadband technology and more.

According to Makore (2014), technologies like broadband technology are growing rapidly particularly in developing countries. Shankar and Balasubramanian (2009), argue that the improvement of information transmission bandwidth, the innovation of mobile applications (Apps), and the usability of mobile devices are important as website usability. The availability of a wireless network for mobile devices enables users to have access to these applications anywhere and anytime. Different service providers are working on getting their service available everywhere and with the current competition among themselves, it is in their best interest to have better coverage and fast internet connection.

Businesses that are conducted through the use of ICT maximise production of the company, this is why it is important to utilise innovations like e-commerce that are made available through the use of the internet and applications. According to Ashrafi (2014), there are four ways that the adoption of ICT in an organisation can contribute, 1) recognition of the

organisation, 2) gives more information to small businesses, 3) towards the organisation exploration of new trade territories and, 4) gives the ability to do business online. Businesses should take advantage of using ICT to do their operations in order to advance their businesses (Miraz and Habib, 2016). According to Niebel (2018), there is plenty of researches that has studied the relationship between ICT effects and economic growth in developed countries and the majority of the studies show a positive relationship between the two.

Developing countries are lurking when it comes to adopting ICT. Developing countries have less diversify industrial infrastructure which holds back the adoption of ICTs (Sadok, Chatta and Bednar, 2016). Developing countries are faced with plenty of obstacles that hinder the adoption of ICTs like the lack of facilities, technology capabilities, and lack of legal determinants (Kossai and Piget, 2014). The majority of developing countries struggle with finances which leads to the lack of infrastructure and the people of these countries have limited technical skills due to lack of training. Yousefi (2015) argues that even though developing countries are lurking behind in terms of ICT penetration and on Research and Development (R&D) investments compared to developed countries, there is evidence that developing countries have been adopting ICTs more than the developed countries in the past decade.

In this decade small businesses are adopting ICT due to the arrival of PCs and the cheapness of certain ICT products. ICT gives SMEs an opportunity to compete with large corporate due to the use of ICT. Previous studies have shown that businesses tend to gain more revenues, increase their market share, and also increase their production when they adopt ICT (Ntwoku et al., 2017, Tarutė and Gatautis, 2014, Yu et al., 2017, Berné et al., 2015). This shows that there is a lot that SMEs can gain by adopting ICT within their enterprises. The lack of awareness of the benefits that come with ICT is one of the barriers that hold back the adoption of ICT (Ashrafi, Sharma, Al-Badi and Al-Gharbi, 2014). According to Miraz and Habib (2016), the majority of SMEs are still reluctant to adopt ICT due to the perception that it is expensive, complicated and they lack experience and customer services. The lack of empirical studies in developing countries about the relationship between ICT adoption and economic development leads to less adoption of ICT (Niebel, 2018). According to Ashrafi et al. (2014), the lack of IT skills is amongst the biggest reasons why most SMEs are behind when it comes to adopting ICTs even in European countries like Poland, Portugal and the United Kingdom (UK).

### **2.3.1 Traditional ICTs**

ICT has come a long way, from technologies that seem primitive now to advanced technologies that are used daily. At the beginning of the technology revolution, ICTs were known as Communication Technology (CT), technologies like electricity, telegraph, radio, television, telephones, etc. These technologies are the foundation of the ICTs that are dominating the world now. Technologies that are making waves in the world in this generation are being built on the foundations of these old technologies. The discovering of radio waves by Heinrich Rudolf Hertz opened the world to new possibilities. Radio waves are used by many different technologies to transmit many different signals like music, voice signals, television programs, cellular phone calls, and wireless internet data (Gale, 2017).

#### **2.3.1.1 Radio**

The radio broadcast started in 1908, this time it was only used by sailing ships and military (Gale, 2017). The first commercial radio station originated in the United State of America in 1921 (UKEssays, 2017). The commercial radio spread out throughout the world, even now radio is still an important mass communication medium. Radio is still considered an important communication medium even though there are new versatile communication methods. The advancement of technology in this past decade has opened radio to new possibilities like having an online radio which enables listeners to interact with the radio station more easily (UKEssays, 2017).

#### **2.3.1.2 Television**

Television (TV) has been developing throughout the years since the 1930s, most of the commercial development of the TV was in 1945 (Gale, 2017). Since its development, TV has become the most influential force in the world. The TV uses many kinds of influential stories to reach out to the world and influence the way people think. According to Singer (2014) TV lessens the time that people spend on reading, writing and exploring other things. Most people in the world spend a certain period of time in front of the TV per day. A lot of different communication channels have come to play but there is still an important part that is played by TV, as a lot of people especially elderly people spend time in front of the TV to catch on the daily news. TV on its own had influenced a lot of advanced development of platforms that perform communication.

### **2.3.1.3 Telephone**

The telephone was developed by Alexander Graham Bell in 1876 when he was trying to improve the telegraph (Gale, 2017). The telephone has advanced so much that it has become a part of people's day to day business (Morris, 2015). The telephone has contributed massively to the lives of the people of this world as it keeps them connected and shortens the communication time, and cost. The telephone has advanced from wired to wireless telephones and it has inspired mobile cellular. The telephone may not be the number one communication channel in this decade, but it is still an important one especially in businesses. The telephone is used by businesses to communicate and as an important part of the internet platform.

### **2.3.2 Modern ICTs**

According to Ismail (2017), modern ICTs are an advancement or innovations that are based on traditional ICTs. "The advancement of ICTs has portrayed novel methods for information generation, management, and dissemination" (Mandalia and Parmar, 2017, p2). The modern ICTs are increasingly taking over in different sectors like in private, public and in government sectors (Strielkowski, Gryshova, and Kalyugina, 2017) . The modern ICTs are positively influencing the way that people conduct their business, the way that people communicate, the way that the health sector practices medicine and the education practice. ICTs like Social Media, Mobile Devices, E-Commerce, Blockchain, Internet of Things (IoT), and Big Data are the latest modern ICTs that are increasing at a fast rate and they have the potential of changing the world towards new dimensions.

#### **2.3.2.1 Internet Technology**

According to Awan and Zhang (2017), in the 1990s the internet was first opened for communication. This introduced the internet to new opportunities and it has grown significantly since the 1990s. Internet technology is considered to be the most important innovations and it is adopted by many people throughout the world (Glavas and Mathews, 2014). The internet has enabled people to do business online in the comfort of their homes. The internet has managed to internationalise things like information and created an opportunity for people to network throughout the world (Mathews, Bianchi, Perks, Healy, and Wickramasekera, 2016). According to Makore (2014), internet technology is considered to be an affordable technology that is more likely to bestow on the reduction of poverty in townships. According to Gan, Inversini, and Rega (2016), the internet has a potential impact on



communities to uplift them through socio-economic development. The internet technology is used to reach almost any user that has an internet connection, this enables any organisation in any sector to benefit from using the internet (Awan and Zhang, 2017).

Al-Somali (2012), argues that ICTs especial the internet is utilised by companies to manage transactions as their strategy. Gan et al. (2016) argue that internet usage in businesses gives rise to opportunities towards selling and promoting products or services for the industries. Organisations use internet technology for selling and buying products and services (Gërduri-Rashiti, Ramadani, Abazi-Alili, Dana, and Ratten, 2017) . The internet technology has brought forth the revolutionary changes when it comes to conducting business, different businesses now see the internet from an innovative perspective (Agwu and Murray, 2018). Businesses are now using the internet for innovative ways to do their day to day productions. The internet helps businesses to do their activities in a short period and it bridges the space between consumers and firms (Agwu and Murray, 2018). The Internet provides consumers the freedom to compare prices of products and services that they wish to buy unlike visiting the physical business. The internet can be used for communication, marketing, social media, and can be used by mobile phone applications (Gan et al., 2016).

According to Mathews et al. (2016), SMEs are short of resources and they have limited knowledge about foreign markets, that is why they are not exploring the opportunities that exist from foreign markets. If the companies use the internet it has a better chance to access international markets at a low cost (Mathews et al., 2016). The internet is a useful instrument when it comes to providing important information, creating relationships and decreasing costs (Mathews et al., 2016). The internet technology is not only for large cooperatives but for SMEs with small investments as well, SMEs can tap to export opportunities at a low cost to the company (Mathews et al., 2016). According to Gupta, Miller, and Darda, (2016) , using social platforms for the business is helpful when it comes to the company's brand.

The adoption of the internet in organisations have changed the way organisations communicate within and also the way they communicate with external parties (Agwu and Murray, 2018). The internet can give customers up to date information about a product or service they wish to purchase. According to Awan and Zhang (2017), the internet gives organisations an opportunity to improve their image by using social media to keep in touch with society. The

advancement of the web services from web 1.0 to web 2.0 that enabled communication between customers and firms, and also assisted the firms to maintain better relationships with their customers. The internet technology has advanced communication on mobile devices, this resulted in a higher penetration of broadband technology. The mobile devices are the beacon of hope for conducting business on the go especially in growing countries.

### **2.3.2.2 E-mails**

Electronic mail (e-mail) is one of the most important forms of communication and it is considered to be a formal form of communication. Emails are important because they are delivered to the intended recipient within seconds or minutes and that makes the communication fast and reliable. The projections estimate that by the end of 2019 the e-mail subscription will be approximately 2.9 billion (Finn, 2018). E-mails are unique, the e-mail address belongs to one person and no two people can have a similar email address. E-mails can be used by businesses for different things and businesses can conduct their business via e-mails. E-mails can be considered as electronic commerce (e-commerce), businesses can use emails as a medium to do business transactions (Dorsey, Andersen, Lee, Grassadonia, Byttow, and Broyles, 2017) . The majority of businesses are using e-mails as a marketing strategy, e-mails are considered to be a low level of ICT adoption by businesses. SMEs that can't offer credit account to their customers are now using point cards to register their customer's details, this gives them an opportunity to send their marketing adverts to their customer's email. E-mails can be sent to many recipients at once, this is fast and easy, but this also brings about the risk of receiving spam emails. Spam e-mails are uninvited emails that get sent out to a large number of recipients (Hidalgo, 2002). Spam e-mails are the problems that threaten a lot of people and businesses if no precautions are taken, people can lose their valuable properties.

### **2.3.2.3 Website**

The website is one of the most used platforms for accessing public information. Websites are used by many organisations from the government sector, private sector, and public sectors. The website has evolved from what is known as web 1.0 to web 2.0. Web 1.0 focused on displaying information known as a static website and web 2.0 became interactive and dynamic, providing and receiving information and allowing communication between people. The growth of the website brought about e-commerce that is largely used by businesses. The website is the second level of ICT adoption by businesses. Websites are used by businesses to display their

information and market their business. According to Ramayah, Ling, Taghizadeh, and Rahman (2016), it is important for the business to have a website as this can benefit the business tremendously through online business transactions.

#### **2.3.2.4 Mobile Technology**

Mobile phones have evolved and that has made them be more popular (Wang, Li, Li, and Zhang, 2016). Mobile devices have been making waves in the technology world, there are many applications that run on mobile devices nowadays. There are many companies that develop mobile devices and that have created competition among the firms. The competition causes firms to sell mobile devices cheap and that helps consumers to afford them even in developing countries. According to Jain, Pant, and Daswani (2011), the development of technology and the awareness of customers has led to the buying power being increased that in turn increases the usage of mobile devices. According to Niebel (2018), in the past decade, there has been a high penetration of mobile devices in Sub-Saharan Africa. The increasing number of mobile device adopters has given technologies and applications a new focus on mobile computing (Shaikh and Karjaluo, 2015). The developers are looking for ways to take advantage of the high penetration of mobile devices. The main reason for the speedy adoption of mobile devices is due to the services they offer and the capabilities of being accessible everywhere and all the time (Shaikh and Karjaluo, 2015).

The mobile phone has evolved so much that its main function is no longer voice calls but it for using applications. According to the International Telecommunication Union (2014), there is significant information that shows that there is an increased demand for data services rather than voice services. A significant number of users use their mobile devices to access the internet this has resulted in the increase of broadband subscriptions. According to Chiu, Chen, and Chen (2017), the 4G broadband data transmission speed will increase the number of applications that will be developed due to the high speed that the 4G broadband network can reach. The increasing speed of the mobile phone enables more applications to run on mobile devices, the certain application can now be done on a mobile device like cellphone banking which was done only on the computer as internet banking. The speedy development of the mobile broadband application has influenced the development of applications like mobile commerce which has drawn more customers and that has brought more revenue to app developers (Nikou and Mezei, 2013). Telecommunication services providers throughout the world are implementing the

broadband network service, this has been the core subject for the mobile application development (Chiu et al., 2017).

There are many different kinds of applications that were found on the computer but now are available on mobile devices as well. The increase in mobile broadband and the processing power of mobile devices are the reason for this shift. The performance of the mobile device's central processing unit (CPU) has increased significantly in recent years. The new model of mobile devices has advanced CPU and new brands with advanced features and the affordability of phones have increased the number of mobile phones that are being purchased (Jain et al., 2011). The advancement of mobile devices has opened the doors for applications like mobile commerce, mobile banking, mobile learning, etc. these applications have seized the benefits of mobile devices. The fact that mobile devices are always close to the user and that they are accessible anywhere provides these applications with a greater chance of being utilized. Mobile devices keep people in touch through the use of cheap applications like social media.

#### **2.3.2.5 Social Media**

“Social media refers to a specific platform through which people communicate such as discussion forums, blogs, wikis, social networks, and multi-media sites” (Guesalaga, 2016, p2). According to ITU (2017), about 48% of the world's population has access to the internet. This signifies that a sizable number of people access to some sort of social media. Facebook, Twitter, Instagram, google+, LinkedIn, and YouTube are amongst the leading social platforms that are mostly used by people throughout the world. The number of social platforms users keep rising and social platforms are constantly utilized regardless of the location of the user due to the high penetration of mobile devices (Hudson, Huang, Roth, and Madden, 2016). The usage of mobile devices to access the internet makes it easy for people to spend time on different social media. According to Bright, Kleiser, and Grau (2015), people spend approximately 24% of their time on social media when they are online. The reason why people spend so much time on social media is that they have multiple accounts on different social media platforms and there is a lot of information that is constantly flooding the social platforms. According to Bright et al. (2015), this phenomenon is called polychromic media consumption.

According to Ashrafi et al. (2014), social media and mobile commerce have decreased physical transportation when it comes to banking, advertising and selling of goods. The social media

platforms have come out as one of the leading communication channels where people can communicate by sharing information and also communicate with sellers and be able to evaluate services and brands (Hudson et al., 2016). According to Guesalaga (2016), social media has been acknowledged to be beneficial for people selling certain products and also for sales management particularly in the business-to-business (B2B) circumstances. Company (2014) states that most people spend their time on social platforms more than they do on other websites. Bright et al. (2015, p150), argue that “social media has changed the way of communication, it might be the communication between B2B, business-to-customer (B2C) or peer to peer”.

According to Abualrob and Kang (2016), there is a huge change in how different industries do business nowadays, the old ways of conducting business are being abandoned. Abeywickrama and Vasickova (2014) argue that the growth of the technology world, the digitalization of business and the hours that people throughout the world spend on the internet are the reason for the switch from tradition business processing to ICT based processing. Tanakinjal, Deans, and Gray (2013) argue that there is always hesitation when it comes to adopting immature innovations that could pose security risks. The hesitation happens mostly in businesses as they are cautious about using insecure platforms.

#### **2.4 Small Medium Enterprises (SMEs)**

SMEs are recognized worldwide, they are the pillar of the world economy. A large number of the businesses in the world fall under the category of Small and Medium Enterprises, approximately 90% of businesses in the world are SMEs (Gasiorowski-Denis, 2015). According to Laya (2015), SMEs are accountable for about 70% of the world population employment. “Small and Medium Enterprises (SMEs) are non-subsidiary, independent firms that employ fewer than a given number of employees” (OECD, 2005, p17). The categorisation of SMEs differs from country to country, but they are most closely related. The categorisation of SMEs is mostly focused on the number of paid workers within the company, the return revenues contributed and the gross assets of the company. In South Africa, SMEs are defined based on the National Small Business Act 102 of 1996 which was later amended in the National Small Business Act 26 of 2003. Act 26 definition is as follows “SMEs based on certain categories, standard industrial sector, and subsector classification, size of the class, equivalent

of paid employees, revenue turnover and asset value excluding fixed property” (The Banking Association South Africa, 2018, p1).

SMEs are businesses that are distinguished throughout the world, they are defined slightly different from country to country but they basically the same. The majority of the countries around the globe consider SMEs as the vehicle of economic growth and employment. “SME’s definition is grounded on the National Small Business Act 102 of 1996 The Act’s definition of small businesses follows a similar approach to that of international organisations: it uses a combination of the number of employees, annual sales turnover, and gross assets excluding fixed property” (Maduku, Mpinganjira, and Duh, 2016, p2). SMEs are believed by economists and business experts as the core driver of economic growth (Bank, 2016). According to The Banking Association South Africa (2018) , approximately 91% of businesses participating in the South African economy are SMEs. However, SMEs consist of a variety of companies, some of these companies are formally registered, informal and non-VAT registered organisations (DTI, 2005). The informal and non-VAT companies are unlikely to contribute towards the economy and these companies are mostly about the survival of the owner. These businesses are unlikely to grow or to hire employees.

Most countries in the world classify SMEs with below 10 employees as microenterprise, from 10 to 50 is a small enterprise and from 51 to 250 is a medium enterprise. The United States of America classifies any business that has less than 500 employees as an SME. According to (OECD, 2005) since 2005 there were two more categories that were added as a classification, the turnover and the balance sheet in the European Union.

**Table 2. 1 European Union SMEs Classification**

Category	Head Count	Turnover	Balance Sheet
Micro	$\leq 10$	$\leq \text{€}2\text{mil}$	$\leq \text{€}2\text{mil}$
Small	$10 \leq 50$	$\text{€}2\text{mil} \leq \text{€}10\text{mil}$	$\text{€}2\text{mil} \leq \text{€}10\text{mil}$
Medium	$50 \leq 250$	$\text{€}10\text{mil} \leq \text{€}50\text{mil}$	$\text{€}10\text{mil} \leq \text{€}43\text{mil}$

**Source: (Oliveira and Martins, 2011b)**

The majority of sectors in South Africa have a similar classification for the size class except for the Agricultural sector which has a smaller size classification when compared to other

sectors. The agricultural sector is considered a medium enterprise if it has a maximum of 100 employees and small enterprise if it has less than 50 employees. Most sectors abide by the following classification, if the company has less than 50 employees it is categorised as a Small enterprise and from 50 to 200 it is considered to be a Medium enterprise and companies with less than 5 employees are considered Micro enterprises (BASA, 2018a). The turnover and asset value are different for each and every sector.

**Table 2. 2: SMEs Classification**

<b>Business Sector or Subsector</b>	<b>Classification</b>	<b>Paid Employees</b>	<b>Turnover</b>	<b>Gross asset value (excl fixed property)</b>
<i>Agriculture, Forestry, and Fisheries</i>	Medium	100	R5m	R5m
	Small	50	R3m	R3m
	Micro	5	R500 000	R500 000
<i>Catering, Accommodation and other Trade</i>	Medium	200	R13m	R5m
	Small	50	R6m	R1m
	Micro	5	R200 000	R100 000
<i>Community, Social and Personal Services</i>	Medium	200	R13m	R6m
	Small	50	R6m	R3m
	Micro	5	R200 000	R100 000
<i>Construction</i>	Medium	200	R26m	R5m
	Small	50	R6m	R1m
	Micro	5	R200 000	R100 000
<i>Electricity, Gas, and Water</i>	Medium	200	R51m	R19m
	Small	50	R13m	R5m
	Micro	5	R200 000	R100 000
<i>Finance and Business Services</i>	Medium	200	R26m	R5m
	Small	50	R13m	R3m
	Micro	5	R200 000	R100 000
<i>Manufacturing</i>	Medium	200	R51m	R19m
	Small	50	R13m	R5m
	Micro	5	R200 000	R100 000
	Medium	200	R39m	R23m

<i>Mining and Quarrying</i>	Small	50	R10m	R6m
	Micro	5	R200 000	R100 000
<i>Retail and Motor Trade and Repair Services</i>	Medium	200	R39m	R6m
	Small	50	R19m	R3m
	Micro	5	R200 000	100 000
<i>Transport, Storage, and Communications</i>	Medium	200	R26m	R6m
	Small	50	R13m	R3m
	Micro	5	R200 000	R100 000
<i>Wholesale Trade, Commercial Agents and Allied Services</i>	Medium	200	R64m	R10m
	Small	50	R32m	R5m
	Micro	5	R200 000	R100 000

**Source: (The Banking Association South Africa, 2018)**

The role that is played by SMEs is important for many countries. SMEs provide a valuable contribution to the economy with an estimated Gross Domestic Product (GDP) value that is between 16% for small income countries and 51% for high-income countries (OECD, 2017). Developing countries have realised the potential that lies within SMEs and they acknowledge that there is plenty of room to grow SMEs. These countries have implemented policies that could encourage people to start-up businesses (Awa, Ojiabo & Emechete, 2015) . South Africa is one of those countries that sees the potential of SMEs in contributing towards the economy that is why the South African government has implemented policies to assist SMEs in order for them to grow and be sustainable. South African SMEs are given support by different institutions and they are provided with incentives to help with their business (Seda, 2016). The SMEs policies are about providing financial and non-financial supports, creating demand for products and services provided by SMEs and cutting down difficult regulations (DTI, 2005, Seda, 2016). In South Africa, approximately 91% of businesses are classified as SMEs (BASA, 2019). This is in the range of other countries like China which has approximately 97% of its businesses classified as SMEs (Hoffmann, 2018). The National Business Act 26 aims to improve the number of SMEs and this will eventually increase the economy in South Africa and eradicate poverty.



According to Ntwoku, Negash, and Meso (2017), SMEs are different from big firms, they are vulnerable, and they are short-lived if they are not managed properly. This vulnerability is due to the fact that SMEs are small in nature and they have limited resources which limits them from competing with bigger firms on a large-scale market. SMEs struggle to sustain themselves because they compete with big firms that have vast technology and that can access a large market especially those SMEs in developing countries. Agboh (2015) argues that most of the time SMEs marketing rely on human interaction. This limits the market for SMEs because they end up dealing with local customers only and it is expensive for SMEs to implement communication channels that need to be managed all the time.

The countries that are considered to be world leaders like Japan and the United States of America (USA) have policies and agencies that monitor and make sure that SMEs are successful (Yeboah-Boateng and Essandoh, 2014). According to Marc Auboin (2016), SMEs worldwide struggle to trade with other countries because of the policies that apply to the SMEs. The policies that regulate the trading of SMEs are hindering from trading to the wider audience. SMEs in South Africa struggle to survive as the results of things like the red tapes (policies and regulations), the lack of adequate infrastructure, lack of entrepreneurial skills, and lack of appropriate technology and that lead to a low level of technical skills (Department of Agriculture, Forestry, and Fishery, 2014). It is important for SMEs to adopt technology so that they can strive in this economy, even though there are regulations that could hinder the progress, but the technology can now reach a wide range of customers which could assist SMEs. The government can assist SMEs not only to loosen regulations and policies but by providing communication infrastructure so that the businesses can communicate with the public.

## **2.5 Retail Industry**

The retail business is one of the largest industries in the world and it contributes immensely to the world economy. The retail industry deals with providing goods to the consumer for personal or household use and it also provides repairing service to the goods (Chinomona and Dubihlela, 2014). According to Pantano, Priporas, Sorace, and Iazzolino (2017), the retail industry was responsible for sales that amounted to \$22 trillion worldwide in 2014 and it is estimated that retail sales reached \$28.4 trillion in 2018. The retail industry is one of the successful businesses throughout the world this has resulted in an increase in the number of shopping centres.

Shopping centres are important for developing the areas that are underdeveloped, they uplift the local economy and create opportunities for employment that help to eradicate poverty especially in developing countries.

The retail industry has become more competitive in the last couple of years, it is crucial for the business to give a satisfying service to the customers and to have optimised operations (Chandramana, 2017). Online shopping has increased in South Africa and this affects the way that the retail industry conducts its business. “In South Africa, the retail industry is categories under the tertiary sector, and it belongs within the wholesale and retail subsector, it is also called a trade subsector” (Aye, Balcilar, Gupta, and Majumdar, 2015, p19). In South Africa, the retail industry includes wholesale, retail business, vehicle repair, hotels, motor sale and restaurants (Chinomona and Dubihlela, 2014). There are two kinds of retail businesses in South Africa, the informal sector and the formal sector (Chinomona and Dubihlela, 2014). The formal sector consists of registered businesses while informal consists of unregistered businesses like spazas, hawkers and small stands (Chinomona and Dubihlela, 2014). The formal retail business is a diverse group that mostly consists of clothing, furniture, and grocery businesses. The South African retail industry is considered to be the largest in sub-Saharan Africa and it is rated the 20<sup>th</sup> largest in the world (Innovate, 2016).

South Africa is mostly used as a representative of the Southern African region for emerging economies due to the fact that there are archived sale records ranging from 1970 to 2018 (Aye et al., 2015). The retail business in sub-Saharan Africa is one of the biggest businesses that newcomers can have profitable investments (Aye et al., 2015). The Global Retail Development Index (GRDI) publication ranked South Africa number 26 out of 30 developing countries in 2011 (Aye et al., 2015). The retail businesses in South Africa are mostly influenced by the way other retail businesses in the world conduct their business. The sales that were generated by the retails in South Africa passed a trillion rand for the first time in 2011 (Innovate, 2016). The sales have been constantly increasing in recent years. Approximately 2.825 million people are employed by retailers and wholesale business, this means about 22% of the workforce of the country is in retail and wholesalers (Innovate, 2016). Given the number of employees that work for retail business, it shows how important retailers for the South African economy. The retail business contributes about 14% GDP of the country’s economy (Innovate, 2016).

The majority of retailers in developing countries like South Africa struggle to decrease their costs and to maximise their profits (Aye et al., 2015). The management of retailers plays an important role when it comes to driving the business towards a successful retail (Aye et al., 2015). The South African retail industry continues to evolve at a fast rate since the adoption of technology and trying to meet customer demands, competition and globalisation of businesses and retails always facing growth challenges (Chinomona and Dubihlela, 2014).

Small retail businesses that conduct their business in a localised economy are often unable to match low prices that are provided by large retailers, this usually end-up forcing the small retailers to go under (Peyton, Moseley, and Battersby, 2015) . In order for the retail business to do well, it employees must be well informed about the product that they provide, the business should deliver quality products and it must interact with customers on the regular basis in order to provide customers with satisfactory service (Jacobs, Renard, and Snelgar, 2014) .

Most of the retails lack innovative capabilities that is why they rely on outsourcing most of their resources (Pantano, 2014). There is a lot of innovative technologies that retailers use for selling goods and services and they are being adopted fast, these technologies enable businesses to support retailers and consumers and it helps retails to archive information quickly and update information on market trends (Pantano, 2014). The retail industry is highly competitive, and the environment is full of uncertainty, it is important for a business to innovate in order to outsmart the competition and brings profit in the business (Pantano, 2014). Retailers adopt technology based on understanding the extent to which the technology will be used by consumers and the extent to which the managers will make use of the data and also provide them with future trends (Pantano, 2014). Competitiveness and complexity are rapidly increasing due to the development of new innovative technologies in the retail industry (Pantano et al., 2017). The retail industry is greatly influenced by technology, big retails are conducting their businesses online. The retail businesses that are operating online are reaching a wide audience and their operation has become cheap. The retail SMEs can benefit vastly in adopting electronic business. The retail business is now operating in two different ways, it operates online and offline (Pantano et al., 2017).

The competitiveness of the retail is based on two things, the favourable local and the industrial conditions in which the retail originate and develop, and the ability to achieve better results

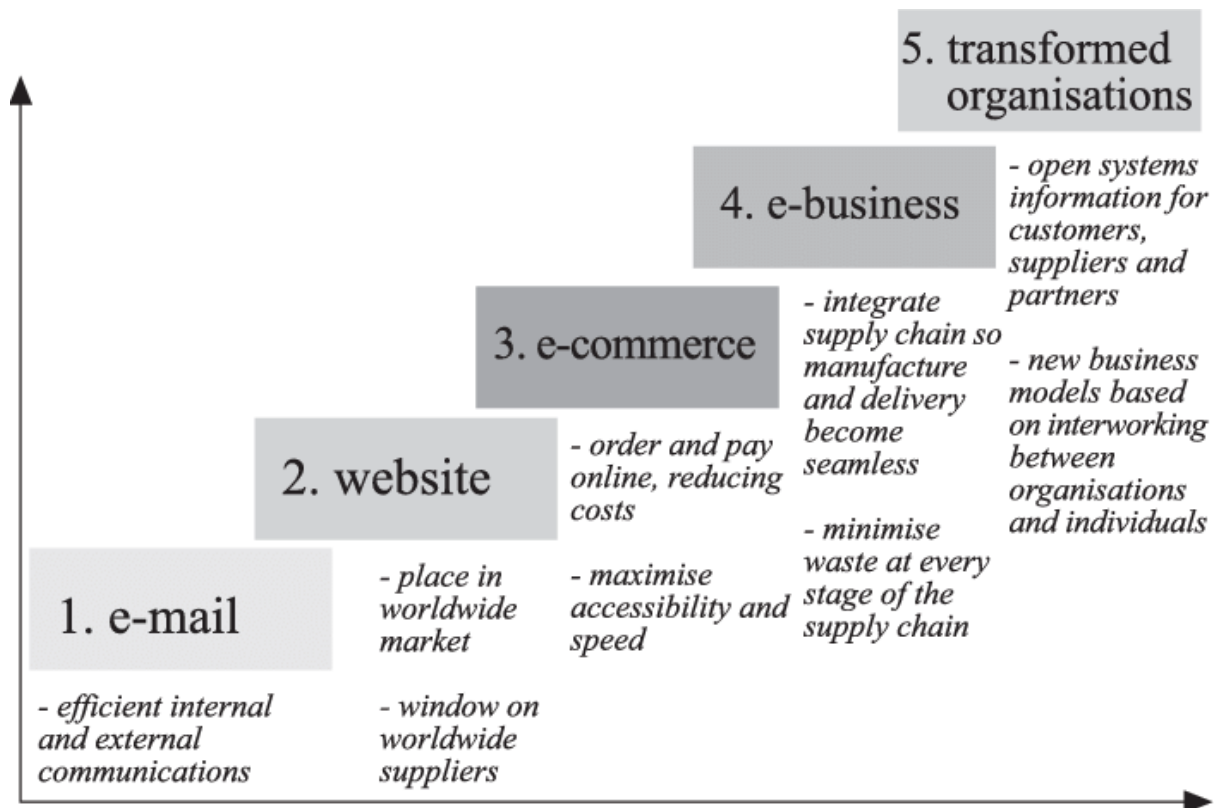
than the competition (Knezevic, Naletina, and Damić, 2016). The retail business should be able to adapt to change quickly in order to be competitive. In order for the retail business to be dominance and dynamic it needs to focus on two things one being internationalisation and the concentration of retail markets. Retail businesses that are trading on an international space are more likely to use technology as a means to accelerate their business processes and to build strong relationships with their customers.

There are new innovative technologies that enable retail businesses to improve their customers' services while it helps them to estimates future market trends (Knezevic et al., 2016). ICTs brings multiple dimensions where it integrates customer and providers as partners in creating business values (Zolnowski, Weiß, and Bohmann, 2014). ICTs are considered to be a key player when it comes to creating business models for retailers (Zolnowski et al., 2014). Internet is an important ICT that provides businesses with the ability to adopt innovations like cloud computing, mobile technology, big data mining and other technologies that help to improve business operations (Gregory, 2015). The internet technology helps to integrate the physical world and the digital world (Gregory, 2015). There is so much that is happening in the digital world, there are retail businesses that are only based on the digital world and they are thriving.

The retail industry is one of the leading in technology innovations like radio frequency identification (Pattanaik and Mishra, 2016). The retail industry is one the largest industry in the world and is vital for it to keep improving the way they do business and ICT provides them that. The retail businesses are leading when it comes to data mining and analyses of the data (Pattanaik and Mishra, 2016). The outside, people don't know about the technological advancement that is done by the retail industry, people have little information about retails (Pattanaik and Mishra, 2016). The operations of retail businesses are not openly known to the world, this makes it difficult for people to know much about the retail business's advancement in technology. The majority of retail businesses focuses on their business reputation and building relationships with their customers and their partners (Pattanaik and Mishra, 2016). The majority of retails uses social networks to interact with customers, check product reviews, and for viral marketing.

## 2.6 ICT Adoption

Figure 2. 1: IT Adoption Ladder



Source:(Martin and Matlay, 2001)

**E-mail** is the bottom level of the adoption ladder. Most SMEs begin the adoption of ICT by adopting emails. Email provides SMEs the foundation to communicate with their clients on a regular basis with less cost, it also helps businesses to market their product by targeting customers with email addresses. The E-mail also helps the business to discover new clients and maintain a relationship with their existing clients.

**The website** is the second level of the ICT adoption ladder. The website assists businesses to widen their market base, build their brand image, provide communication to clients and market their product on a wider audience.

**E-commerce** is the third step in the ICT adoption ladder. E-commerce provide the firm with a chance to increase their revenues by selling to the wider customer base, it also helps the business with the efficiency of doing business online. Selling and buying products online makes things simpler for the business.

**E-business** is the fourth step of adoption, businesses use electronic platforms to run their business. E-business provides opportunities to cut the middle man and making business function quick and efficient by communicating with suppliers and delivering company using an online platform.

**The transformed organisation** is the final level on the ICT adoption ladder. The business becomes integrated in such a way that all the first four levels work together as a business strategy in order to maximise the revenues and explore new opportunities.

### **2.6.1 ICT Adoption in Developed Countries**

The adoption of ICTs differs from developed countries and from developing countries. According to Kossai and Piget (2014), developed countries have a high penetration of ICTs unlike in developing countries. ICTs have been the most important adoption throughout the three decades in developed countries (Kossai and Piget, 2014). “The adoption process of innovation is the mental process through which an individual passes from first learning about an innovation to final adoption” (Tanakinjal et al., 2013, p7). According to Lee, Nam, Lee and Son (2016) , ICTs in organisational level assist organisations to widen the marketplace and broaden the geographic scope and it could also reduce production cost and transaction cost. According to Agboh (2015), the perceived benefits and business strategies are the major drivers of the adoption of ICTs.

### **2.6.2 ICT Adoption in Developing countries**

According to Kayisire and Wei (2016), the majority of the developing countries are showing a vast improvement when it comes to the adoption of ICTs and usage. African countries are among the major adopters of ICTs in the past two decades. Kayisire and Wei (2016) argue that mobile devices are the major ICTs penetration because they are becoming affordable, and they are used for internet access, e-government services, financial services, etc. Mobile devices give users access to a lot of information on the go and they have a potential to grow even high as the technology advances all the time. Africa is adopting ICTs but there is a slow economic transformation, social growth due to technology (Kayisire and Wei, 2016). There are many factors that could be considered when it comes to the adoption of technology.

According to Sadok et al. (2016), the Tunisian government is motivating its people and organisations to use ICTs in order to grow the economy of the country. It is important for the government to lay a strategic plan that could help the citizens to adopt ICTs that could improve the economy and regulation and policies that monitor and assist organisations that adopts ICT. The Malaysian government is encouraging SMEs to adopt ICT as a strategy to conduct business in an efficient manner (Jaganathan et al., 2018). Governments and development agencies from developing countries are influencing businesses to adopt ICT in order to improve the economy of their countries, the government has a huge part to play when it comes to helping businesses (Ntwoku et al., 2017). According to Hashim (2015) in Malaysia, the government assists businesses by providing resources like funding, IT infrastructure, training and fee for IT consultants.

According to Cuevas-Vargas et al. (2016), the previous investigations in developing countries show that there is an improvement in business performance if businesses adopt ICT. Akomea-Bonsu and Sampong (2012) argue that the majority of SMEs in Kumasi Metropolis in Ghana are aware of the benefits that come with the adoption of ICTs by SMEs and there is a positive impact on the SMEs that adopt ICT. The implementation of ICTs in organisations provides them with an advantage when it comes to maximising the production which in turn increases the business performance. Cuevas-Vargas et al. (2016) argue that if the organisations use ICTs as their business strategy gives them a competitive advantage when it comes to improving their work processes. The adoption of ICTs in organisations inspire innovations within and that transforms business processes (Cuevas-Vargas et al., 2016). Once the organisation adopts the use of ICTs many innovative ideas transpire, which leads to greater ideas to do certain processes and ideas to widen the customer base. Using ICT by enterprises in developing countries can help these countries to leapfrog traditional methods in order to increase production (Niebel, 2018).

According to Agboh (2015, p2), there is an existing literature that indicates that most SMEs acknowledge the benefits of the adoption of ICTs but SMEs are faced with plenty of issues that hinder them from using technology. “In order for the organisation to adopt ICTs, the business environment need to be encouraging for open competition, trust and security, interoperability and standardization and the availability of finance for ICTs” (Agboh, 2015, p2). According to Yonazi, Kelly, Halewood, and, Blackman (2012), in the Union Summit of ICT that was held

in Addis Abba in January 2010, most of the African leaders raised concerned that there is no hard evidence that proves that there is a link between investments and development outcomes.

## **2.7 ICTs in South Africa**

According to Smit (2019), South Africa is counted amongst the countries that have the worst unemployment statistics with a total of 29% unemployment rate. South Africans have a lot to do in order to improve the unemployment rate. The South African government sees ICT as a tool that can be utilized to alleviate the socio-economic change in South Africa (Department of Telecommunications and Postal Services, 2016). In South Africa, the ICT sector is divided into three sectors, the information technology, telecommunications and sub-sectors of electronics (Pillay, 2016). The major players in the telecommunication industry include Telkom and Neotel for fixed-line network and Cell C, MTN, Vodacom, Virgin Mobile and Telkom for the mobile network (Akande and Van Belle, 2014).

According to Seda (2016), most of the companies that are in the IT sector are software developers and a few provide hardware. The ICT sector is one of the important sectors in South Africa because it contributes significantly directly and indirectly to the economy of the country. According to Pillay (2016), the IT sector has been contributing significantly to the growth of the GDP of the country. South Africa's ability to compete on the global market is largely dependent on the ICT sector especially on the ability to provide the society with accessible and affordable broadband (Pillay, 2016). South Africa is lacking behind when it comes to adopting broadband compare to other developing countries even though broadband technology is mostly used by SMEs compare to fixed broadband (Gareeb and Naicker, 2015).

The major problems that are facing South Africa are the lack of infrastructure and the expensive connection. South Africa is facing a huge digital divide as the development is uneven, the urban areas have recently ICTs while rural areas have few infrastructures that can help rural areas to succeed in this economy (Pillay, 2016). Telkom as the main national telecommunication provider was tasked by the South African government to make the country connected and reduce the cost of connection by the means of using ICASA (Pillay, 2016). The adoption of internet technology in South Africa is growing at a slower rate compared to the world with approximately 5% growth yearly (Gareeb and Naicker, 2015). South Africa is struggling to



form a productivity paradox, where important ICT innovations are not adopted in time even with different businesses (Gareeb and Naicker, 2015).

“To create a vibrant ICT sector that ensures that all South Africans have access to affordable and accessible ICT services in order to advance socio-economic development goals and support the Africa agenda and contribute to building a better world” (Department of Communication, 2012). The South African government is investing a lot in improving the socio statist of the people by supporting SMEs and encouraging them to use ICT as a tool to improve their business. According to Nkosana and Skinner (2016), businesses that are in developing countries including South Africa find it difficult to compete with other organisations that are in developed countries where they have advanced ICTs. South African businesses are also trading in unequal territories due to the digital divide, businesses in urban areas have a greater chance to succeed than those businesses in rural areas. Most of the people in rural areas live in poor conditions where they lack infrastructures to uplift themselves socially and economically (Nkosana and Skinner, 2016). According to DoTPS (2016), the digital divide in South Africa endures a lot of different access between the poorer segments and the wealthy segments.

The South African government and the private sector have instantiated different ICT initiatives and projects that aim to solve poverty and social inclusion (Mbuyisa and Leonard, 2017). The ICT initiatives and projects are Khulisani ICT training project, FET.com ICT Education, Bridges to the Future-SA, Khayelitsha Minitel centre, Manguzi Wireless Internet, Thusong Service Centres (TSC), etc. TSCs offers government services like health services, education, social grants, passports and identity documents (Mbuyisa and Leonard, 2017). The South African government believes that innovations like E-learning can help the education sector to improve the learning system and that it can improve the skills of the teachers (DoTPS, 2016). ICTs like E-commerce are adopted slowly in South Africa compare to other countries that are part of BRICS (DoTPS, 2016). The South African government have been adopting E-government as the tool to make sure that the citizen has access to government services online. According to DoTPS (2016), the problem that faces most of the South Africans is that the ICT infrastructure is short, poorly located and not maintained properly.

The South African development approach has changed compared to the approaches used before 1994, the government’s, social, political approaches and economic transformation and

inclusion have also changed thus the ICT policies need to comply with the new changes (DoTPS, 2016). Implementing innovative policies can help the ICT sector to grow and produce more jobs for the people.

## **2.8 ICTs in SMEs**

ICTs have the potential to make radical changes to the business's internal processes, changing firm structures, the way firms do their operations (Giotopoulos, Kontolaimou, Korra and Tsakanikas, 2017). In the late 1990s, the US had major productivity growth than Europe, this is due to the fact that the US invested heavily in ICT. There is literature that focuses on SMEs and there is empirical evidence that ICTs have huge benefits when they are adopted by SMEs. According to Mazzarol (2015), there are a lot of opportunities that come to SMEs when they can access the digital technologies that were only available to large organisations. SMEs are able to work effectively, save costs, improve services and interaction between customers and suppliers, and SMEs are able to explore new business opportunities that explore a large marketplace and they are able to compete with bigger firms (Giotopoulos et al., 2017, Ongori and Migiro, 2013).

SMEs have been spending a lot of money implementing emerging ICTs in order to save costs in the future and enhancing the firm's performance (Chinedu Eze, 2013). Doing business on the internet accumulate minimum costs this has enabled SMEs to be involved in doing business on a global scale (Kilangi, 2012). It is easy for SMEs to adopt ICTs by taking advantage of cheap ICTs because they are flexible (Chinedu Eze, 2013). The previous literature mentions that internet technology is the ICT that is mostly adopted by SMEs (Djatikusumo, 2014). SMEs in developing countries have no choice but to adopt new ICTs in order to be competitive in their industry and worldwide (Kilangi, 2012).

**Table 2. 3: SMEs with Internet Connection in SA, 2010**

	<b>Emerging SMEs</b>	<b>Established SMEs</b>
<b>ADSL Connectivity</b>	51%	74%
<b>3G Connectivity</b>	6%	3%
<b>GPRS Connectivity</b>	2%	2%
<b>No Internet Connectivity</b>	37%	17%

**Source: (Pillay, 2016)**

The whole world is implementing policies that will help SMEs to adopt newer ICTs. The policymakers must have enough information in order to plan and implement effective policies, they must understand the determinants that shape the business decision about ICT adoption (Giotopoulos et al., 2017). ICTs are valuable when it comes to building relationships with customers and when it comes to sharing knowledge, but few people look at the conditions that facilitate the adoption and use of ICTs (Chinedu Eze, 2013). The policymakers must understand the effect that ICT adoption has on the organisation changes, business strategies, and human skills and how systems are managed.

SMEs are still facing hardship when it comes to adopting ICTs due to the limitation of resources like infrastructure, ICT skills and finances (Giotopoulos et al., 2017). Most of the SMEs in developed countries have access to different kinds of ICTs unlike SMEs in developing countries where they face more difficulties when they try to adopt and use new ICTs (Kilangi, 2012). According to Chinedu Eze (2013) the reason the SMEs struggle when it comes to adopting and using ICTs is due to the poor management, and lack of awareness due to the small size of the SMEs. The problem that SMEs face is that they look at the short-term operations of ICTs (Chinedu Eze, 2013). It is important for SMEs to look at long-term investments since the impact of ICT can be seen after a period of time (Mbuyisa and Leonard, 2017).

## **2.9 ICTs in South African SMEs**

ICTs have the potential to also uplift SMEs by providing them with a comprehensive market area (Mbuyisa and Leonard, 2015). The South African DoC strategy plan is predicated on ICTs as it believes that ICT is important for the SME's growth and the socio-economic development of the country (Mbuyisa and Leonard, 2015). According to Gareeb and Naicker (2015), in order

for SMEs to achieve their goal, it needs to be able to have a way to evaluate, interpret, synthesis and understand the available information. This is made possible by utilising some sort of ICT that can help SMEs to understand the market and how to reach the customers. Using an Internet-based ICT can assist the SME to grow and survive (Gareeb and Naicker, 2015). ICTs can help SMEs to increase their production and income generation by giving them access to the market quickly and cheap (Mbuyisa and Leonard, 2015). According to DoC (2012), South Africa is still lacking when it comes to the adoption of high-speed broadband especially in SMEs. The lack of high broadband in South Africa holds the growth of SMEs as the slow broadband result in slow services. Pillay (2016), argues that the reason that a lot of SMEs don't have access to the internet is due to the high cost of the network that is considered to be one of the highest in the world. According to DoC (2012), South Africa needs a fast and affordable broadband infrastructure as it is a creative platform to increase economic competition on the international level.

South Africa has better ICT infrastructure compared to the neighbouring countries but SMEs still struggle with similar problems as these countries (Pillay, 2016). According to Mbuyisa and Leonard (2015), most of the SMEs are moving towards using mobile devices rather than computers as their business processes because they are affordable and easy to access. SMEs are more likely to invest in ICTs that are familiar to them like websites, computers, internet, VoIP, intranets, bulk SMS, etc. According to Gono, Harindranath, and Berna Özcan (2016), the decision to adopt ICTs in SMEs usually lies in the hands of the manager/ owner only. Most of the informal businesses have less access to ICTs unlike grown SMEs have access to ICTs and they are using it as their business strategy (Mbuyisa and Leonard, 2017).

SMEs are faced with different barriers that hold them back from adopting ICTs like the lack of finances, skills, knowledge, security concern and that some applications are not suitable for SMEs (Mbuyisa and Leonard, 2015, Ismail and King, 2014). The micro-business in South Africa is more likely to fail than more established businesses due to the mentioned barriers. Informal businesses are struggling more because they have no infrastructure support and the government has no projects aimed at helping informal business (Mbuyisa and Leonard, 2015). Some of the SMEs still struggle with the network connection for the fixed-line when they are trying to adopt ICT. According to Mbuyisa and Leonard (2015), the number of fixed-line telephones has been decreasing in the decade.

Mbuyisa and Leonard (2015) argue that the average number of people who own SMEs are less educated and have less knowledge about ICTs in general, and they have no idea of the benefits that ICT brings to a business. According to the study conducted by Gono et al. (2016), most of the SMEs in the manufacturing and logistics industry lack the ICT expertise so they are usually dependent on external experts. According to Pillay (2016), most of the SMEs in South Africa have access to basic ICTs like Internet Technology, Voice over Internet Protocol (VoIP) phone service, Fax and Telephone service, E-mails and Computers. SMEs feel that it is easy and cheap to adopt these basic ICTs even though this means that these ICTs are only used for operations and they are not used as a strategy.

## **2.10 Determinants of Adoption of ICTs**

According to Macgregor and Vrazalic (2006), the important factors that influence the adoption of ICTs are socio-economic and technological aspects. Mpofu, Milne, and Watkins-Mathys (2013) argue that small hotels express that most of the time they are pressured by suppliers, competition, and top management to adopt ICTs. Gareeb and Naicker (2015), argue that the majority of SMEs in South Africa believes that the major influencing factor when it comes to adopting newer technology is relative advantage and compatibility. Manufacturing SMEs found that the increase in productivity was due to the adoption of ICTs that was influenced by suppliers and external support (Mazzarol, 2015). The financial resource was identified as an important determinant when it comes to understanding the intention to adopt an innovation (Ramayah et al., 2016). Dlodlo and Dhurup (2013) discovered that the most important determinants of intention to adopt mobile marketing technologies are relative advantage, IT capability, and top management support.

Pan and Jang (2008) argue that one of the important determinants of enterprise resource planning systems adoption in firms is organisation size. Lin (2014), found that top management support and competitive pressure are significant adoption discriminators (Wang et al., 2016). Maduku et al. (2016) also found that top management support is one of the most important determinants that influence the adoption of mobile marketing technology. According to Lin (2014), there is some empirical evidence that shows that most studies that use the TOE framework found that the important determinants of intention to adopt electronic data interchange (EDI) are financial resources, IT capability, and the regulatory environment. A

study that was conducted at firms discovered that relative advantage, external pressure, and regulatory environment are important determinants when it comes to understanding the intention to adopt e-business (Lin, 2014). Compatibility, complexity and regulatory environment are influential determinants for ICT adoption (Padilla-Vega, Snquiz-Daz, and Ojeda, 2015) .

SMEs go through a lot of different challenges that hinder them from adopting ICTs especially the newer ICTs. The most common challenges that different researchers have found is the high cost of ICTs and the lack of capacity by owners due to ignorance towards ICTs and also the lack of skilled employees to run these ICTs (Nkosana and Skinner, 2016). Mbuyisa and Leonard (2017) argue that SMEs in South Africa invest in simple ICT rather than complex ones due to the lack of skills to operate these ICTs. There are more challenges that are found in developing countries like the lack of communication infrastructure, high expenses, and lack of ICT policies to assist SMEs, skilled workers, expensive ICTs, lack of awareness, obsolete ICTs and resistance to change (Mbuyisa and Leonard, 2017, Ismail and King, 2014, Rangaswamy and Nair, 2012).

## **2.11 ICT Adoption Barriers**

According to Al-Somali (2012), a study that was done in Brazil shows that the lack of adoption of E-commerce was due to the regulations that were imposed by the government due to the concern of security and the lack of protection of consumers if they purchase products online. Different studies show that the reason for the lack of adoption is due to the rules and regulations that are imposed by the government on using ICTs (Hamade, 2009). The most notable hindrance of ICT adoption in growing nations is financial resources. A lot of SMEs don't have enough revenues to adopt ICTs that why the majority of them only adopt the low-level ICTs like emails and websites. According to Gareeb and Naicker (2015), the majority of SMEs are not adopting ICT in South Africa because the government is not providing support to small businesses. The lack of service delivery in South Africa has been an issue for many years, the South African government has put forth many policies regarding ICT adoption by SMEs, but no significant implementation has been done.

## 2.12 Theoretical Framework

### 2.12.1 Technology adoption theories

The following section is about the Information System (IS) theories that are used in studies that are about the adoption of technology. According to Al-Somali (2012), the existing literature on the studies of IS innovation and diffusion are based on different theoretical frameworks from different disciplines. “theoretical framework is a collection of interrelated concepts that can be used to direct research with the purpose of predicting and explaining the results of the research” (Molefe, 2014, p10). This section will look at the following IS theories, TAM, UTAUT, DOI, TPB, and the TOE framework.

**Table 2. 4: Technology adoption frameworks**

Approach	Influences	Source
Technology Acceptance Model (TAM) (Davis, 1989)	Perceived Credibility, Perceived Usefulness, Computer Self-Efficacy, and Customer Attitude	Awa et al. (2015)
TAM Extended	Subjective norm and customers’ trust of the Internet Banking System,	Maduku (2013)
Unified Theory of Acceptance and Use of Technology (UTAUT) (Venkatesh, Morris, Davis, and Davis, 2003)	Facilitating Conditions, Effort Expectancy, Social Influence, Performance Expectancy	Basak (2015)
Diffusion of Innovation Theory (DOI) (Rogers, 2003)	Compatibility, Trialability, Complexity, Relative Advantage, Observability	Abualrob and Kang (2016)
UTAUT2	Effort expectancy, social influence, performance expectancy, Price/value (PV), facilitating conditions, hedonic motivation (HM) and habit (H).	Oliveira, Thomas, Baptista, Campos (2016)
Technology, Organisation, and Environment (TOE) (Tornatzky and Fleischer, 1990)	Technological, Organisational, and Environmental	Tornatzky et al. (1990), Maduku et al. (2016)

### **2.12.2 Technology Acceptance Model (TAM)**

TAM is an IS theory that originated with (Davis, 1989). TAM was adapted from the Theory of Reasoned Action (TRA) of Fishbein and Ajzen (1975) in order for TAM to be used for predicting the acceptance and use of new technologies in firms. TAM is designed in such a way that it can be used to study the diffusion and acceptance of the technology innovation general (Kazi and Mannan, 2016). According to Muñoz-Leiva, Climent-Climent, and Liébana-Cabanillas (2017), TAM is considered to be one of the rich and powerful models that are used in studying the acceptance of innovation behavior. The TAM theory uses two variables known as Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) as determining the factor of user's Attitude Towards Use (ATU) of ICT.

**Perceived Usefulness (PU):** “The degree to which a person believes that using a specific system will increase his or her job performance” (Davis, Bagozzi, and Warshaw, 1989, p985). PU aims to understand how the user sees the technology when it comes to productivity.

**Perceived Ease of Use (PEOU):** “The degree to which a person believes that using a particular system would be free of effort within an organisational context” (Davis et al., 1989, p985). ATU and PU are determinants that influence the Behavioural Intention (BI), BI then influence the Actual Use (AU) of the technology. TAM has been used by many different researchers as the lens to look into the adoption of new technology (Muñoz-Leiva et al., 2017, Kazi and Mannan, 2016). TAM has its own shortcomings, it is widely criticised for the lack of focusing on only two variables PU and PEOU, which doesn't take into consideration other factors like the environment. According to Kazi and Mannan (2016), it is also criticised for the lack of guidance to practitioners on how to improve the technology innovation in order for the users to accept it. TAM is not an ideal theoretical framework to study the technology adoption at the firm level to the lack of variables that look at the influential part that is played by the organisation and the environment that surrounds the firm.

### **2.12.3 Theory of Planned Behaviour (TPB)**

TPB is an extension of the Theory of Reasoned Action (TRA), with the addition of a construct called Perceived Behavioural Control (PBC). The TPB model was first proposed by (Ajzen, 1985). TPB is a rich theoretical model that provides researchers with an informative prediction



of the new innovation adoption (Gupta, Zaidi, Udo, and Bagchi, 2015). TPB model is grounded on the idea that the best way to predict the adoption behaviour is based on the intention of the user which is influenced by Perceived Behavioural Control (PBC), Subjective Norm (SN), and Attitude Toward the Behaviour (ATB) (Montano and Kasprzyk, 2015). According to Gupta et al. (2015), TPB has been largely used in studies that aim to understand the factors that influence the intention to adopt a technology innovation by focusing on factors, Perceived Behavioural Control, Subjective Norm, and Attitude Toward the Behaviour (ATB). The TPB model's constructs pertain to factors that influence an individual's behaviour as a likelihood to adopt a technology (Montano and Kasprzyk, 2015).

**Perceived Behavioural Control (PBC):** “The degree to which the decision-maker is confident in performing the behaviour” (Weigel, Hazen, Cegielski, and Hall, 2014, p5).

**Subjective Norm (SN):** “The degree to which a decision-maker feels it necessary to behave in a manner consistent with the social environment” (Weigel et al., 2014, p5).

**Attitude Toward the Behaviour (ATB):** “The degree to which a decision-maker holds a positive attitude toward the adoption of the innovation” (Weigel et al., 2014, p5).

#### **2.12.4 Unified Theory of Acceptance and Use of Technology**

The Unified Theory of Acceptance and Use of Technology (UTAUT) model that was developed by Venkatesh et al. (2003) as the lens to understand the adoption of new technology innovation. According to Suryana (2014), UTAUT is a combination of eight previously established technology acceptance models, TRA, TPB, TAM, TAM-TPB combination, Motivational Model, Social Cognitive Theory, DOI and Model of PC Utilization. The UTAUT model is a model that was developed in order to study the adoption of technology innovation at the individual level (Suryana, 2014). There are a lot of studies that have used UTAUT as a lens to study an adoption but not all studies use all the constructs of the model (Akbar, 2013). The model consists of four core constructs and these constructs are the ones that most researchers use. These are the core constructs of UTAUT; Performance Expectancy (PE), Effort Expectancy (EE), Social Influence (SI), and Facilitating Conditions (FC). The model UTAUT also uses moderators to check if there is any influence they have towards the

relationship between the dependent variable and the independent variables. Age, Gender, Experience, and Voluntariness of Use are the moderators that are used in the UTAUT model.

**Performance Expectancy (PE):** Pertains to the level that the clients think that utilizing the information system can make the task performance better (Venkatesh et al., 2003). PE checks if the technology innovation will simply a task and do the task effective and efficient.

**Effort Expectancy (EE):** This construct is measured by the perception of how easy it is to use the new technological innovation, as well as how easy it is to learn to use it (Alshehri, 2012).

**Social Influence (SI):** Is the level of how important people thinks that he/she should utilize the new system (Venkatesh et al., 2003).

**Facilitating Conditions (FC):** “Is the degree to which an individual believes that an organisational and technical infrastructure exists to support the use of the system” (Venkatesh et al., 2003, p29). This construct aims to identify if the participant has the necessary resources to use the technology that he/she is adopting.

### **2.12.5 Diffusion of Innovation Theory**

The IS theory by Rogers (2003) known as Diffusion of Innovation (DOI) was first developed in 1962. The theoretical framework can be utilized to investigate the perception of an individual toward the adoption of the innovation by the organisation. According to Nedev (2014), DOI and TOE are the only two theoretical frameworks that can be used to investigate the adoption at the organisational level. Internal and external factors of the organisation and the individual characteristics are considered to be the core factors that influence the adoption of organisational innovation (Rogers, 2003). TOE and DOI are an important theoretical framework that investigates the different factors that affect the adoption of innovative technology in any organisation. DOI has different constructs that are used to investigate the adoption of an innovation. These are the construct of DOI, Relative Advantage, Compatibility, Complexity, Observability, and Trialability.

**Relative advantage** is the measure of how much the innovation is perceived as an improvement of the previously known idea (Rogers, 2003). There are different kinds of

measures that determine that the innovation provides a relative advantage, measures like financial benefits are important, but also convenience, gratification, and high standard are crucial measures.

**Compatibility** “is the degree to which an innovation is perceived as being consistent with the existing values, past experiences, and needs of potential adopters” (Rogers, 2003, p15). The innovation that is incompatible with the previous systems and the previous way of doing things will not be adopted quickly as the compatible system, complete change of doing things makes the adoption uneasy. If a completely new system is introduced an early version of that system is usually adopted.

**Complexity** “is the degree to which an innovation is perceived as difficult to understand and use” (Rogers, 2003, p15). The innovations that are complicated to use are usually slowly adopted while innovations that are easy to master are adopted quicker.

**Trialability** “is the degree to which an innovation may be experimented with on a limited basis” (Rogers, 2003, p16). New innovations that come as a trial first are more likely to be adopted, unlike untried innovations. Tried innovations could be tested before they are adopted, and any flows could be encountered before any commitment is made. The innovations that can be tried first give the users the chance to learn about the innovation before committing to it.

**Observability** “is the degree to which the results of an innovation are visible to others” (Rogers, 2003, p16). The innovation that has observable results is more likely to be adopted, innovation adopter feels at easy if they know the exact result of the innovation that they are acquiring.

### **2.12.6 Technology, Organisation, and Environment Framework**

The TOE theory is mostly about researching the notions that guide someone’s intentions and attitude towards adopting an innovation (Abualrob and Kang, 2016). According to Tornatzky et al. (1990), the TOE framework has been used in many instances especially in business researches. Abualrob and Kang (2016) concur that the TOE framework has been used in empirical studies where it proves to be a valid theoretical framework when it comes to explaining and understanding the intentions to adopt an innovation, it has been validated. The

following tables show different researches that have used the TOE model as the research tool in their studies.

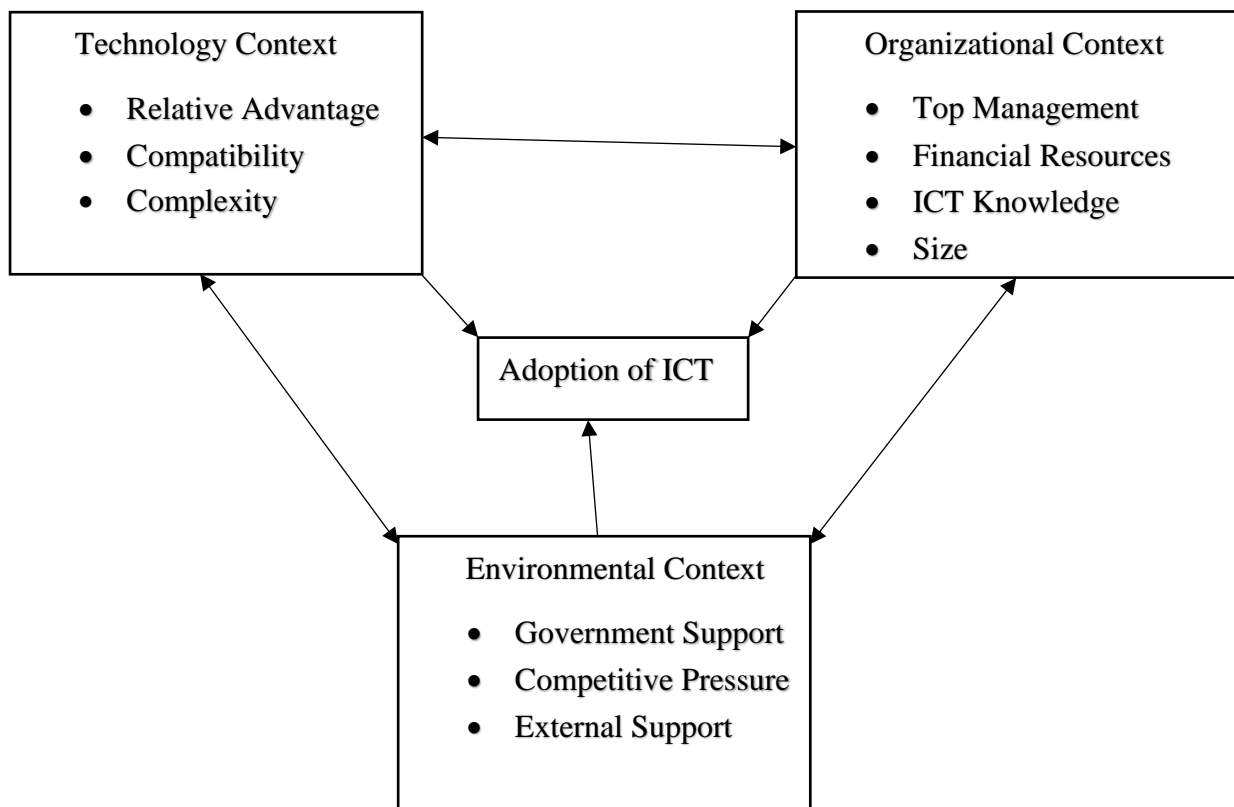
**Table 2. 5: Studies that are based on TOE model**

<b>IT Adoption</b>	<b>Analysed Variables</b>	<b>Methods</b>	<b>Data, and Context</b>	<b>Author(s)</b>
The Adoption and Impact of ICT in South African SMEs	Technology - relative advantage and compatibility Organisational – organisational readiness and owner/manager commitment Environmental – supply chain networks, ICT vendors and consultants, and government support	Kruskal-Wallis correlations, Chi-Square	130 SMEs in Gauteng and a questionnaire were used.	(Gono et al., 2016)
Accounting Information Systems	Technology – relative advantage and compatibility Organisational – organisational readiness and owner/manager commitment Environmental – competitive pressure, government support, and networking (informal factors)	Cronbach’s alpha, Composite reliability, Average Variance, Correlations and the square root of AVE.	204 SMEs in Jordan and a questionnaire were used.	(Lutfi, Idris, Mohamad, 2016.)
Broadband Internet Technologies	Technology – relative advantage, perceived ease of use, service quality and availability, compatibility, and observability Organisation – size and business, type self-efficacy, top management commitment, affordability, and motivation to use	One way Anova, Logistic Regression Analysis	123 online surveys and 88 telephonic interviews were used. South African SMEs were the target population	(Gareeb and Naicker, 2015)

	Environment – facilitating conditions resources, competitive forces, supplier forces, and customer forces			
Mobile Marketing Technology	Technology – relative advantage, complexity, and cost Organisational – top management, financial resource, and employee capacity Environmental – competitive pressure, vendor support, and customer pressure	Cronbach’s alpha, SEM, CFI, Correlations and the square root of AVE	204 SMES in Gauteng and using questionnaire	(Maduku et al., 2016)
Electronic Commerce (E-Commerce)	Technology – perceived usefulness, perceived ease of use, perceived behavioural control, and perceived service quality Organisation - scope of business operations, firm’s size, organisation mission, facilitating conditions, individual difference factors, and social influence or subjective norms Environment - consumer readiness, competitive pressure, trading partners’ readiness, and perceived trust	Not Empirical work	Not Empirical	(Awa et al., 2015)
Broadband Mobile Applications	Technology - relative advantage, compatibility, complexity, and trialability Organisation – information intensity, management support,	ANOVA, t-test, Levene’s test, Chi-square	411 SMEs and questionnaires were used	(Chiu et al., 2017)

	employee knowledge, absorptive capability Environment – competitive pressure, business partner, external supports, and government supports			
ICT Adoption and Usage	Innovation characteristics – relative advantage, compatibility, complexity, social influence Organisational characteristics – organisational location, organisational e-resources, top management support External environmental characteristics – Competitive pressure, external support, institutional intervention	CFA, multiple regression analysis, and SEM	295 questionnaires were used from Dar es Salaam, Arusha, Kilimanjaro and Zanzibar	(Kilangi, 2012)

This study will utilise the adoption framework that is known as the Technology, Organisation, and Environment framework (TOE). The TOE framework originated with (Tornatzky et al., 1990). TOE is a tool that is believed to be useful when it comes to factors that influence the adoption of the new technology by an enterprise (Oliveira and Martins, 2011a). The three aspects of the TOE framework are technology context, organisational context, and the environmental context of the enterprise. TOE framework suggests that the adoption of technology by an enterprise is influenced by the technology development, organisational conditions and, the industry environment (Kauffman and Walden, 2001, Chatterjee et al., 2002).



**Figure 2. 2: Technology, Organisation, and Environment Framework**

### 2.12.6.1 Technology context

Technology is the core aspect when it comes to the adoption of new technology. The different theoretical framework considers technology when it comes to the factors that influence the adoption of new technology innovations. Baker (2012) argues that the success of the adoption of a new technology resolute on the IT infrastructure of the organisation, employee’s technical skills of and user time. Organisations that are familiar with technology are more likely to adopt new technology. Existing technology within an organisation provides the foundation on the amount of ICT the organisation can adopt at once (Baker, 2012). The organisation with no technology can set its path in many different ways, unlike the organisation that is already using technology. It a difficult task for an organisation to do away with its current ICT trend and adopt a totally new system. Baker (2012), argues that existing technology that is not yet been used by the organisation also influences the adoption of new technology.

The existing ICTs set the limit and the direction that an organisation can take that will help them grow. For an organisation to have technology resources is not enough. Technology competency is more than just having the equipment, it is important to have innovative people who are skillful and people who can keep the organisation on top of its competitors (Metaxiotis, 2009). The technology context in this study has three variables, Relative Advantage, Complexity, and Compatibility. These are the variables that many empirical studies find that they are influential when it comes to the adoption of new technology innovation and they are the ones that are most tested by different researchers (Borgman et al., 2013, Lutfi et al., 2016).

### **Relative Advantage**

Relative Advantage is the measure of how much the innovation is perceived as an improvement of the previously known idea (Rogers, 2003). There are different kinds of measures that determine that the innovation provides a relative advantage, measures like financial benefits are important, but also convenience, gratification, and high standard are crucial measures. The relative advantage of adopting ICT by SMEs is the benefits that the business can gain by using ICT. More than a handful of researchers found that Relative Advantage is an influential factor when it comes to the adoption of ICTs (Ghobakhloo and Hong Tang, 2013, Lutfi et al., 2016, Maduku et al., 2016). Chiu et al. (2017), argue that Relative Advantage is one of the most important factors that influence the adoption of ICT in Malaysia. According to Yoon and George (2013), there are a number of studies that found that relative advantage is not significant when it comes to certain ICT adoption. The owner/manager of an SME is more likely to adopt an ICT if it will be beneficial to the business (Maduku et al., 2016).

### **Compatibility**

Compatibility “is the degree to which an innovation is perceived as being consistent with the existing values, past experiences, and needs of potential adopters” (Rogers, 2003, p15). The compatibility of newer ICT can be defined as how much is it coherent to the existing business values, culture and ICT infrastructure (Ghobakhloo and Hong Tang, 2013). The innovation that is incompatible with the previous systems and the previous way of doing things will not be adopted quickly as the compatible system, complete change of doing things makes the adoption uneasy. Borgman, Bahli, Heier, and Schewski (2013), argue that there is a significant improvement of compatibility between the software but there is still a problem when it comes to compatibility of process and data, this results in hindering the adoption of technology.



According to Ghobakhloo and Hong Tang (2013), there are studies that found that the adoption and use of ICTs like E-commerce are influenced by compatibility. A study in Malaysia on ICT adoption amongst SMEs found that compatibility is an influential determinant of ICT adoption (Chiu et al., 2017). If the top management trusts the new technology innovation and believes in the compatibility of it to the existing technology and it in line with business processes it is easier to adopt the technology (Borgman et al., 2013). Factors in technology contest are believed to be more influential when it comes to adoption of new technology innovations (Chiu et al., 2017).

### **Complexity**

Complexity “is the degree to which an innovation is perceived as difficult to understand and use” (Rogers, 2003, p15). Complexity access how difficult it is for the user to use the new ICT innovation. The innovations that are complicated to use are usually slowly adopted while innovations that are easy to master are adopted quicker. Abualrob and Kang (2016) the complexity of technology innovation can be a defining factor between adopting and not adopting technology because owners believe that complex ICTs can be risky to adopt, and they are more likely to be abandoned. A lot of people do take into consideration the complexity of the system before adopting it, as complexity can define a usable or not usable technology. Hashim (2015) found that the majority of owners of SMEs in Malaysia find ICTs to be complex. Owners/manager especially that of SMEs may feel that it costs to take employees to expensive and long training. Researchers have found that complexity is an important factor that influences the adoption of new technology innovation (Abualrob and Kang, 2016, Hashim, 2015).

#### **2.12.6.2 Organisation context**

Organisational aspects are about the defining determinants of the organisation such as organisation size; the centralisation, financial resources, organisation’s ICT knowledge, and top management support; communication channels and decision making (Angeles, 2014). Chau and Tam (1997, p35), argue that “organisational context is part of the structure and processes of an organisation that influence the adoption of technology and its implementation”. Top executives are the ones that champion the changes in the organisation, they hinder progress or encourage the adoption of technology (Angeles, 2014). The management decides what technology the organisation can adopt, and they also provide the finances for the adoption of ICT that is why top management is a crucial player that contributes significantly to adoption

of ICT. The scope and size of an organisation are important determinants that influence the adoption of technology (Rogers, 1995, Tornatzky et al., 1990).

### **Top Management Support**

In SMEs owners/managers are important figures in the firm since they are the ones who take major decision unlike in big organisations. Djatikusumo (2014), argues that in SMEs it is very important to have managerial support since strategies and organisation objectives are strongly influenced by the owners/managers of the firm. The most important benefit of having top managerial support is that it promotes a conducive, supportive, fertile environment by providing the necessary resources to achieve successful ICT adoption and use (Djatikusumo, 2014, Maduku et al., 2016, Borgman et al., 2013). If top management in SMEs seeing the potential benefits of using new ICTs and the risks are minimum, then there is a high possibility of adopting the new ICT (Ghobakhloo and Hong Tang, 2013).

Ghobakhloo and Hong Tang (2013) argue that in most cases the top management in developing countries is more likely to be reluctant to adopt new ICTs like e-commerce and cloud computing. There is a positive association between the top management support and the adoption of cloud computing (Borgman et al., 2013, Chiu et al., 2017). There are many studies that have found that top management support is the important variable that is a key when it comes understanding the firm's behaviour towards the adoption of a new ICT innovation (Wang and Lai, 2014, Ramayah et al., 2016, Maduku et al., 2016).

### **Financial Resources**

“Financial resources refer to the availability of capital for investment in technology innovations, for implementation of subsequent changes, and coverage of ongoing expenses during usage” (Nguyen and Petersen, 2017). Brook et al. (2014), argue that the cost of implementing new ICTs has changed significantly in recent years due to innovations like cloud computing where an organisation doesn't have to buy an intensive infrastructure but can just rent a service. This is an important innovation that can help a lot of businesses to work efficient and effective but there are still those SMEs who still lack financial resources and who feel that cloud computing services are not compatible with their processes. The lack of financial resources is a common problem with SMEs because they don't have effective organisational governance and their ICTs are ineffective (Djatikusumo, 2014).

Previous studies have shown that SMEs in countries like Indonesia are financially incapable to adopt and use the ever-changing ICT innovations (Djatikusumo, 2014). In the study conducted by Mpofu et al., (2013), in South African tourism SMEs the majority of businesses argue that lack of finances is the major reason they don't adopt new ICTs. Findik (2013), argues that SMEs that have advanced financial resources are more likely to adopt new ICTs at an early stage, unlike the ones who lack resources. The literature in the adoption of ICTs suggests that the adoption of new ICTs is more likely to be influenced by the availability of financial resources (Nguyen and Petersen, 2017). According to Aljowaidi (2015), any introduction of a new innovation must have adequate financial resources in order for it to succeed. The owner/manager allocation of financial resources for the adoption of an innovation is considered an important influential factor. In studies of adoption of cloud computing, e-commerce, ICTs financial resources is an important factor that influences the adoption (Nguyen and Petersen, 2017, Aljowaidi, 2015, Taruté and Gatautis, 2014).

### **ICT Knowledge**

It is important for SMEs to have prior knowledge about any ICT before considering adopting it (Findik, 2013). Alshamaila (2013) argue that a small portion of SMEs has adequate ICT platforms and have the employees that have the necessary ICT knowledge that can help them to adopt new ICT innovations. Findik (2013), argues that firms that have ICT knowledge and experience are more likely to adopt new ICT innovation. The ability of a firm to adopt the new innovation lies in the ability of the employee's ability to use their existing ICT knowledge (Hung et al., 2016). The organisation that contributes to the growth of the employee's ICT skills and encourage sharing of ICT information within the organisation is more likely to adopt new ICTs (Aljowaidi, 2015).

In history, SMEs are known for the lack of technical skills and ICT knowledge (Nguyen and Petersen, 2017). Taruté and Gatautis (2014), argue that studies that aim to understand the relationship between ICT adoption and ICT knowledge found that there is a positive impact to have ICT knowledge when it comes to the adoption of an innovation. ICT knowledge is a significant factor for the adoption of new ICT and the lack of ICT knowledge can result in the slow adoption processes of e-commerce (Alanezi and Brooks, 2014). Firms that have access to an expert that has ICT knowledge are found to be more likely to adopt new ICTs.

## **Firm Size**

The firm size can be measured by the number of employees, revenue turnover and capital investment (Al-Somali, 2012). The opportunities that are available for businesses in our days are no longer restricted to business size, different size of businesses is now competing for the same opportunities. ICTs like the internet have played a vital role for the different firms to compete with the aid of ICTs like E-commerce (Al-Somali, 2012). Different studies have found that firm size is an important determinant of new ICT adoption (Lin, 2014). According to McKinnie (2016), large organisations are more suitable to adopt new ICT because they can commit financially on and innovation and they have the necessary resources for adoption.

In the previous studies there is evidence that shows that among the most investigated determinant of ICT adoption, firm size is one of the frequently investigated determinants (Hameed, Counsell, and Swift, 2012). According to Nguyen and Petersen (2017), the researcher usually finds that there is a significant relationship between firm size and ICT adoption. Isma'ili et al. (2016), argue that SMEs are usually characterized by the lack of financial resources and lack of IT experts. SMEs are better suited for adopting new ICT because they are flexible and they can adjust quickly unlike big organisation due to the fact that big organisations are not agile (Nguyen and Petersen, 2017, Kilangi, 2012). According to Hameed et al. (2012), even though a lot of researchers have studied the relationship between firm size and ICT adoption there is inconclusive evidence on the effect of size. There is a general notion that states that the size of the firm is related to innovation adoption positively (Kilangi, 2012, Rogers, 2003).

### **2.12.6.3 Environmental context**

“The environmental aspect looks at the elements of the structure of the industry, service providers of the technology and the environment regulations” (Baker, 2012, p6). Tornatzky et al. (1990) argue that mature and declining industries are less likely to adopt new technology while organisations that are in the fast-growing industries are more likely to adopt technology rapidly. Fast-growing industries adopt technology in order to maximize production and minimise worker especially if it costs to pay them. Competing organisations are pressured to adopt new technology so that they can stay in front of their competitors (Tarafdar and Vaidya, 2006). Regulators also define if an organisation can implement certain technologies to meet certain criteria or not (Angeles, 2014).

Most of the SMEs are developed in such a way that they interact with order businesses, family, industry, and government these factors could be influential when it comes to adoption of new ICT (Chinedu Eze, 2013). Previous studies have found that determinants like individuals, government, IT experts, and competition can push SMEs to adopt ICTs (Chinedu Eze, 2013, Raza et al., 2018). The environmental context has a different kind of pressure when it comes to the adoption of ICT, like the external pressure, competitive pressure, trading partners and government support and the uncertainty of the market (Aljowaidi, 2015). In order for the firm to be able to adopt new ICT successfully, it needs to make sure that it can integrate the external and internal pressure (Aljowaidi, 2015).

### **Government Support**

According to Dahnil, Marzuki, Langgat, and Fabeil, (2014), the important determinant of ICT adoption in the environmental context is government support to SMEs. Most governments in the world understand the importance of helping SMEs to reach great heights, this is why the support of government is important for SMEs as they also lack the necessary resources to adopt ICTs within their businesses. Government support is one of the important determinants that influence the adoption of cloud computing (Lee, Elbashir, Mahama, and Sutton, 2014). Agwu and Murray (2018), argue that the Nigerian government has policies that aim to assist most SMEs with the adoption of e-commerce. There is a delay in the implementation of ICT regulations in most developing countries Findik (2013), this causes the development of these countries.

Previous researches show that there is a lot of talk about the involvement of government on building and sustaining SMEs but there is a lack of empirical evidence of the influence of government on ICT adoption in developing countries especially in Africa (Chinedu Eze, 2013). In developing countries like the UK, there are initiatives that show the government involvement in influencing the adoption of ICT by SMEs like the case where they set up a deadline for the adoption of ICT so that they could be early adopters (Chinedu Eze, 2013). In this case, it is clear that the government is a vital influential determinant of ICT adoption in the UK.

According to Kilangi (2012), the government plays an important part as a support system for SMEs by providing rules, regulations and support that helps to guide SMEs to success through different organisations like Small Industries Development Organisation (SIDO). Different

countries have come up with policies and regulation that aims to help SMEs to succeed in their business and the government had opened different organisation that works to better SMEs. The private organisations, government, and different agencies are working towards the adoption of ICTs by SMEs in such a way that they even providing businesses with infrastructure and IT support in order to influence the adoption and use of ICTs (Kilangi, 2012). The government is in the best position in influencing SMEs to adopt or reject an ICT innovation by imposing rules and regulations on the adoption (Kilangi, 2012). Any organisation that wants to adopt ICTs like cloud computing must be familiar with the government rules and regulations of using such technology. Alshamaila (2013), argues that the growth of the adoption of cloud computing may force the government to review its policies in order to improve the adoption among SMEs.

### **Competitive Pressure**

“Competitive pressure is the pressure that comes in from the industry’s competitors and places top managers in a position to be concerned about being perceived, amongst their peers, as lagging behind their competitors or suffering financial losses” (Mellat-Parast, 2015, p11). According to Awa et al. (2015), competitive pressure plays a role when it comes to the adoption of ICTs, but they are not very important factors that influence adoption. In industries with high competition, it is important to be ahead when it comes to the adoption of ICT in order to rip the advantage of using ICT (Yoon, 2012). Competitive pressure is an important factor that is influencing the adoption of new ICT (Hameed et al., 2012). If a firm is under pressure from the competition they are more likely that it will adopt the technology that the competition is using in order to be competitive (Alatawi et al., 2012, Yoon, 2012).

Most of the researchers found that competitive pressure is mostly perceived as having a positive influence when it comes to the adoption of ICTs and is considered to be the main influence (Ismail and King, 2014). A study by Malak (2016), revealed that there is a relationship between the adoption of cloud computing and the competitive pressure. This is also echoed by other researchers that found that competitive pressure is an influential determinant of ICT adoption (Cavusoglu et al., 2015). Gascó et al. (2018) argue that competitive pressure drives firms to adopt e-procurement in order to stay ahead of their competition. The competitive pressure can be seen mostly in developed countries that are using advanced ICTs (Chiu et al., 2017).

## **External Support**

The external support is a significant determinant that influences the adoption of e-procurement and enterprise system, but the external support has proved to be more complicated for the vendors (Chiu et al., 2017). According to Awa et al. (2015), external support is an important determinant that defines the actual adoption of ICT. According to Ifinedo (2012), in the study of e-business adoption, the researcher found that external support is one of the key determinants of e-commerce adoption. The importance of external support is so relevant in such a way that the lack of it can result in the failure of the adoption of technology innovation (Yang et al., 2013). The studies in the adoption of ICTs by firms shows that external support is an influential determinant when it comes to the adoption of ICTs (Ismail and King, 2014). IT vendors are important role players that are known as external support that provides assistance to the firms (Ismail and King, 2014). A lot of researchers argue that the assistance that is provided by the vendor close the gap of lack of IT experts within the SMEs. Ismail and King (2014) argue that external support is very important to SMEs especially when the firms are not familiar with the new ICT innovation.

## **2.13 Chapter summary**

This chapter reviewed the literature about SMEs and the adoption of different ICTs in the world and it focused on developing countries in Africa, South America, and Asia. The main focus was in countries that have a similar economic stance like South Africa. This chapter also looked at different ICTs starting from the old ICTs to newer ICTs that are most used in the new age. This section also looked at the definition of SMEs around the world, with the notable literature finding being that the definition of SME is somehow similar, the number of employees and the revenue is used as a definition. This chapter further looked at the different types of Technology acceptance theories, with the focus on Technology, Organisation, and Environment Theoretical Framework. The following chapter looks at the methodology that the researcher followed as a guideline to do quantitative research.

## **CHAPTER 3: RESEARCH METHODOLOGY**

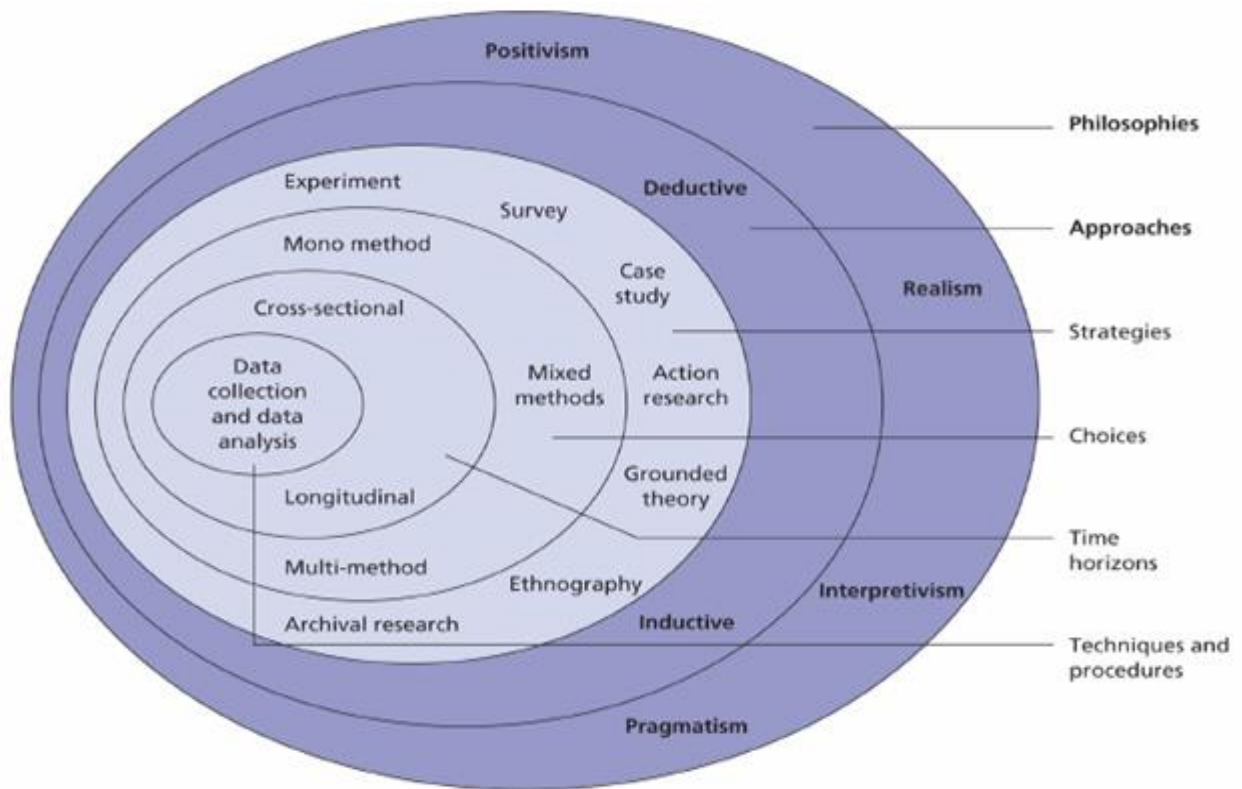
### **3.1 Introduction**

In this chapter, the researcher looks at the methods that were applied to answer the research questions about the determinants that influence the adoption of ICTs by the SMEs in Pietermaritzburg. In this chapter, the researcher discusses the roadmap that was followed as a guideline on how to conduct the study. The study followed the research ‘onion’ method and the researcher chose different methods that help to answer the questions that are posed by the study. The researcher elaborates on the following ‘onion’ segments, research philosophy, research approach, research strategy, choice, research time horizon, and data collection and data analysis. This chapter also looks at the ethical consideration and the pilot study of the research. It further discussed the research instrument and the process used to choose the sample size. The analysis is also discussed, the different tests that the study aimed to do in order to answer the research questions.

### **3.2 Research Design**

The research design looks at the guidelines on how the researcher went about answering the research questions (Saunders, 2011). It gives an elaborate plan on what to do and how to do it in order for the study to provide the appropriate findings to the research questions. According to Saunders (2011, p213), “the research design is chosen based on the researcher’s preferences, the research philosophy, and the ideas about the most appropriate strategy and choices of the methods for the study”. This study is a descriptive study, a descriptive study can be explained by three points, describing, explaining and validating the research findings. According to Al-Somali (2012), a descriptive study is usually conducted when the researcher aims to discover relationships between variables. This study was conducted following a framework called “research onion” (Saunders, 2011). The following figure 3.1 is of the “research onion”, it shows layers that could be applied in order to answer the research questions. There are different paths that could be chosen, it depends on the questions that are posed by the study.





**Figure 3. 1: Research ‘onion’ (Saunders, 2011)**

### 3.3 Research Philosophy

According to Khan (2014, p214), a paradigm is “a set of values and techniques which is shared by members of a scientific community, which act as a guide or map, dictating the kinds of problems scientists should address and the types of explanations that are acceptable to them”. The research paradigms are founded on three features, epistemology, ontology, and methodology (Punch, 2013). Epistemology is about the assumption of valid knowledge and on how the researcher gathers the knowledge (Eriksson and Kovalainen, 2015). There are four epistemologies that are mainly used in different studies when it comes to Information Systems studies as a guideline namely, Positivism, Interpretivism, Pragmatism and Realism research paradigm. The study used the Positivism paradigm as its research method.

#### 3.3.1 Realism

Realism assumes that there is a reality, which exists independently of human beliefs or thinking. In the core of realism, there is a belief that whatever the senses feel is the truth (Saunders, 2011). Realism is a part of epistemology that has similar characteristics of that of positivism, in such a way that they both follow a scientific method when it comes to developing

a study. The researcher must individually interpret that investigation phenomenon in order to understand larger social structures or effects (Saunders, Lewis, Thornhill & Bristow, 2015). Realism is characterised into two types, the first type is known as direct realism and the second type is called critical realism. *Direct realism* states that what your senses tell you about the world is true (Saunders, 2011). “While *critical realism* argues that what we experience is not the actual thing but the images of the things in the real world” (Saunders et al., 2015, p214).

### **3.3.2 Interpretivism**

“Interpretivism emphasises that humans are different from physical phenomena because they create meanings” (Saunders et al., 2015, p215). Interpretivism contends that people and social worlds can't be considered similarly as physical phenomena and that in this manner social sciences research studies should not be the same as natural sciences as opposed to copying the last mentioned (Saunders et al., 2015). Interpretivism is about interpreting people and their different circumstances and understanding them through the view of their social life. The purpose of interpretivism is to propose new, deeper understandings and renditions of the social world and contexts (Saunders et al., 2015). It is important for the interpretivism philosophy for the researcher to adopt an emphatic position (Saunders et al., 2015). The researcher must be one with the subject, the researcher must understand the subject background, circumstances, and their point of view.

### **3.3.3 Pragmatism**

“Pragmatism asserts that concepts are only relevant where they support action” (Saunders et al., 2015, p217). Pragmatism attempts to accommodate both objectivism and subjectivism, reality and values, exact and in-depth knowledge and different contextualised experiences (Saunders et al., 2015). It does this by considering theories, concepts, ideas, and hypothesis and research findings not in an abstract form, but in terms of their practical consequences in specific contexts. Pragmatist research starts with a problem and aims to contribute practical solutions that inform future practice. According to Saunders et al. (2015, p217) “if the research problems don't suggest unambiguously that one particular type of knowledge or method should be adopted, this only confirms that pragmatist's view is perfectly possible to work with different types of knowledge and methods”. Pragmatist understands that there are many ways to interpret the social world and there are different methods that can be applied to interpret the world, but

that doesn't mean that pragmatist uses all methods, but the pragmatist applies the relevant and accurate method to the problem.

### **3.3.4 Positivism**

“Positivists believe that reality is stable and can be observed and described from an objective viewpoint without interfering with the phenomena that are being studied” (Myeko, 2014, p14). The positivist paradigm should be conducted without the influence of the researcher and the result must be able to be duplicated by someone else in a similar situation. According to Chilisa and Kawulich (2012), positivism is founded on the perspective that science is the basis of the truth. Positivists believe that everything in existence can be explained by science. “It holds that the methods, techniques, and procedures used in natural science offer the best framework for investigating the social world” (Chilisa and Kawulich, 2012, p112). Positivism typically applies the scientific method to study human actions. The positivist Paradigm accentuates that Genuine, Empirically, Real and Factual happening could also be explained by the method for clear Investigation and Analysis (Aliyu, Bello, Kasim & Martin, 2014) .

### **3.4 Deductive and Induction Approach**

The deductive approach constitutes the development of the theory which must be tested thoroughly (Saunders, 2011). The deductive approach is based on legit reasoning that is impossible to reject its premises. The researcher deduces the hypothesis of the research based on the theoretical information that is available of the current study (Saunders, 2011). The hypothesis that is formulated by the research must be researchable. The researcher must then translate the hypothesis into operational terms (Saunders, 2011). This means that the researcher needs to specify how data can be collected in relation to the concepts that make up the hypothesis. The last steps of revision of theory involve a movement that is in the opposite direction from deduction (Saunders, 2011). It involves *induction* as the researcher deduce the implications of his/her finding for the theory that prompted the whole exercise. The results are fed back to the stock of the theory and the research results are affiliated with a certain field. This study followed the deductive approach as it aims to find solutions to the objectives that were created from the available theoretical information.

### **3.5 Strategies**

According to Saunders (2011), a research strategy is a guideline that assists the researcher in strategies to use in order to reach the research goals. There are different strategies that could be used when the study is being conducted. “There are seven strategies that are found in Saunders’s “onion research” that could be used to collect data namely, Experiment, Survey, Case Study, Action Research, Grounded Theory, Ethnography, and Archival Research” (Saunders, 2011, p220). This study uses a survey as the data collection strategy. The survey is usually used when the research is using a deductive approach. According to Saunders (2011), survey strategy is usually used for management and business approach which usually exploratory and descriptive research.

### **3.6 Choice of Methods**

There are different options that the researcher can choose to use for the data collection method as a mono-method, mixed-method and multiple methods. The mono-method is where the researcher chooses one method to collect data and also uses a corresponding analysis procedure. The mixed-method is used when the researcher chooses to use the qualitative and quantitative methods to collect data and different analyses are also used (Saunders, 2011). Multiple methods are utilised when the researcher applied multiple data collection methods and multiple analysis procedures are applied. The researcher utilised the mono method to collect data and then use the analysis that answers the research questions. The researcher only used the questionnaire for data collection and the questions are closed-ended questions that correspond to a quantitative research method.

### **3.7 Time Horizons**

According to Saunders (2011), the research may be constrained by time and this kind of research is known as a cross-sectional study. There is research that is longitudinal, this research can be carried out for a longer time frame. This study used cross-sectional because of the time constraint. The cross-sectional study is about determining the characteristics of the group, the researcher chooses a topic, determines the population and select the sample then contact the respondents to acquire the information that is needed for the research (Ranjit, 2011).

### **3.8 Research Approach**

According to Saunders (2011), research methods are used by researchers as a means to gather the data that the researcher can use to answer the question that the study aims to solve. The research can follow a Quantitative method or Qualitative method. In some cases, the research can use both research methods.

#### **3.8.1 Qualitative Approach**

The qualitative approach is mostly about focusing on the data that isn't quantifiable, it focuses on things like descriptions, opinions or observations (Nedev, 2014). A qualitative approach usually uses interviews or a questionnaire with open-ended questions which enables the researcher to collect non-numeric data.

#### **3.8.2 Quantitative Approach**

The study used the quantitative approach as its fundamental approach. Quantitative studies have the rigorous and coherence advantage that is important for tending to the measurements and internal consistency that support the adoption of ICTs by the SMEs (Dlodlo and Dhurup, 2013). The quantitative method is used when the study opts for the deductive approach. The quantitative method is statistically based, it aims to provide the answer to the research hypothesis or objectives that the researcher aims to prove or disprove. "A research approach chosen should be done according to the research questions in that particular situation since each approach has its own merit and demerit and how empirical data is collected and analysed" (Yin, 1994, p78). The quantitative approach uses statistics and mathematics to analyse the data. Using the quantitative approach gives the researcher an opportunity to conduct a study on a wider sample. This enables the researcher to generalize the results that will be discovered during the study (Fitzgerald and Howcroft, 1998). "Quantitative researchers measure variables on a sample of subjects and express the relationship between variables using effect statistics such as correlations, relative frequencies, or differences between means; their focus is to a large extent on the testing of theory" (Bebli, 2012, p37).

### **3.9 Research Techniques and Procedures**

The research study used a survey strategy to collect data, survey strategy is mostly used when the research uses a deductive approach. The research questionnaire used closed-ended questions as the means to collect data since the study used quantitative research. The

questionnaire used questions from previous research studies. The questionnaire consists of simple and understandable questions that enabled the respondents to have a clear understanding of what is required. The research questionnaire has seven pages. Page one of the questionnaires consist of information of the researcher and information about the study, the researcher explains the topic and the privacy, and the confidentiality of any information received from the participant. A second page is a consent form that had to be duly signed by the participant before attempting to fill the questionnaires. There is a section which collected demographic data about the participant and information about the organisation. All the sections in the questionnaire preceded with detailed instructions on how to supply answers to the questions. There are four sections that used a five-point Likert Scale. The Five-Point Likert scale is rated from "strongly disagree" (1) to "strongly agree" (5). The respondents had to tick the degree they disagree or agree with the provided statements. The following section aims to provide an elaborate design of the research instrument.

### **Section A**

Section A of the research questionnaire is about the socio-demographic information about the participant. This section starts from question 1 to question 4. This section asked for the participant's name, gender, age group, and education level.

### **Section B**

This is section enquires about the participant's company, from question 5 to question 8 the participant needed to give information about the company. It also asks about the participant's experience with ICT.

### **Section C**

Section C is about answering questions that are based on the TOE theoretical framework. It begins with questions that are under Technology Context. It starts from question 9 to question 16. These questions are about Relative Advantage of using ICTs, it looks to determine if the use of ICT will give the company a relative advantage. Starting from question 17 to question 21, the researcher aimed to determine if the participant perceives that using ICT is complex. Question 22 to question 27, these questions aimed to determine the compatibility of ICTs with the way that the company conducts its business.

The second part of section C is an Organisational Context, it starts from question 28 to question 43. Starting from question 28 to question 32 it asks about questions that are about the top management of the organisation. These questions aimed to determine if the top management is supportive of ICT adoption by the organisation. Question 33 to question 37 are about financial resources, it means to find out if the firm has enough resources for the adoption of ICTs. From question 38 to question 43, this part aimed to determine the IT Knowledge of the firm staff. It aimed to determine the knowledge that the staff has of the ICTs that are available.

The third part of section C is an Environmental Context, it starts from question 44 to question 60. Starting from question 44 to question 47 it asks about questions that are about Government Support. These questions aimed to determine if the government gives support to SMEs for the adoption of ICTs. Question 48 to question 53 are about Competitive Pressure, it aimed to find out if the firm is getting any pressure from competing organisation for it to adopt ICTs. From question 54 to question 60, this part aimed to determine the External Support for the firm. It aimed to determine that the firm gets enough support from external entities that provide ICT resources.

Starting from question 61 to question 70 this part aimed to understand the barriers that hinder SMEs from adopting the ICTs.

## **Section D**

Section D is the last section of the questionnaire, from question 71 to question 73 these questions aimed to determine the intention of the participant to adopt ICTs. Question 74 is a Logistic question that has two answers, yes or no, this question aimed to find out if the participant is planning to adopt ICT or not.

### **3.10 Questionnaire Design and Development**

Developing a questionnaire is more than just drawing up questions (Giesen, Meertens, Vis-Visschers, and Beukenhorst, 2012). There are six different steps that need to be followed in order to develop a research questionnaire. These are the steps that need to be followed:

- **Conceptualisation and research design**
- **Questionnaire**
- **Testing**
- **Revision**

- **Data collection**
- **Process monitoring and evaluation**

### **Conceptualisation and research design**

The conceptualisation of a questionnaire is about defining the subject and variables that the researcher needs to measure (Giesen et al., 2012). The process of conceptualisation must lead to concrete quantifiable concepts (Giesen et al., 2012). These quantifiable concepts are known as indicators. Indicators must be in line with what the research questions aim to answer.

### **Questionnaire design**

“A textual version of the questionnaire is compiled and formatted in the questionnaire design and construction phase” (Giesen et al., 2012, p10). In this step, the researcher must format the questions in a logical manner so that the respondent must find it easy to understand. The font style and font size must be consistent and easy to see.

### **Testing**

It is important to test the questionnaire in order to see if there aren't any errors or unclear questions. There are a lot of things that need to be tested in the questionnaire. There are different tests that the researcher can apply. There is informal testing, where the researcher can go through the questionnaire and check for any inconsistency. There is also an expected review, where a supervisor can test the questionnaire. A pilot study is also valuable since it tests how the questionnaire is received and understood by the participants. The pilot studies further test if the questionnaire is valid and reliable, these tests are done by a statistician.

### **Revision**

The revision is done when the questionnaire has been tested and there are certain issues that the researcher needs to fix, e.g. questions grammar, the format of the questionnaire. After revision, the questionnaire must be retested to make sure that it is in good condition, with no errors and is ready to be deployed.



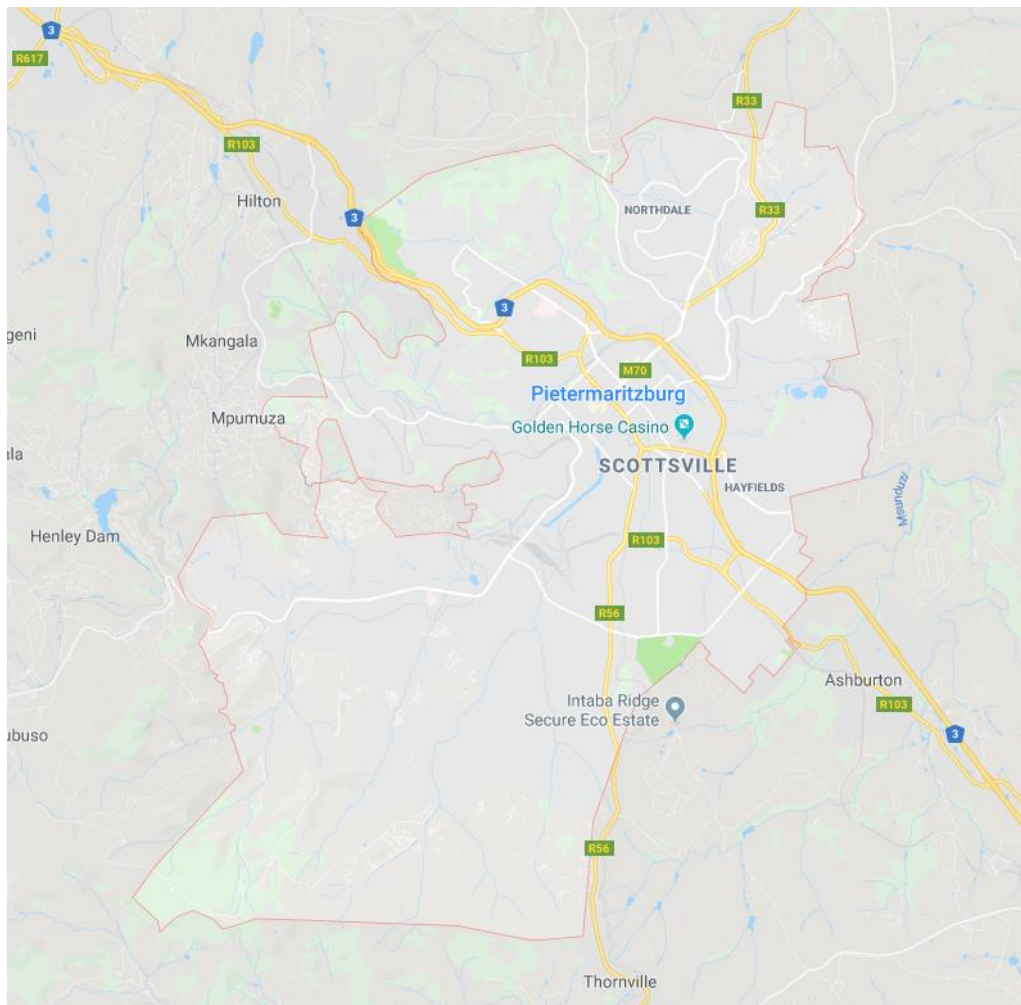
## Data collection

Data collection is implemented when the questionnaire is ready, and the data collection can begin. The collection of data can happen in various ways. The researcher visited each and every participant in their businesses and ask them to participate in the study.

## Process monitoring and evaluation

The questionnaire needs to be monitored especially newly developed questionnaires. Monitoring the questionnaire helps in the case where there is an evaluation of a questionnaire necessity (Giesen et al., 2012).

## Study Site: Pietermaritzburg Map



**Figure 3. 2: Source google map**

This study took place in KwaZulu-Natal (KZN), with the research focus in Pietermaritzburg. KwaZulu-Natal is the second largest province in South Africa, it consists of different cultures,

but it is mostly dominated by Zulu people. KZN has the second-highest profit turn-over (Seda, 2016). Pietermaritzburg is the capital city of KwaZulu-Natal, Pietermaritzburg has different townships which mostly consist of unregistered SME's and there are notable businesses within the Pietermaritzburg Central Business District (CBD) that consist of many different registered SME's. Pietermaritzburg CBD consists of different businesses that specialise in various services and trade different stuff. These businesses are owned by different people from different backgrounds and cultures. The study site is ideal when it comes to understanding different industries' perspectives when it comes to the adoption of ICTs.

### **3.11 Target population**

The target population for the research focused on the managers, supervisors, owners, marketing department and IT specialist of SMEs in KwaZulu-Natal. The research was mainly focused on businesses in Pietermaritzburg. Many businesses fall under the classification of SMEs in South Africa and these businesses play an important role in the economy of the country.

### **3.12 Sampling techniques and sample size**

Sampling techniques assist the researcher in reducing the quantity of the data that needs to be gathered by only looking at a representative group of the population (Saunders, 2011). This study uses a sample of businesses in order to save time and resources. According to Saunders (2011), there are two sampling techniques that a researcher can consider when it comes to sampling, namely a Non-Probability and Probability sampling. The research used a Non-Probability technique which is also known as a judgment and convenience sampling technique since the target participants were visited during the working hours, there was a possibility that another potential participant was busy with their jobs which hindered them from participating in the research. By selecting a sub-group of the population, the researcher chose alternative participants until reaching the desired number of participants.

The study used Structural Equation Modelling (SEM), which usually works well when the sample size is large. According to Kilangi (2012), the big sample size is able to give static results that can be replicated. Green and Salkind (2016) state that the recommended minimum sample size for SEM is 200. A value of 200 or more produces favourable results for SEM. To determine the sample size the researcher used a population of the businesses of 533 SMEs within Pietermaritzburg with a 5% margin of error, 95% confidence of level, and the 50%

response distribution, this gave the researcher a minimum sample size of 227 SMEs. The population size was provided by the Msunduzi Municipality which manages the SME's within the city of Pietermaritzburg.

### **3.13 Data Collection Procedures**

There are a few different ways that a questionnaire can be administered e.g. emails, posts, websites, telephone, and personal delivery. This study used personal delivery since it is most effective, and it gave the researcher assurance about people that were willing to participate. The researcher delivered the questionnaire to participants during business hours. This enabled the researcher to clarify any issues that arise during data collection. If the participants were willing to participate in the study then, a participant was given a self-administered, structured questionnaire. The questionnaire has a short explanation of the research purpose and objectives. The participant had to fill his/ her demographic information then he/she can fill up the second section. The second section consisted of general questions about the Organisation. The third section consists of questions about ICT adoption, that were guided by the TOE framework, the participant had to choose an answer by ticking the box that describes their understanding towards that given statement.

### **3.14 Data Quality Control**

#### **3.14.1 Reliability**

Reliability is about making sure that the data collection methods and analysis procedures will yield consistent results (Saunders, 2011). According to Bebli (2012), reliability tests aim to measure the consistency of the research instrument, it further measures the stability of the instrument. Consistency measures how much intent the research instrument measures the model and the conceptual framework. Cronbach's alpha was used as a measuring method for the reliability of the framework's constructs. "Cronbach's alpha is a coefficient that indicates how well the items in a set are positively correlated to one another" (Al-Qeisi, 2009, p254). The research instrument is believed to be reliable if similar results are found by different researchers who are researching a similar phenomenon. According to Bebli (2012), Cronbach's alpha value is between 0 and 1, a value that is close to 1 is considered to be having a high internal consistency.

### 3.14.2 Validity

Validity is defined as “The ability of a scale or measuring instrument to measure what is intended to be measured” (Bebli, 2012, p14). Validity is used to measure if the results are exactly what they seem to be about (Saunders, 2011). The researcher must measure the validity of the data to make sure that the questionnaire measures the variables of the theoretical framework. The validity test is about testing if the research instrument measures exactly what it aimed to measure. According to Hardy and Bryman (2004), there are different types of validity tests that could be used in research studies, namely, context, face, construct, concurrent, and predictive validity.

- **Context validity** aims to measure if the variables and questions measure all the aspects of the research questions.
- **Face validity** checks that the questions and variables are related to the objectives of the research.
- **Construct validity** evaluates the degree in which the measuring instrument evaluates the model construct it is created to measure.
- **Concurrent validity** checks if the measurement is created to figure out the current ability or performance of the participant.
- **Predictive validity** checks if the measurement is created to estimate the future performance of the participant.

There are different ways that the context validity of a model could be measured, this study used the Structural Equation Modelling (SEM) to measure the validity of the theoretical framework. The research also went through all the above-mentioned validity tests as the assurance of making sure that the instrument is valid.

### 3.15 Data analysis

The data that the researcher gathered through the use of a questionnaire from the field was recorded using Microsoft excel then transferred to a Statistical Package for Social Science (SPSS) application. SPSS is the tool that was utilised to analyse the data that was collected from the field. The analysis began by doing a descriptive analysis then the researcher measured the reliability of the constructs using Cronbach’s alpha as the testing method. Cronbach alpha was testing for the internal consistency of the constructs. The Kaiser-Meyer-Olkin (KMO) and

Bartlett’s test was also conducted. The KMO and Bartlett’s test measures the collected data adequacy before the factor analysis is being conducted (Statistics-How-To, 2016). The accepted KMO value starts from 0.8 to higher value.

The data was then analysed using the statistical techniques, multiple regression analysis was used as part of the model analysis, while the analysis of variance helped to compare the results with the participants’ demographic characteristics. Structural Equation Modelling (SEM) is the method that was used to determine if the model is valid. This is important since the model is applied in a different setting and it is modified in such a way that it accommodates the study of businesses in South Africa. According to Hox and Bechger (1998, p58) “structural equation modelling provides a very general and convenient framework for statistical analysis that includes several traditional multivariate procedures, for example, factor analysis, regression analysis, correlation and etc”. SEM was then used to measure the Model Fit.

**Table 3. 1: Data Analysis methods**

<b>Objective</b>	<b>Data Analysis Methods</b>
Descriptive Statistics	Mean, Standard Deviation, Data Trend
Reliability Test	Cronbach Alpha
Normality Test	Kolmogorov – Smirnov’s Normality
Sampling adequacy	KMO & Bartlett’s
Validity Test	Structural Equation Modelling
Objective Testing Using Correlation Analyses	Pearson Correlation, Multiple Regression Analysis

### **3.16 Ethical Consideration**

Cooper and Schindler (2014) define ethics as standard conduct of how people guide their moral choices when it comes to the behaviour and associations with other people. According to Saunders (2011), ethical consideration is generally about ethical issues that the research design should not violet the participants, embarrass or harm them in any way. This research did not subject its participant to any ethical misconduct. The researcher of this study completed the human ethical clearance form to make sure that the researcher abides by the rules and

guidelines of the University of KwaZulu-Natal. The questionnaire had a consent form that the participant had to sign as an acknowledgment and agreement that the data provided can be used for the study. The consent form also states that participation is voluntary, the participants were free to disengage from the study anytime should he/she felt uncomfortable about the questions that were being asked. The consent form further assures that the data provided by the participant is confidentiality.

The questionnaires were only examined by the researcher and the supervisor, then they were locked in the cupboard where they will be kept until it's time for them to be destroyed. The data was assigned to a number rather than the participant's name. Anonymity is guaranteed for the participants, the questionnaire referred to the participants as participants 1, 2, 3 and etc. The questionnaire is structured in such a way that it did not ask personal questions that would have been insensitive or personal questions that could have made the participant feel uncomfortable. The consent form stated that the research is for academic purposes only.

### **3.17 Limitations of the study**

This study is similar to most cross-sectional studies, it was limited by time. The time constraint was the most notable limitation of this study as it influences most decisions taken regarding the study. The population of the study is also a limitation since it is selected from a single province rather than different provinces which may give different views on ICT adoption. Time constraints led the researcher to choose a single province which led to a selection of a sample size that is based in Pietermaritzburg for the study.

### **3.18 Pilot study**

The pilot study is the recommended study that is done in order to check for any weaknesses or flaws in the research tool. Doing a pilot study assisted the researcher by proving the validity, reliability, and usability of the questionnaire. The researcher gave two supervisors the questionnaire to check if the research questions are in line with the research objectives. The validity of the questionnaire before the data collection process started was firstly ascertained by a statistician who checked for any errors and consistency issues. The researcher conducted a pilot study as the means to measure the validity of the research instrument. Ten SME owners were given a questionnaire to fill it and provided information about their interpretation of the questionnaire. The responses were then analysed and any emanating problems with regards to

understanding the questions, language and any issues identified by the pilot group were then used to update the questionnaire before the actual data collection process can commence. The pilot study also assisted the researcher to assess the length it takes to fill out the questionnaire. These pre-tests assured that the research is viable and that the respondents will understand the questions in the questionnaire.

### **3.19 Chapter summary**

This section provided information about the research methodology of the study. This chapter provided an elaborate plan on how the study was conducted and how the research 'onion' was used as a guideline to answer the research questions. The methodology chapter provided information about the study population and the techniques that were used to select the sample size of the study. This chapter also gave detailed information about data instrument development, data collection procedures. The chapter further explained the tests that were going to be conducted in order to measure the reliability and validity of the research questionnaire. Elaborate details of the pilot test were discussed and the changes that were made after the test, for instance, fixing language errors and simplified the language. This chapter elaborates on the ethics of the study and how it respects the ethics of the participants. The following chapter provides elaborate details of the data analysis.

## **CHAPTER 4: DATA ANALYSIS AND DISCUSSION**

### **4.1 Introduction**

In this chapter, the researcher provides details about the analysis of data that was collected using the questionnaire as the collection instrument. The data that was collected firstly went to a process called data screening, then the researcher tests the reliability of the instrument using Cronbach's alpha. The researcher further discusses the Normality Test, Statistical Descriptive Analysis, and Structural Equation Modelling then discusses the findings of the research.

### **4.2 Data Screening**

The collected data was coded then captured using Microsoft Excel before it was transferred to Statistical Package for Social Science (SPSS version 25 and SPSS Amos version 25). The descriptive data of the participant were coded using numbers ranging from 1 to 5 and some questions had answers ranging from 1 to 9. The questions under the TOE framework were coded from 1 to 5, starting with 1 = "Strongly Disagree" to 5 = "Strongly Agree". The data was then checked for missing values, there were less than 1% of missing values. The researcher decided to replace the missing data with the series mean. The series mean was calculated by averaging the responded answers on that particular question with a missing value. In the complexity construct, there were three questions that needed to be reverse coded. The researcher further checked for the unresponsive response, all the respondents seem to be fairly engaged. The data was then considered clean and ready to be analysed.

### **4.3 Reliability Test**

The data that was collected was composed in a form of Likert scale and it was crucial to test for the reliability of data. Cronbach's alpha is the test that was used to measure the reliability of the data. According to Abualrob and Kang (2016), the value of 0.70 is considered an acceptable value of Cronbach's alpha. The observed values of Cronbach's alpha were between 0.75 and 0.963, which is considered to be a good to excellent values of Cronbach's alpha. The total Cronbach's alpha is above 0.9, which is an excellent value that means the internal consistency of the observed variables is good and that the variables are highly correlated. Table 4.1 shows detailed information about the Cronbach's alpha.



**Table 4. 1: A Test of Reliability of the TOE Constructs**

Construct	Number of items	Sample reliability using Cronbach's alpha ( $\alpha$ )
<b>Technology Context</b>	<b>19</b>	<b>.923</b>
Relative Advantage (RA)	8	.922
Complexity	5	.862
Compatibility	6	.834
<b>Organisation Context</b>	<b>16</b>	<b>.945</b>
Top Management (TM)	5	.816
Financial Resources (FR)	5	.918
IT Knowledge (ITK)	6	.888
<b>Environmental Context</b>	<b>17</b>	<b>.873</b>
Government Support (GS)	4	.750
Competitive Pressure (CP)	6	.802
External Support (ES)	7	.939
<b>Intention to Adopt</b>	<b>3</b>	<b>.963</b>
<b>Total Alpha</b>	<b>55</b>	<b>.923</b>

#### 4.4 Normality Test

It is important to measure the normality of the data as this test provides the essential information moving forward. The normality test provides information about the test that needs to be performed in order to get the desirable results. A normally distributed data can be analysed using parametric tests while non-normal data can be analysed using non-parametric tests. According to Oliveira et al. (2016), a significant value of greater than 0.05 means that the data is normally distributed.

H<sub>0</sub>: The data is normally distributed.

H<sub>1</sub>: The data is not normally distributed.

The normality test was conducted using a Kolmogorov-Smirnov<sup>a</sup> test, all the variables show a significant value that is less than 0.05 (See Appendix B), thus this means that the H<sub>0</sub> is rejected. The tests that should be conducted are non-parametric tests.

#### 4.5 Sampling adequacy

It is important to test for the adequacy of the data before doing the factor analysis. The Kaiser-Meyer-Olkin (KMO) and Bartlett's test was conducted as sampling adequacy in order to perform factor analysis. The Kaiser-Meyer-Olkin sampling adequacy test was applied to determine the measure of the proportion of variance among variables that might be a common variance. The recommended value of the KMO test is suggested to be 0.7 and higher while Bartlett's test value is considered significant if the p-value is less than 0.05 (Kilangi, 2012). The KMO test for this study is 0.924, which is acceptable, and Bartlett's test is significant at a p-value of less than 0.05, this proposed that the data is correlated.

**Table 4. 2: Sampling Adequacy Table**

<b>KMO and Bartlett's Test</b>		
<b>Kaiser-Meyer-Olkin Measure of Sampling Adequacy</b>		.924
<b>Bartlett's Test of Sphericity</b>	Approx. Chi-Square	10595.354
	Df	1326
	Sig.	.000

#### 4.6 Descriptive Analysis

The descriptive analysis is an important analysis that provides the reader with a summary of the participant's socio-demographic details and the SME's basic information. This analysis provides details about the age of participants, gender, education level and it provides information on the level of ICT understanding by the participant. It further provides details of the SMEs, by providing information about the number of employees in the organisation, the years of existence of the business and the business annual revenues. The descriptive analysis summary of the variables is provided in Appendix A. This appendix provides a summary in the form of a mean, mode, median, standard deviation and variance of the data. Most of the questions have a modal of 4 which suggests that most respondents chose "agree" for most questions in the survey. The majority of the standard deviation is close to 1, this value shows that the values are not widely dispersed from the mean.

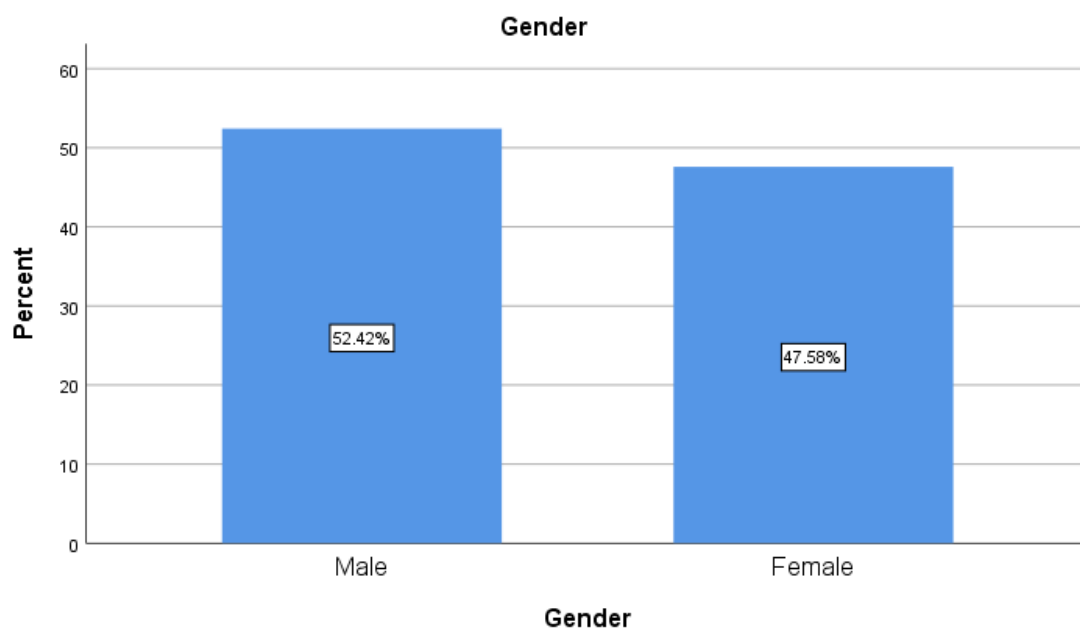
The questionnaire began with a question about the age of the participant. The results show that the majority of participants were between the age of 36 years to 50 years, with 44.1% followed

by the participants with the age between 26 years and 35 years, with 25.1%. The participants with 66 years and above were the least to participate with 2.6%.

**Table 4. 3: Participant’s Age**

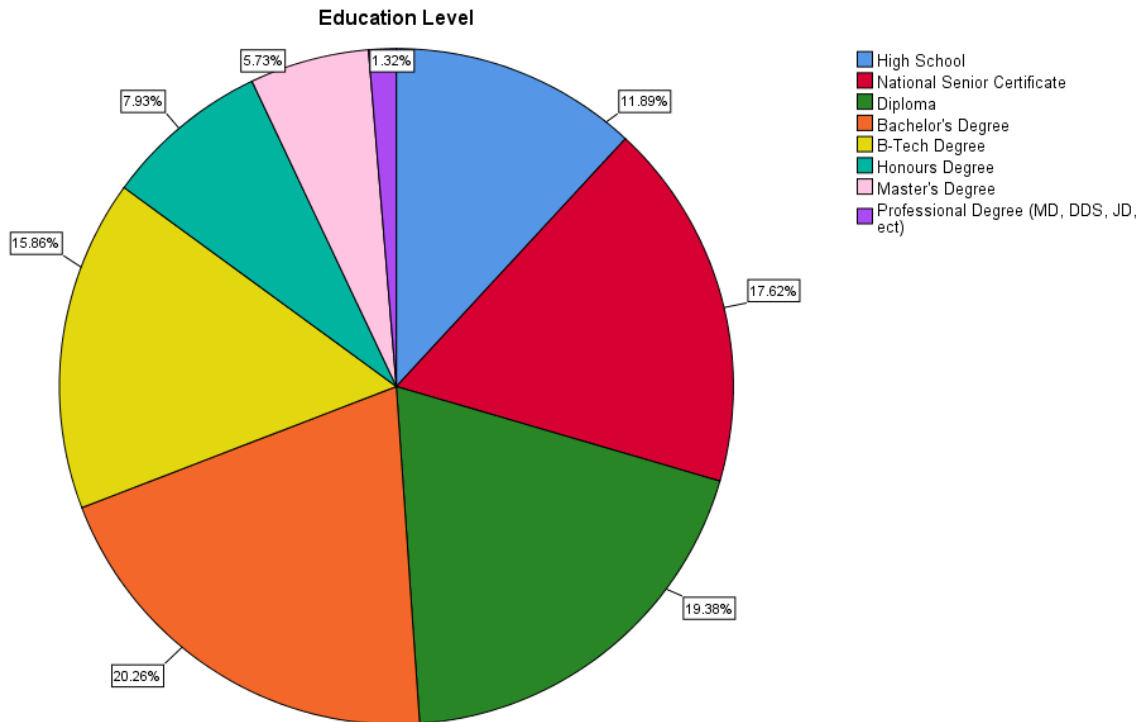
Age			
	Frequency	Percent	Cumulative Percent
<b>18 – 25</b>	25	11.0	11.0
<b>26 – 35</b>	57	25.1	36.1
<b>36 – 50</b>	100	44.1	80.2
<b>51 – 65</b>	39	17.2	97.4
<b>66 and above</b>	6	2.6	100.0
<b>Total</b>	227	100.0	

There wasn’t much difference when it comes to the gender of participants, 52.42% of participants were males while 47.58% were females. The ratio of the participant’s gender is almost even, both genders were fairly represented.



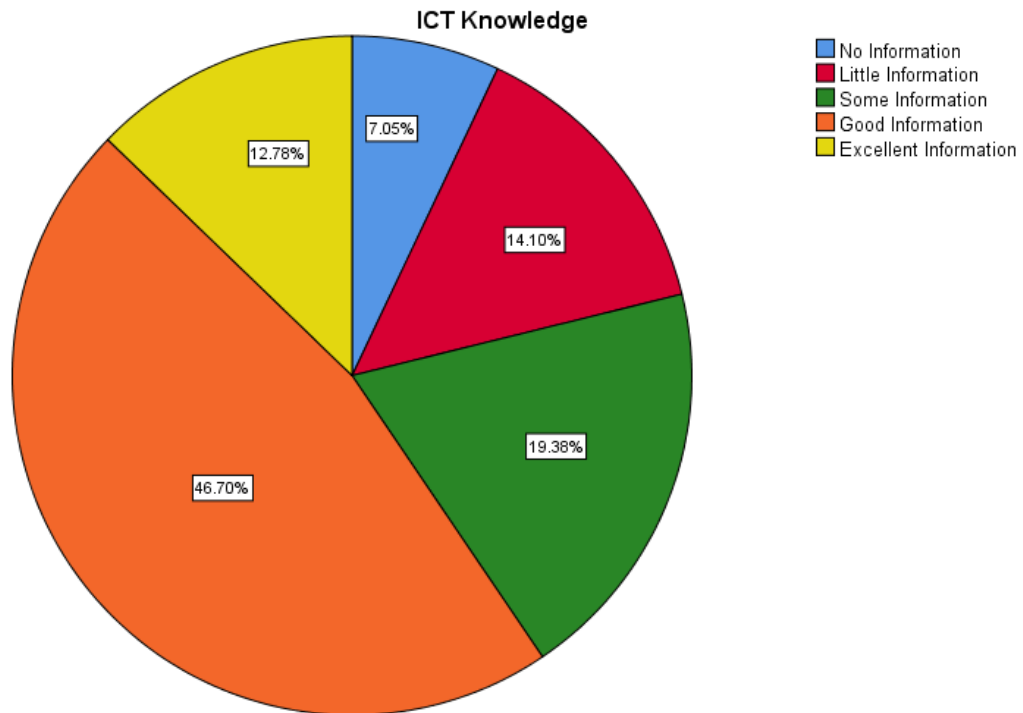
**Figure 4. 1: Participant’s Gender**

The majority of participants have a bachelor's degree as their qualification about 20.26%, this is followed by 19.36% of participants with a diploma qualification. About 17.62% of the participants have a national senior certificate, followed by participants with a B-Tech degree with 15.86%. 11.89% of participants stopped schooling in high school, 7.93% have an honour's degree as their highest qualification and 5.73% have a master's degree and only 1.32% have a professional degree.



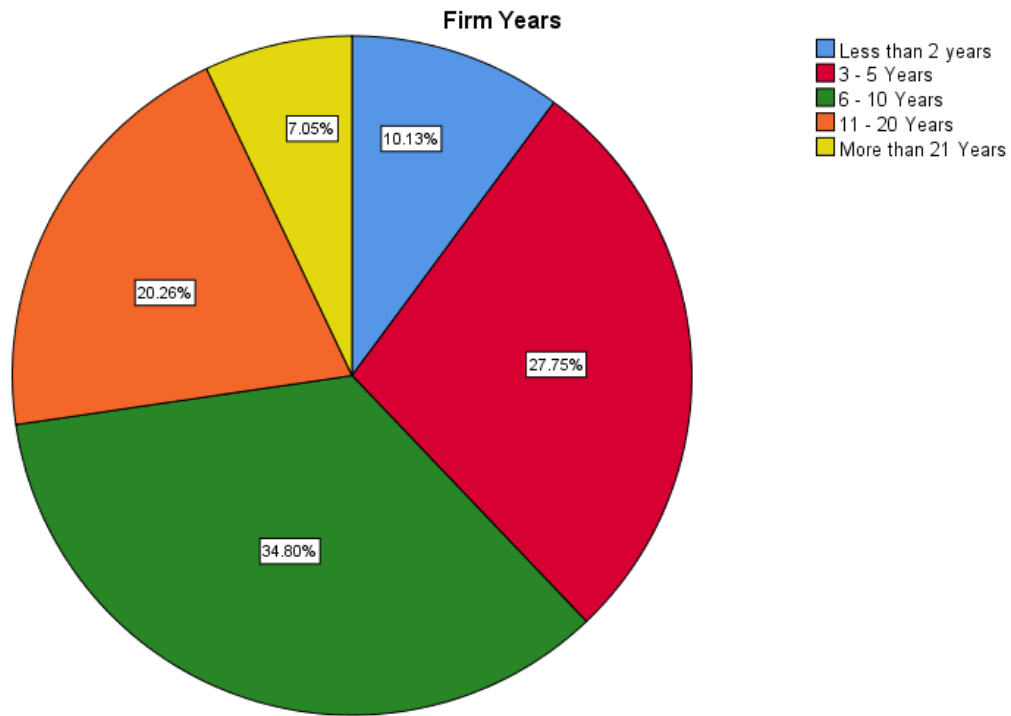
**Figure 4. 2: Education level of the Participant**

Approximately 46.70% of the participants had a good understanding of ICT, and 19.38% of participants had some knowledge of ICT. 14.10% of participants had little ICT knowledge while 12.78% of participants had excellent knowledge of ICT. The least number of participants in the study had no knowledge of ICT, only 7.05% of these participants had no knowledge.



**Figure 4. 3: ICT Knowledge of the participant**

34.8% of SMEs in Pietermaritzburg that were involved in a study had been existing for 6 to 10 years, and SMEs with 3 to 5 years of existence made up 27.75% of participants. About 20.26% of SMEs have been existing for 11 to 20 years, 10.13% of SMEs have less than 2 years and the least number of SMEs that were involved in the study have been existing for more than 20 years.



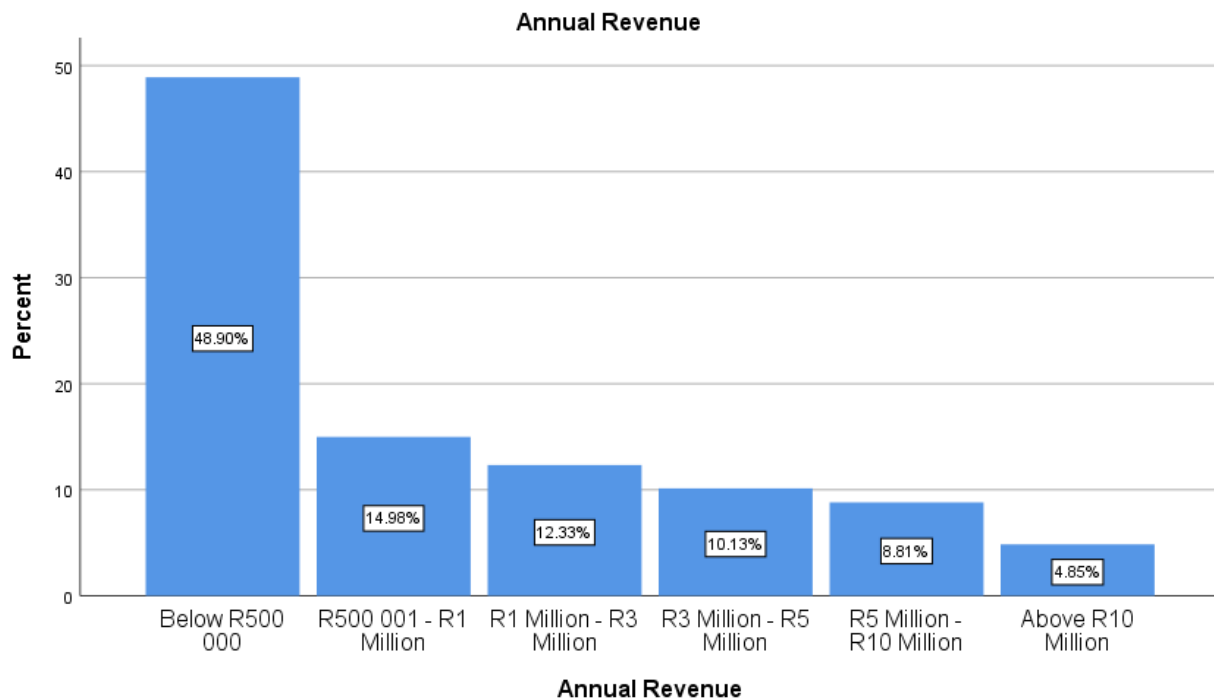
**Figure 4. 4: Firm Years**

The number of employees is one of the important variables as it determines the size of the SME. The majority of the SMEs that participated in the survey had 5 or fewer employees that make up 35.2% of a survey followed by SMEs with employees between 11 and 50 employees making up 27.8% of a survey. About 26% of SMEs that participated had between 6 and 10, SMEs that had the least participants were the ones with employees between 51 and 150, 151 and 200, these SMEs had about 4.8%, and 6.2% of participation respectively.

**Table 4. 4: Number of Employees in a Firm**

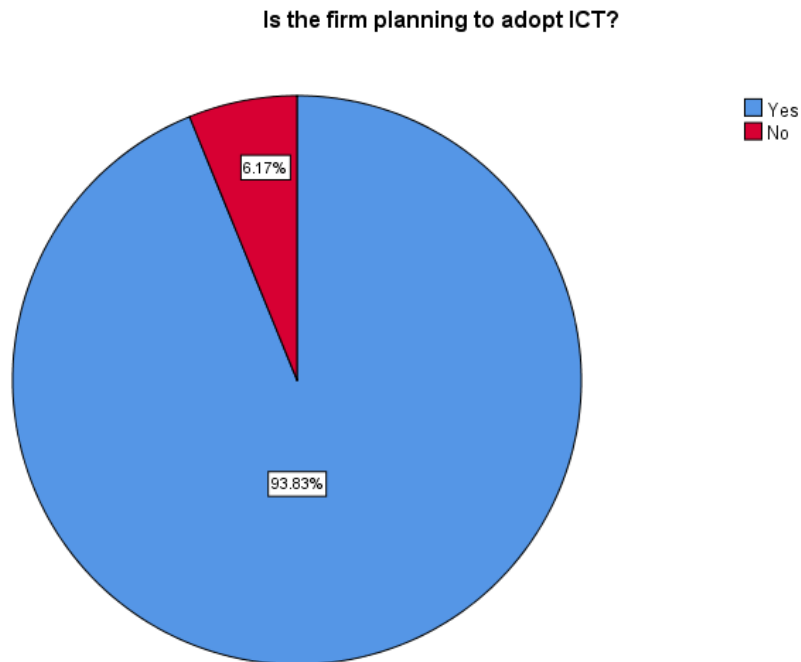
		Frequency	Percent	Cumulative Percent
Valid	5 or less	80	35.2	35.2
	6 - 10	59	26.0	61.2
	11 - 50	63	27.8	89.0
	51 - 150	11	4.8	93.8
	151 - 200	14	6.2	100.0
	Total	227	100.0	

The descriptive data shows that the majority of SMEs that took part in the study were about 48.9% and they make less than R500 000 per year, this was followed by SMEs that make between R500 001 to R1 000 000 per year and they make up 14.96% of the survey. 12.33% of SMEs make between R1 000 000 and R3 000 000, followed by 10.13% of SMEs that makes between R5 000 000 and R10 000 000, the SMEs with the least participation were 4.85% they make above R10 000 000 per annual.



**Figure 4. 5:Annual Revenues of a Firm**

The last question on the questionnaire is about SME’s plan to adopt ICT. The majority of SMEs in Pietermaritzburg are planning to adopt ICT and some of the SMEs are already using ICT in their business and they are exploring further adoption of ICT. About 94% of SMEs are planning to adopt ICT while only 6% are not interested in ICT. This means that the majority of SMEs see the reason to adopt ICT as it could assist them with their business.



**Figure 4. 6: Firm's planning to adopt ICT**

#### **4.7 Structural Equation Model**

SEM is one of the tools that are vastly used by researchers to investigate the interrelation of variables that form a theoretical model. It is recommended to have a sample size that is ranging from 150 to 400 in order to perform SEM analysis (Kilangi, 2012). This study has a sample size of 227 which is in the range of the recommended size. SEM is versatile when it comes to analysis as it can do multiple tests at once. The SEM checks for the validity of the construct's variables before analysis of the relationships between the variables.

#### **4.8 Correlation**

Table 4.5 shows the correlations between the variables of the TOE theoretical framework since the data is not normally distributed the Spearman's rho test was conducted. The Spearman's rho test is a non-parametric test that is conducted if the data is not normally distributed. The correlation results show that there is a positive correlation between the variables with the correlation between Technology Context and Organisation Context the strongest followed by the correlation between the Organisation Context and Environmental Context as a second strongest correlation. The correlation between Technology Context and Environment Context is the least strong. All the correlations are significant at p-value < 0.01.



**Table 4. 5: Correlations of TOE Theoretical Framework**

			<b>Technology Context</b>	<b>Organisation Context</b>	<b>Environment Context</b>
<b>Spearman 's rho</b>	<b>Technology Context</b>	Correlation Coefficient	1.000		
		Sig. (2-tailed)	.		
	<b>Organisation Context</b>	Correlation Coefficient	<b>.723**</b>	1.000	
		Sig. (2-tailed)	.000	.	
	<b>Environment Context</b>	Correlation Coefficient	<b>.552**</b>	<b>.658**</b>	1.000
		Sig. (2-tailed)	.000	.000	.
<b>**.</b> Correlation is significant at the 0.01 level (2-tailed).					

#### 4.9 Regression

Table 4.6 shows the estimates regression weights between the independent variables, Technology Context, Organisation Context, and Environmental Context and the dependent variable Adort\_ICT. The variable Adort\_ICT aims to identify the Intention to adopt ICT by SMEs. The regression estimates between Technology Context and Adopt\_ICT is 0.975 and it significant at p-value < 0.05. The regression estimates between Organisation Context and Adopt\_ICT is -0.221 and it significant at p-value < 0.05. The regression table further shows that the regression estimates between the variable Environment Context and Adopt\_ICT is -0.014 with a p-value of .938 which is greater than 0.05, this means the regression is not significant between the two variables.

**Table 4. 6: Regression Estimates**

<b>Dependant Variable</b>		<b>Independent Variables</b>	<b>Estimate</b>	<b>S.E.</b>	<b>C.R.</b>	<b>P</b>
Adopt_ICT	←	Technology Context	,975	1,204	1,766	***
Adopt_ICT	←	Organisation Context	-,221	,848	-,381	***
Adopt_ICT	←	Environmental Context	-,014	,380	-,078	,938

#### 4.9.1 Correlations and Regressions of Environment Context Variables

Table 4.6 revealed that the regression estimates of Environment Context towards Adopt\_ICT is insignificant, this finding was further explored in order to get a better understanding of this result from the variable Environmental Context. It is important to test for correlation before analysing the regression estimates. Table 4.7 is the shows the Spearman’s rho correlation of Environmental Context variables. The table shows that there is a positive correction between the variables with the strongest correlation between Government Support (GS) and External Support (ES) with a relationship significant at p-value < 0.01, the second-strongest correlation is between External Support and Competitive Pressure (CP) significant at p-value < 0.01, and the least strong correlation is between GS and CP with p-value significant at 0.05.

**Table 4. 7: Correlations of Environment Context Variables**

			<b>GS</b>	<b>CP</b>	<b>ES</b>
<b>Spearman's rho</b>	<b>GS</b>	Correlation Coefficient	1.000		
		Sig. (2-tailed)	.		
	<b>CP</b>	Correlation Coefficient	<b>.155*</b>	1.000	
		Sig. (2-tailed)	.019	.	
	<b>ES</b>	Correlation Coefficient	<b>.380**</b>	<b>.282**</b>	1.000
		Sig. (2-tailed)	.000	.000	.
<b>*. Correlation is significant at the 0.05 level (2-tailed).</b>					
<b>** . Correlation is significant at the 0.01 level (2-tailed).</b>					

Table 4.8 further explore the regression of the Environment Context variables since the Environment Context is insignificant when it comes to influencing ICT\_Adopt. The findings of the regression estimate on the Environment Context find that GS is insignificant when it comes to influencing the adoption of ICT with a regression estimate of 0.906. The CP and ES are significant when it comes to influencing the adoption of ICT with a regression estimate of 0.00.

**Table 4. 8: Regression Analysis for Environment Context**

Coefficients <sup>a</sup>						
Model		Unstandardized Coefficients		Standardized Coefficients	T	Sig.
		B	Std. Error	Beta		
1	(Constant)	-.448	.382		-1.171	.243
	GS	.008	.072	.006	.118	.906
	CP	.844	.087	.528	9.752	.000
	ES	.327	.077	.242	4.259	.000
<b>a. Dependent Variable: Adopt_ICT</b>						

The further exploration of technology context (relative advantage, complexity, compatibility) and organisation context (financial resources, IT knowledge, top management) shows that the variables of these constructs are significantly correlated at  $p < 0.01$  (Appendix E and Appendix H). The regression estimate for these constructs shows that all the variables of technology context and organisation context are significant at  $p < 0.05$  (Appendix G and Appendix J).

#### 4.10 Model Fit Index

The model fit test is a test that aims to examine if the model fits the data and that the model is valid. The model fit test can be conducted in different ways. Table 4.7 shows different cut-off criteria for the different tests that can be used to measure the model fit index. CMIN/DF is unacceptable if the value is above 5, if the value is between 3 and 5 that means it acceptable, and if the value is between 1 and 3 then the model fits excellent. For CFI the model fit is excellent if it above 0.95, it is considered acceptable if the Comparative Fit Index (CFI) value is between 0.90 and 0.95, and lastly it is unacceptable if the CFI value is less than 0.90. Any value of Standardised Root means squared residual (SRMR) that is greater than 0.10 means the model fit is unacceptable, while an SRMR value that is between 0.10 and 0.08 is acceptable and the SRMR value that is less than 0.08 is considered excellent. A Root Mean Squared Error of Approximation (RMSEA) value that is greater than 0.08 is unacceptable, the RMSEA value that is between 0.08 and 0.06 is acceptable and an RMSEA value that is less than 0.06 is an excellent model fit. The PClose value of less than 0.01 is unacceptable, the PClose value that is between 0.01 and 0.05 is acceptable and a PClose value that is greater than 0.05 is considered an excellent model fit.

**Table 4. 9: Cutoff Criteria**

Measure	Unacceptable	Acceptable	Excellent
<b>CMIN/DF</b>	> 5	> 3	> 1
<b>CFI</b>	<0.90	<0.95	>0.95
<b>SRMR</b>	>0.10	>0.08	<0.08
<b>RMSEA</b>	>0.08	>0.06	<0.06
<b>PClose</b>	<0.01	<0.05	>0.05

Table 4.10 shows the result of the model fit. According to Hu and Bentler (1999), it is recommended to use a combination of CFI and SRMR with a measure of CFI close to .95 and SRMR close to 0.08 when the sample size is less or equal to 250. The following table shows that CFI value = 0.929 which is close to 0.95 which is recommended by Hu and Bentler (1999) and the SRMR value = 0.07 which is close to 0.08. The previous cutoff criteria table suggests that if the CFI value is slightly below 0.95 the model fit is acceptable and if the SRMR is slightly less than 0.08 then the data fit the model excellent. The RMSEA value = 0.074, this value means that the model fit is acceptable according to (Hu and Bentler, 1999). Given that the measurement combination has good value then the model fit is acceptable.

**Table 4. 10: Model Fix Index**

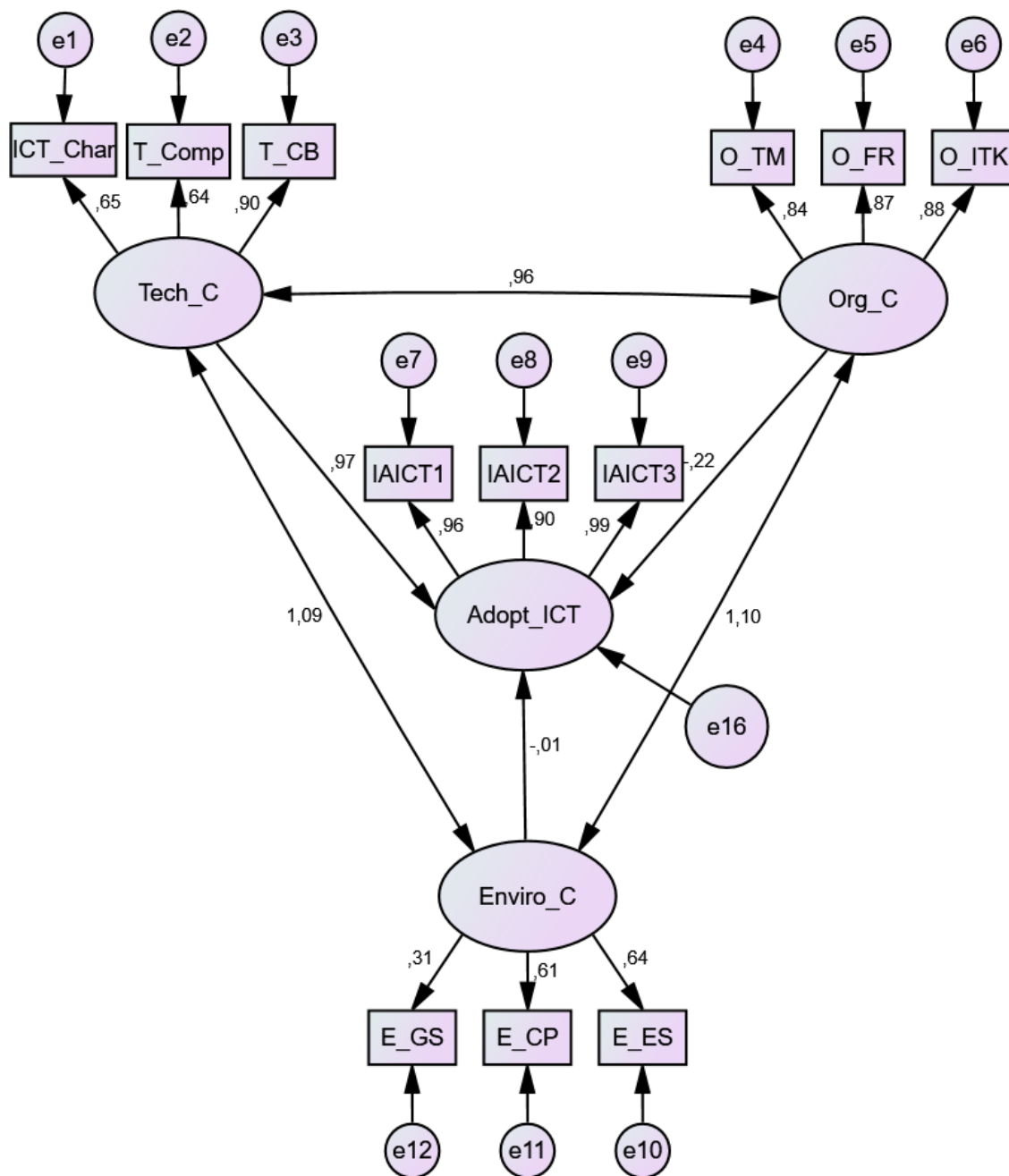
Measure	Estimate	Threshold	Interpretation
<b>CMIN</b>	216,002	--	--
<b>DF</b>	48,000	--	--
<b>CMIN/DF</b>	4,500	Between 1 and 3	Acceptable
<b>CFI</b>	0,929	>0.95	Acceptable
<b>SRMR</b>	0,070	<0.08	Excellent
<b>RMSEA</b>	0,074	<0.06	Acceptable

Figure 4.7 shows the factor loadings for the observed variables are above 0.6 and there is only one variable that is below 0.6 with a value of 0.31. Government Support (GS) has the lowest loading which suggests that this variable is less correlated with the other variables. The

organisation context variables have high factor loadings which suggest that the variables are highly correlated.

Further to this, Figure 4.7 shows the regression estimates with Technology Context having the highest regression of 0.97 towards the adoption of ICT (Adopt\_ICT), this regression estimate is significant. The regression estimate for organisation context is -0.22 towards intention to adopt ICT and this regression estimate is significant at  $p\text{-value} < 0.05$ . The environment context has a regression estimate of -0.01 towards intention to adopt ICT, this regression means that the path is insignificant at  $p\text{-value} < 0.05$ . The regression weight analyses from the SEM revealed that only Technology Context can be considered the best predictor for Intention to Adopt ICT by SMEs with a weighting of 0.97 being above the suggested threshold of 0.80 (Jeyaraj et al., 2006).

Also, it is shown in Figure 4.6 that the covariance correlation with a relationship between Technology Context and Organisation Context having a correlation of 0.96. The correlation between Technology Context and Environment Context has a 1.09 correlation. The relationship between Organisation Context and Environment Context has the highest correlation of a value of 1.10. Table 4.9 is a correlation table that shows the correlation that exists between the TOE theoretical framework's constructs is that they are all significant at  $p\text{-value} < 0.05$ .



**Figure 4. 7: Standardised Residual Covariances**

**Table 4. 11: Covariance Correlation (AMOS)**

			P
Technology Context	<-->	Environment_Context	***
Organisation Context	<-->	Environment Context	***
Technology Context	<-->	Organisation_Context	***

## **4.11 Discussion**

### **4.11.1 Socio-demographic Factors**

The study found that the majority of SMEs in Pietermaritzburg are managed and owned by the people who have the age range between 36 and 50 years and approximately 20% of participants were above 50 years. The gender of these participants is evenly matched with males having a slightly bigger number. The gender results reveal that females have been moving up into the position of power and they are getting into the business. The participants came from all sorts of educational backgrounds with participants with a bachelor's degree having a slight edge over participants with diplomas. The majority of participants are educated or at least they were able to obtain their National Senior Certificate, only approximately 11% were high school dropouts. Approximately 78% of participants have some sort of information about ICT this means only 22% have little to no information about ICT. This shows that the majority of participants are aware of ICT and some use it in their business.

The majority of SMEs have been existing for less than 10 years, most of these businesses are still growing and learning about their customers. These businesses are still establishing themselves in the industry and ICT helps them to grow and reach the right customer base. Most of the SMEs that were involved in the study have less than 50 employees which means they are mostly classified as small businesses. Small business makes up 97% of participants this means only 3% were classified as medium businesses. The majority of businesses have less than R500 000 annual revenues with fewer than 5% of business makes over R10 million.

### **4.11.2 Technology Context**

The technology context is part of the TOE theoretical framework. The technology context consists of three variables Relative Advantage, Complexity, and Compatibility. The analysis shows that these variables are correlated, and Compatibility has the highest loading factor. The technology context correlated with environmental context and it is correlated with organisation context. The technology context has a positive correlation and a significant regression estimate with the intention to adopt ICT, this means that technology context is a significant determinant of intention to adopt ICT. The technology context has the highest regression estimate towards intention to adopt ICT this means that the technology context is influential when it comes to intention to adopt ICT by SMEs. According to Jeyaraj et al. (2006), a predictor that has a

regression of 0.08 and above is considered the best predictor. The technology context is the most influential determinant for intention to adopt ICT by SMEs. Gareeb and Naicker (2015) argue that the technology context determinant is influential when it comes to the adoption of broadband technology by SMEs with relative advantage and compatibility the most contributors. Gono et al. (2016) echo the same sentiments about technology context being a significant determinant and relative advantage and compatibility being the important players that influence the intention to adopt ICT within the Technology Context. The technology context is a significant factor when it comes to the adoption of Broadband Mobile Technology (Chiu et al., 2017).

#### **4.11.3 Organisation Context**

The second determinant of the TOE framework is Organisation Context. The Organisation Context consists of four variables, Top Management Support, Financial Resources, IT Knowledge and size of the firm. The analysis shows that the variables of Organisation Context are highly correlated, they have a high loading factor compared to the majority of the TOE framework's variable except for firm size. The firm size had a low factor loading of a value below 0.3 and keeping the firm size causes the model to be unfit for the data. A factor loading for a sample size less than 300 should have a factor loading of greater or equal to 0.3 (Yong and Pearce, 2013). The firm size was deleted from the model since it had a factor loading of less than 0.3.

The Organisation Context is highly correlated with Environment Context and it is correlated with Technology Context. The regression towards ICT adoption Intention from Organisation is negative but significant. This finding suggests that Organisation Context is influential towards the adoption of ICT, the negative regression suggests that as the negative value decreases as the ICT adoption increases. The Organisation Context is a determinant of ICT adoption. The Organisation context is an influential determinant of broadband technology adoption by retail SMEs and Top Management Support has the most impact (Gareeb and Naicker, 2015). The Organisation Context is the most influential determinant of mobile marketing technology with Top Management Support having the highest loading factor (Maduku et al., 2016).



#### **4.11.4 Environment Context**

The last determinant of the TOE model is Environment Context. The Environment Context consists of three variables, Government Support, Competitive Pressure, and External Support. The analysis shows that the variables of the Environment Context are all correlated, the Competitive Pressure and External Support are correlated while Government Support is correlated with the other variable with a significant p-value  $< 0.05$ . The loading factor of Government Support is 0.3 which shows a weak correlation with the other variables while the other two variables have loading factors that are just above 0.6, which are fairly significant. The regression estimate towards ICT adoption Intention from Environment Context is negative and insignificant. The Environment Context is not a significant determinant of ICT adoption in SMEs. This finding suggests that Environment Context is not influential towards the adoption of ICT. According to Gareeb and Naicker (2015), the Environment Context has the least impact on the adoption of broadband technology because of the government's lack of providing support to businesses. Malak (2016) argue the opposite of this study findings, the Environment Context was found to be significant in the study of Cloud adoption.

The further exploration of the Environment Context shows the influential variable. The results show that External Support is significant thus it is influential when it comes to the adoption of ICT. Competitive Pressure also shows that it is significant and it influential when it comes to adopting ICT. Government Support is insignificant, and this means it is not influential when it comes to the adoption of ICT by SMEs. The government's lack of support has been the most notable problem when it comes to assisting SMEs in South Africa. Gareeb and Naicker (2015) echo similar sentiments about the lack of government assistance. The SA government has a lot of policies that aim to assist SMEs, but it lacks follow through to its promises to the public. Mpofu et al. (2013), found that the SA government plays a significant role when it comes to assisting the tourism industry but there is still more the government can do to uplift the industry. According to Gono et al. (2016), the government should play a better role in giving SMEs ICT support and developing business personnel's ICT skills.

#### **4.12 Chapter summary**

This chapter presents the results of the study, the findings look at the descriptive statistics of the collected data. The descriptive statistics present the mean, median, mode, standard deviation and variance of the data. The descriptive further shows the age of participants, the

graph of gender distribution amongst the participants. This chapter further shows the correlations and regressions between the TOE theoretical framework's constructs. The SEM results also show that the model fits the data. The Technology Context and Organisation Context are significant determinants for the adoption of ICT by SMEs in Pietermaritzburg while the Environment context is an insignificant determinant. The majority of participants are planning to adopt ICT in the future. The following chapter will answer the research questions and states some research limitations and suggest what future studies must look at and then concludes the research.

## **CHAPTER 5: CONCLUSION**

### **5.1 Introduction**

This is the final chapter it concludes the research by providing the summary of the research starting from the literature, methodology, analysis and it also provides the answers to the research questions. This section further discusses the limitations of the study and it provides a recommendation to SME owners, the government and future studies and to then conclude this chapter.

### **5.2 Critical Questions Answers**

#### **What are the determinants that influence the intention to adopt ICT by SMEs in Pietermaritzburg?**

Understanding the determinants that influence adoption will assist the SMEs and the government to understand what needs to be done in order to influence the adoption of ICT by SMEs. This study used the TOE theoretical framework as a tool to study the influential determinants. The theoretical framework consists of Technology Context, Organisation Context, and the Environment Context. The analysis shows that the determinant that influences the intention to adopt ICT is Technology Context and Organisation Context. The technology Context positively influences the intention to adopt ICT while the Organisation Context influences the intention to adopt ICT negatively.

The Environmental Context was found to be not an influential determinant although a further analysis revealed that government support was the variable that was insignificant while the External Support and Competitive Pressure variables were significant. The government support is the variable that causes a problem, the lack of government agents follow through to its policies is the reason the majority of SMEs feel that they don't get enough support. Gareeb and Naicker (2015) found similar problems with government support on mobile marketing technology adoption. Lutfi et al. (2016) argue the opposite of what this study discovered about government support, in Malaysia the government support is influential when it comes to ICT adoption.

#### **Which determinant is most influential when it comes to intention to adopt ICTs by SMEs in Pietermaritzburg?**

The Technology Context is the only determinant that has a regression that is above 0.08 thus it the only determinant that is considered a predictor according to (Jeyaraj et al., 2006). Technology Context is the most influential determinant. The Technology Context variables are highly correlated, which are Relative Advantage, Compatibility, and Complexity. These variables are considered by many studies as the important determinants of ICT adoption (Gareeb and Naicker, 2015, Gono et al., 2016). Understanding the benefits and compatibility of ICT is important, it makes the participants decisive about the intention to adopt ICT.

### **How suitable is the proposed model for studying intention to adopt ICT by SMEs in Pietermaritzburg?**

The Technology context, Organisation context, and Environment context theoretical framework is an old frame that has been used in many studies by researchers. In these years of it experience a lot of changes have been applied to it, it keeps evolving to accommodate the evolving scenarios and contexts to allow for the analysis of different context. The use of TOE in this study was based on previous research that has applied the same framework on firm-level studies (Gono et al., 2016). The model fits the data when tested thus the TOE framework is a suitable model, it can be considered for studying the intention to adopt ICT by SMEs in Pietermaritzburg. This developed theoretical framework assists to understand the relationship between the determinants of intention to adopt ICT.

### **What relationship exists between the determinants of ICT adoption for SMEs?**

The model shows that there are significant relationships between the determinants. The correlation estimates are high for all the relationships thus the determinates are highly related. The relationship exists amongst the determinants and it is a strong relationship.

### **5.3 Limitations**

The most notable limitation of the study was the lack of financial resources which led the researcher to use Pietermaritzburg as the only geographic area for the study. Time limitation also led to choosing one geographic area for the study. Using one city for the study makes it difficult to generalise the finding to a country level. Using Pietermaritzburg area as a study site makes it difficult to generalise the findings of the study and the economy of Pietermaritzburg is below the economy of the cities like Cape Town, Johannesburg, Pretoria, and Durban which could suggest that SMEs from these cities are more advanced and have better resources than

the ones in Pietermaritzburg. The use of non-probability sampling may also limit the generalisation of the study since the participants were not randomly chosen.

#### **5.4 Recommendation**

In future studies, it would be beneficial to study the topic using mixed-method and get different perspectives regarding the research. The future studies should also look at longitudinal studies that can be covered over time to study the adoption level of ICTs in SMEs. Studying this topic in different provinces with different economies will assist in generalisation the study for the whole South African country. Studying a similar topic in large cooperation will assist small businesses to understand what they can do when it comes to the adoption of ICT and to learn the benefits of using ICTs. The lack of actual adoption has fallen behind in South Africa it would be interesting for future studies that research how the adoption affect SMEs. Future studies should also research ICT adoption by countries that are developing especially in Africa. This will help to understand how South Africa can improve the adoption of ICTS by SMEs. The South African people are cultural people, it is also important to study how different cultures take the adoption of ICT in business.

SME owners and managers must keep their eyes and ears open because the technology is moving fast, and it keeps changing and it brings about important change. In order for South African SMEs to compete at an international level, they need to move with time, they should adopt ICTs and use it as a business strategy in order to grow their businesses. SMEs should invest in educating their staff about using ICT as part of their business strategy. When it comes to growing SMEs, the South African government has plenty of regulations and guidelines but it lacks the proper channels to implementations these regulations. Most SMEs are complaining about the lack of government commitment to assists SMEs to adopt ICTs. The government must provide an adequate infrastructure that will make it easy for SMEs to adopt ICT. The majority of SMEs lack financial resources to adopt ICT and the government can play a vital role by providing incentives to assist SMEs in their struggles. The external support is a significant influent, this challenges the IT vendors to influence and provide the necessary information to SMEs in order for them to adopt ICT. SMEs must be educated about outsourcing ICT resources as it could assist them to grow their business at a reasonable cost. External support got an important role to play in uplifting SMEs by providing expect guidelines on adopting ICT.

The government must dedicate an organisation similar to the Small Enterprises Development Agency (SEDA) that will provide ICT transformations to SMEs. This organisation can provide strategies to SMEs on how to use ICT as the strategy to uplift the business. This will provide SMEs the necessary tools to compete in a large market space. A government agency can educate SME owners about the benefits of using ICTs and the importance of understanding the alignment of ICT and business strategies. It is important to adopt ICT and to understand business strategy is important as well. The lack of understanding of ICT benefits that have been shown by some owners is due to the fact that they don't understand how ICT can align with their business strategies. This gap can be significantly decreased if the government agencies can provide the necessary training to SMEs.

Further to this study, the results produced have given rise to an academic paper that has been submitted to a journal (see appendix N) for a peer review to officially contribute to the body of knowledge within the discipline of Information Systems and Technology. A key recommendation would be to further test the validity and rigidity of the findings of this study by publishing more of the findings of this study in accredited peer-reviewed journals as the one used for the current paper (The Use of the Technology, Organisation and Environment Framework to Investigate Determinants of ICT Adoption by Small and Medium Enterprises in Pietermaritzburg).

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## APPENDICES

### Appendix A: Statistical Description

	Mean	Median	Mode	Std. Deviation	Variance
Age	2.75	3.00	3	.955	.912
Gender	1.48	1.00	1	.501	.251
Education	3.64	4.00	4	1.748	3.055
ICT Knowledge	3.44	4.00	4	1.101	1.212
Firm Years	2.86	3.00	3	1.074	1.154
Number of Employees	2.23	2.00	1	1.231	1.516
Annual Revenue	2.30	2.00	1	1.584	2.510
Using ICT would enable us to accomplish tasks more quickly.	4.28	4.00	5	.886	.785
Using ICT would improve the quality of the work we do.	3.97	4.00	4	1.062	1.127
Using ICT would make it easier for us to do our job.	4.03	4.00	4	.933	.871
Using ICT would enhance our effectiveness on the job.	4.02	4.00	4	.859	.738
Using ICT would increase our firm's productivity	4.26	5.00	5	.976	.952
Using ICT would improve our job performance.	4.04	4.00	4	1.008	1.016
Compared to traditional methods, ICT would be faster.	4.29	4.00	4	.806	.650
Overall, I think using ICT would be advantageous for the business.	4.40	5.00	5	.794	.631
Working with ICT is complicated, it is difficult to understand what is going on.	3.89	4.00	4	1.151	1.325
It takes too long to learn how to use ICT to make it worth the effort.	4.09	4.00	4	1.065	1.134
Learning to operate the ICT system is easy for me.	3.86	4.00	4	1.128	1.272
ICT is flexible to interact with.	4.17	4.00	4	.825	.680
In general, ICT are very complex to use.	3.64	4.00	5	1.360	1.850
Using ICT fits well with the way our firm does business.	4.17	4.00	4	.955	.913
Using ICT fits well with our firm's business values and culture.	4.09	4.00	5	.951	.904
ICT can easily be integrated into our existing IT infrastructure.	3.33	4.00	4	1.401	1.964

ICT fits well with the firm's existing distribution channel.	3.79	4.00	4	1.289	1.660
In order to use ICT, we do NOT need to technically change anything.	2.77	3.00	4	1.335	1.782
Using ICT fits well with the way our management would like to operate.	4.13	4.00	4	.820	.673
Top managers are willing to try to provide the necessary resources for implementing ICT systems.	4.15	4.00	4	.936	.877
Top managers often advise employees to keep track of the latest developments in internet-related business practices.	2.71	2.00	4	1.387	1.924
Our top management is likely to consider the implementation of ICT systems as an important strategy.	4.15	4.00	4	.876	.768
Top managers in our firm keep telling people that they must bring more of their business practices online in order to meet customer's future needs.	2.92	3.00	4	1.388	1.927
OTM5 - According to top managers in our firm, incorporating ICT systems is a very important way to gain a competitive advantage.	4.21	4.00	4	.910	.829
My firm has the technological resources to adopt ICT.	3.43	4.00	4	1.303	1.697
OFR2 - My firm has the financial resources to adopt ICT.	3.41	4.00	4	1.288	1.660
OFR3 - My firm has financial resources to maintain ICT.	3.38	4.00	4	1.247	1.556
OFR4 - My firm has the technical staff to maintain ICT.	2.98	4.00	4	1.454	2.115
OFR5 - My firm is able to find consultants who are skilful in ICT.	3.85	4.00	4	1.169	1.367
We have connectivity to the Internet.	4.32	5.00	5	1.108	1.228
Our firm has an individual(s) with expert knowledge of ICT.	3.03	4.00	4	1.511	2.282
Our staff's understanding of computers is very good compared to other local businesses.	3.71	4.00	4	.993	.986
Our firm has an individual(s) who could plan and carry out various parts of the evaluation procedure of ICT implementation.	2.94	4.00	4	1.485	2.205
Most of our employees have unrestricted access to computers.	3.83	4.00	4	1.172	1.373
Most of our employees are computer literate.	4.00	4.00	4	1.111	1.234

The government is adequately driving the use of ICT by providing incentives.	2.01	2.00	1	1.048	1.097
The government demonstrates a strong commitment to promote the use of ICT.	2.14	2.00	1	1.134	1.287
There are effective laws and regulations that support ICT.	3.52	4.00	3	.956	.914
Information about ICT privacy and data protection laws is sufficient.	3.42	3.00	3	.998	.997
ECP1 - We believe that our competitors get many advantages through adopting ICT.	4.12	4.00	4	.798	.636
We believe we would lose our customers to our competitors if we do not adopt ICT.	3.75	4.00	4	1.190	1.417
There are many products/services in the market which are different from our products that perform the same function.	4.34	4.00	5	.761	.579
Our firm experiences competitive pressure forcing us to implement ICT solutions.	3.60	4.00	4	1.176	1.382
Many of our competitors are going to adopt ICT in the near future.	4.32	4.00	4	.682	.465
We feel it is a strategic necessity to use ICT to compete in the market place.	4.48	5.00	5	.794	.631
Our IT consultant/technology vendor solves our firm's problems quickly.	3.90	4.00	4	1.032	1.065
Our IT consultant/technology vendor provides relevant information to our firm.	3.77	4.00	4	.873	.761
Our IT consultant/technology vendor provides on-time information.	3.59	4.00	4	.875	.765
We are confident in the support we receive from our IT consultant/technology vendor.	3.88	4.00	4	.853	.728
Our IT consultant/technology vendor has high integrity.	3.95	4.00	4	.951	.905
Our IT consultant/technology vendor gives us reliable information and advice.	3.72	4.00	4	.830	.688
In general, there is efficient support from our IT consultant/technology vendor to support our ICT.	3.92	4.00	4	.928	.861
We find ICT too expensive to implement.	3.07	2.00	2	1.355	1.836
The firm lacks awareness of the benefits of ICT.	2.17	2.00	1	1.286	1.653
Employees have a low level of IT skills.	3.03	3.00	2	1.335	1.782
We have no access to ICT infrastructures (e.g. electricity, telephone lines, computers, the internet, etc).	1.77	1.00	1	1.048	1.098
Business partners do not make use of ICT.	2.28	2.00	2	1.247	1.555

Suppliers do not make use of ICT.	2.16	2.00	2	1.223	1.497
Customer does not make use of ICT.	2.71	2.00	2	1.338	1.789
Employees are satisfied with traditional technologies.	2.92	3.00	4	1.437	2.064
The IT service providers are unreliable.	2.00	2.00	2	.852	.726
We find government regulations to be challenging.	2.34	2.00	2	.885	.784
We intend to use ICT in the next 12 months.	4.26	5.00	5	1.096	1.202
I predict we would use ICT in the next 12 months.	4.34	5.00	5	1.049	1.101
IAICT3 - We plan to use ICT in the next 12 months.	4.26	5.00	5	1.107	1.226
Is the firm planning to adopt ICT?	1.06	1.00	1	.241	.058

### Appendix B: Kolmogorov-Smirnov<sup>a</sup> Normality Test

Tests of Normality			
	Kolmogorov-Smirnov <sup>a</sup>		
	Statistic	Df	Sig.
Q8 - TRA1 - Using ICT would enable us to accomplish tasks more quickly.	.272	227	.000
Q9 - TRA2 - Using ICT would improve the quality of the work we do.	.296	227	.000
Q10 - TRA3 - Using ICT would make it easier for us to do our job.	.293	227	.000
Q11 - TRA4 - Using ICT would enhance our effectiveness on the job.	.314	227	.000
Q12 - TRA5 - Using ICT would increase our firm's productivity	.297	227	.000
Q13 - TRA6 - Using ICT would improve our job performance.	.302	227	.000
Q14 - TRA7 - Compared to traditional methods, ICT would be faster.	.267	227	.000
Q15 - TRA8 - Overall, I think using ICT would be advantageous for the business.	.317	227	.000
Q16 - TC1 - Working with ICT is complicated, it is difficult to understand what is going on.	.338	227	.000
Q17 - TC2 - It takes too long to learn how to use ICT to make it worth the effort.	.304	227	.000
Q18 - TC3 - Learning to operate the ICT system is easy for me.	.329	227	.000
Q19 - TC4 - ICT is flexible to interact with.	.270	227	.000

Q20 - TC5 - In general, ICT are very complex to use.	.277	227	.000
Q21 - TCB1 - Using ICT fits well with the way our firm does business.	.292	227	.000
Q22 - TCB2 - Using ICT fits well with our firm's business values and culture.	.243	227	.000
Q23 - TCB3 - ICT can easily be integrated into our existing IT infrastructure.	.306	227	.000
Q24 - TCB4 - ICT fits well with the firm's existing distribution channel.	.295	227	.000
Q25 - TCB5 - In order to use ICT, we do NOT need to technically change anything.	.219	227	.000
Q26 - TCB6 - Using ICT fits well with the way our management would like to operate.	.321	227	.000
Q27 - OTM1 - Top managers are willing to try to provide the necessary resources for implementing ICT systems.	.271	227	.000
Q28 - OTM2 - Top managers often advise employees to keep track of the latest developments in internet-related business practices.	.220	227	.000
Q29 - OTM3 - Our top management is likely to consider the implementation of ICT systems as an important strategy.	.316	227	.000
Q30 - OTM4 - Top managers in our firm keep telling people that they must bring more of their business practices online in order to meet customer's future needs.	.258	227	.000
Q31 - OTM5 - According to top managers in our firm, incorporating ICT systems is a very important way to gain a competitive advantage.	.298	227	.000
Q32 - OFR1 - My firm has the technological resources to adopt ICT.	.309	227	.000
Q33 - OFR2 - My firm has the financial resources to adopt ICT.	.314	227	.000
Q34 - OFR3 - My firm has financial resources to maintain ICT.	.319	227	.000
Q35 - OFR4 - My firm has the technical staff to maintain ICT.	.265	227	.000
Q36 - OFR5 - My firm is able to find consultants who are skilful in ICT.	.309	227	.000
Q37 - OITK1 - We have connectivity to the Internet.	.333	227	.000
Q38 - OITK2 - Our firm has an individual(s) with expert knowledge of ICT.	.287	227	.000
Q39 - OITK3 - Our staff's understanding of computers is very good compared to other local businesses.	.276	227	.000

Q40 - OITK4 - Our firm has an individual(s) who could plan and carry out various parts of the evaluation procedure of ICT implementation.	.304	227	.000
Q41 - OITK5 - Most of our employees have unrestricted access to computers.	.334	227	.000
Q42 - OITK6 - Most of our employees are computer literate.	.296	227	.000
Q43 - EGS1 - The government is adequately driving the use of ICT by providing incentives.	.233	227	.000
Q44 - EGS2 - The government demonstrates a strong commitment to promote the use of ICT.	.235	227	.000
Q45 - EGS3 - There are effective laws and regulations that support ICT.	.210	227	.000
Q46 - EGS4 - Information about ICT privacy and data protection laws is sufficient.	.231	227	.000
Q47 - ECP1 - We believe that our competitors get many advantages through adopting ICT.	.278	227	.000
Q48 - ECP2 - We believe we would lose our customers to our competitors if we do not adopt ICT.	.296	227	.000
Q49 - ECP3 - There are many products/services in the market which are different from our products that perform the same function.	.279	227	.000
Q50 - ECP4 - Our firm experiences competitive pressure forcing us to implement ICT solutions.	.324	227	.000
Q51 - ECP5 - Many of our competitors are going to adopt ICT in the near future.	.273	227	.000
Q52 - ECP6 - We feel it is a strategic necessity to use ICT to compete in the market place.	.358	227	.000
Q53 - EES1 - Our IT consultant/technology vendor solves our firm's problems quickly.	.231	227	.000
Q54 - EES2 - Our IT consultant/technology vendor provides relevant information to our firm.	.286	227	.000
Q55 - EES3 - Our IT consultant/technology vendor provides on-time information.	.257	227	.000
Q56 - EES4 - We are confident in the support we receive from our IT consultant/technology vendor.	.293	227	.000
Q57 - EES5 - Our IT consultant/technology vendor has high integrity.	.230	227	.000
Q58 - EES6 - Our IT consultant/technology vendor gives us reliable information and advice.	.296	227	.000
Q59 - EES7 - In general, there is efficient support from our IT consultant/technology vendor to support our ICT.	.248	227	.000
a. Lilliefors Significance Correction			

### Appendix C: Model Summary for Environment Context Variables

Model Summary				
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.655 <sup>a</sup>	.430	.422	.79618
a. Predictors: (Constant), ES, GS, CP				

### Appendix D: Anova Table for Environment Context Variables

ANOVA <sup>a</sup>						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	106.440	3	35.480	55.971	.000 <sup>b</sup>
	Residual	141.360	223	.634		
	Total	247.800	226			
a. Dependent Variable: ICT_Adoption						
b. Predictors: (Constant), ES, GS, CP						

### Appendix E: Correlations for Technology Context Variables

Correlations					
			RE	C	CB
Spearman's rho	RE	Correlation Coefficient	1.000	.406 <sup>**</sup>	.562 <sup>**</sup>
		Sig. (2-tailed)	.	.000	.000
		N	227	227	227
	C	Correlation Coefficient	.406 <sup>**</sup>	1.000	.549 <sup>**</sup>
		Sig. (2-tailed)	.000	.	.000
		N	227	227	227
	CB	Correlation Coefficient	.562 <sup>**</sup>	.549 <sup>**</sup>	1.000
		Sig. (2-tailed)	.000	.000	.
		N	227	227	227
**. Correlation is significant at the 0.01 level (2-tailed).					

### Appendix F: Anova Table for Technology Context Variables

ANOVA <sup>a</sup>						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	124.989	3	41.663	75.651	.000 <sup>b</sup>
	Residual	122.811	223	.551		
	Total	247.800	226			
a. Dependent Variable: ICT_Adoption						
b. Predictors: (Constant), CB, C, RE						

### Appendix G: Regression Estimates for Technology Context Variables

Coefficients <sup>a</sup>						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	.079	.300		.264	.792
	RE	.372	.085	.263	4.404	.000
	C	.240	.068	.206	3.535	.000
	CB	.462	.079	.374	5.849	.000
a. Dependent Variable: ICT_Adoption						

### Appendix H: Correlation for Organisation Context Variables

Correlations					
			TM	FR	ITK
Spearman's rho	TM	Correlation Coefficient	1.000	.665**	.693**
		Sig. (2-tailed)	.	.000	.000
		N	227	227	227
	FR	Correlation Coefficient	.665**	1.000	.803**
		Sig. (2-tailed)	.000	.	.000
		N	227	227	227
	ITK	Correlation Coefficient	.693**	.803**	1.000
		Sig. (2-tailed)	.000	.000	.
		N	227	227	227
**. Correlation is significant at the 0.01 level (2-tailed).					



### Appendix I: Anova Table for Organisation Context Variable

ANOVA <sup>a</sup>						
Model		Sum of Squares	Df	Mean Square	F	Sig.
1	Regression	118.623	3	39.541	68.260	.000 <sup>b</sup>
	Residual	129.177	223	.579		
	Total	247.800	226			
a. Dependent Variable: ICT_Adoption						
b. Predictors: (Constant), ITK, TM, FR						

### Appendix J: Regression Estimates for Organisation Context Variables

Coefficients <sup>a</sup>						
Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	1.214	.226		5.385	.000
	TM	.490	.089	.399	5.529	.000
	FR	.329	.091	.268	3.610	.000
	ITK	.275	.097	.262	2.854	.005
a. Dependent Variable: ICT_Adoption						

## Appendix K: Consent Form

**UNIVERSITY OF KWAZULU-NATAL**  
**School of Management, IT and Governance**

Dear Respondent,

**Research Project**

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I, Nsikelelo Vincent Ngidi am an M-Com student in the School of Management, IT and Governance, at the University of KwaZulu-Natal. You are invited to participate in a research project entitled (*Determinants of ICT adoption by Small and Medium Enterprises in Pietermaritzburg*). The aim of this study is to: Research the determinants that influence the adoption of ICT adoption by SMEs in Pietermaritzburg. 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 research project. Confidentiality and anonymity of records will be maintained by the researcher and the school of Management, IT and Governance, UKZN. All collected data will be used solely for research purposes and will be destroyed after 5 years. This study has been ethically reviewed and approved by the UKZN Humanities and Social Sciences Research Ethics Committee (approval number: HSS/1939/018M). The questionnaire should take about 15 minutes/s to complete. Thank you for your time.

Sincerely

Researcher's signature \_\_\_\_\_ Date \_\_\_\_\_

Nsikelelo Ngidi

*This page is to be retained by the participant*

**UNIVERSITY OF KWAZULU-NATAL  
School of Management, IT and Governance**

**Research Project**

**Researcher:** Nsikelelo Ngidi (Tel number: 078 600 9493) (Email: [207510478@stu.ukzn.ac.za](mailto:207510478@stu.ukzn.ac.za))

**Supervisor:** Dr. Ntabeni Jere (Tel number: 033 260 6466) (Email: [jeren@ukzn.ac.za](mailto:jeren@ukzn.ac.za))

**Co-Supervisor:** Dr. Sanjay Ranjeeth (Tel number: 033 260 5641) (Email: [ranjeeths@ukzn.ac.za](mailto:ranjeeths@ukzn.ac.za))

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**Building, Westville Campus, Tel: 27 31 2604557, Email: [HSSREC@ukzn.ac.za](mailto:HSSREC@ukzn.ac.za)**

**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 the researcher*

## Appendix L: Questionnaire

### Instruction:

This questionnaire is intended to collect information concerning the determinants of ICT (*Information and Communication Technology*) adoption by Small and Medium Enterprises. ICT in this study refers to **web applications (websites, social media platforms)** and **email services (Gmail, outlook, yahoo, etc)**. Your answers are very important to the accuracy of the research. Your personal information is highly confidential and will be used for this research only. The questionnaire contains four sections. Please read each section carefully and follow the instruction provided.

### Section A

Please fill out your answer in space and mark (X) the box with the description most corresponding to you.

1. What is your age group?

18-25		26-35		36-50		51 - 65		65 and above	
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2. What is your gender?

Male		Female	
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3. The highest level of education.

High School		National Senior Certificate		Diploma	
Bachelor's Degree		B-Tech Degree		Honours degree	
Master's Degree		Professional Degree (MD, DDS, JD)		Doctoral Degree	

### Section B

4. Select the best description of your ICT knowledge.    5. How long has your firm been in business?

No information	
Little information	
Some information	
Good understanding	
Excellent information	

2 years or less	
3 to 5 years	
6-10 years	
11-20 years	
More than 21 years	

6. How many employees are in the firm?

5 or less		6 – 10	
11 – 50		51 – 100	
101 – 200			

7. Which of the following values best describes your firm's annual revenue estimates in a year?

Below R500 000		R500 001 – R1 million		R1 – R3 million	
R3 – R5 million		R5 – R10 million		Above R10 million	

### Section C: Technology Organisation Environment (TOE)

Please rate the following questions from Strongly Disagree to Strongly Agree, where "Strongly Agree" means that you totally agree with the statement and "Strongly Disagree" means the statement does not apply to you or you disagree with the statement.

**NB:** Please indicate your response by making a cross (X) in the appropriate box.

<b>Strongly Disagree</b> 1	<b>Disagree</b> 2	<b>Unsure</b> 3	<b>Agree</b> 4	<b>Strongly Agree</b> 5
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#### Technology Context

Please indicate your level of agreement or disagreement with each of the following statements about the *Relative Advantage* of using ICT.

<b>Relative Advantage</b>					
8. Using ICT would enable us to accomplish tasks more quickly.	1	2	3	4	5
9. Using ICT would improve the quality of the work we do.	1	2	3	4	5
10. Using ICT would make it easier for us to do our job.	1	2	3	4	5
11. Using ICT would enhance our effectiveness on the job.	1	2	3	4	5
12. Using ICT would increase our firm's productivity	1	2	3	4	5
13. Using ICT would improve our job performance.	1	2	3	4	5
14. Compared to traditional methods, ICT would be faster.	1	2	3	4	5
15. Overall, I think using ICT would be advantageous for the business.	1	2	3	4	5

Please indicate your level of agreement or disagreement with each of the following statements about the *Complexity* of using ICT.

<b>Complexity</b>					
16. Working with ICT is complicated, it is difficult to understand what is going on.	1	2	3	4	5
17. It takes too long to learn how to use ICT to make it worth the effort.	1	2	3	4	5
18. Learning to operate the ICT system is easy for me.	1	2	3	4	5
19. ICT is flexible to interact with.	1	2	3	4	5
20. In general, ICTs are very complex to use.	1	2	3	4	5

Please indicate your level of agreement or disagreement with each of the following statements about the *Compatibility* of using ICT.

<b>Compatibility</b>					
21. Using ICT fits well with the way our firm does business.	1	2	3	4	5
22. Using ICT fits well with our firm's business values and culture.	1	2	3	4	5
23. ICT can easily be integrated into our existing IT infrastructure.	1	2	3	4	5
24. ICT fits well with the firm's existing distribution channel.	1	2	3	4	5

25. In order to use ICT, we do NOT need to technically change anything.	1	2	3	4	5
26. Using ICT fits well with the way our management would like to operate.	1	2	3	4	5

### Organisational Context

Please indicate your level of agreement or disagreement with each of the following statements about *Top Management* of the firm.

<b>Top Management</b>					
27. Top managers are willing to try to provide the necessary resources for implementing ICT systems.	1	2	3	4	5
28. Top managers often advise employees to keep track of the latest developments in internet-related business practices.	1	2	3	4	5
29. Our top management is likely to consider the implementation of ICT systems as an important strategy.	1	2	3	4	5
30. Top managers in our firm keep telling people that they must bring more of their business practices online in order to meet customer's future needs.	1	2	3	4	5
31. According to top managers in our firm, incorporating ICT system is a very important way to gain a competitive advantage.	1	2	3	4	5

Please indicate your level of agreement or disagreement with each of the following statements about the *Financial Resources* of the firm.

<b>Financial Resources</b>					
32. My firm has the technological resources to adopt ICT.	1	2	3	4	5
33. My firm has the financial resources to adopt ICT.	1	2	3	4	5
34. My firm has financial resources to maintain ICT.	1	2	3	4	5
35. My firm has the technical staff to maintain ICT.	1	2	3	4	5
36. My firm is able to find consultants who are skillful in ICT.	1	2	3	4	5

Please indicate your level of agreement or disagreement with each of the following statements about *IT Knowledge* of the firm.

<b>IT Knowledge</b>					
37. We have connectivity to the Internet.	1	2	3	4	5
38. Our firm has an individual(s) with expert knowledge of ICT.	1	2	3	4	5
39. Our staff's understanding of computers is very good compared to other local businesses.	1	2	3	4	5
40. Our firm has an individual(s) who could plan and carry out various parts of the evaluation procedure of ICT implementation.	1	2	3	4	5
41. Most of our employees have unrestricted access to computers.	1	2	3	4	5
42. Most of our employees are computer literate.	1	2	3	4	5

### Environmental Context

Please indicate your level of agreement or disagreement with each of the following statements about **Government Support** on SMEs.

<b>Government Support</b>					
43. The government is adequately driving the use of ICT by providing incentives.	1	2	3	4	5
44. Government demonstrate a strong commitment to promote the use of ICT.	1	2	3	4	5
45. There are effective laws and regulations that support ICT.	1	2	3	4	5
46. Information about ICT privacy and data protection laws is sufficient.	1	2	3	4	5

Please indicate your level of agreement or disagreement with each of the following statements about **Competitive Pressure**.

<b>Competitive Pressure</b>					
47. We believe that our competitors get many advantages through adopting ICT.	1	2	3	4	5
48. We believe we would lose our customers to our competitors if we do not adopt ICT.	1	2	3	4	5
49. There are many products/services in the market which are different from our products that perform the same function.	1	2	3	4	5
50. Our firm experiences competitive pressure forcing us to implement ICT solutions.	1	2	3	4	5
51. Many of our competitors are going to adopt ICT in the near future.	1	2	3	4	5
52. We feel it is a strategic necessity to use ICT to compete in the market place.	1	2	3	4	5

Please indicate your level of agreement or disagreement with each of the following statements about **External Support**.

<b>External Support</b>					
53. Our IT consultant/technology vendor solves our firm's problems quickly.	1	2	3	4	5
54. Our IT consultant/technology vendor provides relevant information to our firm.	1	2	3	4	5
55. Our IT consultant/technology vendor provides on-time information.	1	2	3	4	5
56. We are confident in the support we receive from our IT consultant/technology vendor.	1	2	3	4	5
57. Our IT consultant/technology vendor has high integrity.	1	2	3	4	5
58. Our IT consultant/technology vendor gives us reliable information and advice.	1	2	3	4	5
59. In general, there is efficient support from our IT consultant/technology vendor to support our ICT.	1	2	3	4	5





## Appendix M: Journal Submission

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### #1166 SUMMARY

[SUMMARY](#) [REVIEW](#) [EDITING](#)

#### Submission

Authors	Joseph Ntabeni Jere, Nsikelelo Ngidi
Title	A TOE Framework Analysis of ICT Adoption by Small and Medium Enterprises in Pietermaritzburg
Original file	<a href="#">1166-9813-1-SM.DOCX</a> 2019-11-04
Supp. files	<a href="#">1166-9814-1-SP.PDF</a> 2019-11-04 <a href="#">ADD A SUPPLEMENTARY FILE</a> <a href="#">1166-9815-1-SP.PDF</a> 2019-11-04 <a href="#">1166-9816-1-SP.PDF</a> 2019-11-04 <a href="#">1166-9817-1-SP.PDF</a> 2019-11-04 <a href="#">1166-9818-1-SP.PDF</a> 2019-11-04
Submitter	Dr Ntabeni Joseph Jere
Date submitted	November 4, 2019 - 09:47 PM
Section	Original Research
Editor	None assigned

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#### Status

Status	Awaiting assignment
Initiated	2019-11-04
Last modified	2019-11-04

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## Appendix N: Ethical Clearance Letter



18 January 2019

Mr Nsikelelo Vincent Ngidi 207510478  
School of Management, IT and Governance  
Pietermaritzburg Campus

Dear Mr Ngidi

Protocol reference number: HSS/1939/018M  
Project title: Determinants of ICT Adoption by Small and Medium Enterprises in Pietermaritzburg

**Full Approval – Expedited Application**

In response to your application received 17 October 2018, the Humanities & Social Sciences Research Ethics Committee has considered the abovementioned application and the protocol has 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

.....  
Dr Rosemary Sibanda (Chair)  
Humanities & Social Sciences Research Ethics Committee

/pm






cc Supervisor: Dr Ntabeni Jere & Dr Sanjay Ranjeeth  
cc Academic Leader Research: Professor Isabel Martins  
cc School Administrator: Ms D Cunynghame

Humanities & Social Sciences Research Ethics Committee  
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