# SMEs DIGITAL DIVIDE: AN ANALYSIS OF FACTORS INFLUENCING ICT ADOPTION

Submitted in fulfilment of the requirements in respect of the Masters Degree

in the

**Department of Business Management at the University of the Free State**

**by**


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**27 November 2023**

# DECLARATION

I, Zoleka Dikana, declare that the Master's Degree research dissertation or interrelated, publishable manuscripts/published articles, or coursework Master's Degree mini-dissertation that I herewith submit for the Master's Degree qualification in Business Management at the University of the Free State is my independent work, and that I have not previously submitted it for a qualification at another institution of higher education.

_____ _27/11/2023_____

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10-Aug-2023

Dear Miss Zoleka Dikana

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Research Project Title:
**SMEs DIGITAL DIVIDE: AN ANALYSIS OF FACTORS INFLUENCING ICT ADOPTION**

Ethical Clearance number:
**UFS-HSD2023/0700**

We are pleased to inform you that your application for ethical clearance has been approved. Your ethical clearance is valid for twelve (12) months from the date of issue. We request that any changes that may take place during the course of your study/research project be submitted to the ethics office to ensure ethical transparency. furthermore, you are requested to submit the final report of your study/research project to the ethics office. Should you require more time to complete this research, please apply for an extension. Thank you for submitting your proposal for ethical clearance; we wish you the best of luck and success with your research.

Yours sincerely

**Dr Adri Du Plessis**
**Chairperson: General/Human Research Ethics Committee**

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# DEDICATION

I dedicate this thesis to God for giving me the strength not to give up. Additionally, I extend this dedication to my family for their unwavering support and prayers. Thirdly, to my colleagues and friends for their words of encouragement and advices. Lastly, to all the participants who welcomed me into their businesses, wished me success in my studies, and provided me with valuable life lessons.

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# ABSTRACT

**Keywords: SMEs, Digital divide, ICT adoption, Technological environment, Organisational environment, External environment.**

Information and Communication Technology (ICT) enables Small and Medium Enterprises (SMEs) to operate with flexibility, provided they possess the necessary ICT tools. However, ICT adoption can exacerbate the digital divide among SMEs. Therefore, this study aimed to investigate the factors that influence ICT adoption among SMEs in South Africa, using the digital divide approach. The study used the Technological, Organisational, and External (TOE) model developed by Tornatzky and Fleischer in 1990 as the theoretical framework.

SMEs play a crucial role in the economy by creating employment, promoting exports, and encouraging entrepreneurship. It is important to note that there is no global definition of SMEs. Instead, institutions often base the definition on the number of employees, turnover and business assets (European Commission, 2020). Furthermore, the integration of ICT has become a centrepiece in SMEs. However, SMEs in rural areas still lag behind with the adoption of ICT. As a result, SMEs in rural areas remain with a challenge of digital divide.

A quantitative research method was adopted for this study. The study's target population was SME owners, managers, and representatives from marketing and IT departments across various industries in urban and rural areas. Data collection was facilitated through the use of a questionnaire. Also, through non-probability (quota) sampling, the study visited 200 SMEs, located in the Free State Region.

The study's findings indicated a positive correlation between TOE factors and ICT adoption. The ICT adoption is influenced by relative advantage, compatibility, top management, resource availability, ICT knowledge, and external support. In contrast, government support does not influence ICT adoption in SMEs. Moreover, the results demonstrated that factors, such as location and industry, slightly strengthened the relationship between TOE factors and ICT adoption. Furthermore, studying the factors influencing ICT adoption, highlighted the disparities in access and use among different types of SMEs, potentially leading to policies aimed at reducing the digital divide. In this way, the study made a valuable contribution to the existing body of literature on ICT adoption.

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# LIST OF ABBREVIATIONS

SME – Small Medium Enterprise

ICT – Information and Communication Technology

GHREC – General and Human Research Ethics Committee

TOE – Technological, Organisational, External environment

IT – Information Technology

NITA – National Telecommunications and Information Administration

OECD – Organization for Economic Co-operation and Development

StatsSA – Statistics South Africa

SPSS – Statistical Package for Social Sciences

ARD-ZDF – German and American surveys

NTIA – Telecommunications and Information Administration

UN – United Nations

EA – Enumeration Area

UK – United Kingdom

GDP – Gross Domestic Product

EC – European Commission

IMF– International Monetary Fund

USA – United State of America

CAPMAS – Central Agency for Public Mobilization and Statistics

ITC – International Trade Centre

DOI– Diffusion of Innovation

TQM– Total Quality Management

SEDA– Small Enterprise Development Agency

SBI – Small Business Institute

SD – Standard Deviation

EFA – Exploratory Factor Analysis

CFA– Confirmatory Factor Analysis

KMO–Kaiser-Meyer-Olkin

ANOVA – One-Way Analysis of Variance

# CHAPTER 1
# INTRODUCTION, PROBLEM STATEMENT, AND OBJECTIVES

## 1.1 INTRODUCTION

Information and Communication Technology (ICT) has grown significantly over time, which has resulted in a societal divide between those who can access and utilise the Internet and those who cannot (Alam & Salahuddin, 2015). The societal divide, as a result of ICT between and within nations, is referred to as a technological divide by Elena-Bucea, Cruz-Jesus, Oliveira, et al. (2021). According to Nielsen, Rohman, and Lopes (2018), most of the population worldwide is excluded from the advantages of technology, especially the Internet-facilitated digital world. The technological divide is also known as the digital divide. All in all, ICT constantly makes things uncertain and puts pressure on a firm's knowledge and skills, individual roles, and relationships in Small and Medium-sized Enterprises (SMEs) (Nyandoro, 2016).

Access to and use of ICT in SMEs may differ. The difference could be attributable to investments that SMEs frequently find difficult to undertake (Eze, Chinedu-Eze, Bello, et al., 2019). To quantify this difference, it is necessary first to comprehend the underlying factors that influence ICT adoption in SMEs. Furthermore, if the factors influencing ICT adoption are identified and understood, it helps to minimise SMEs' digital divide. According to Chang, Wu, and Cho (2011), factors influencing ICT adoption can provide an overview of the digital divide. Hence, this study sought to identify the factors influencing ICT adoption in South Africa, especially SMEs between rural and urban areas.

ICT is crucial for closing the digital gap between urban and rural SMEs (International Telecommunication Union, 2011; AlBar & Hoque, 2019). However, SMEs in rural areas are slower to adopt ICT, resulting in an increase in the digital divide (AlBar & Hoque, 2019). Undoubtedly, the slower adaptation to ICT in rural SMEs is due to a lack of infrastructure (Pillay, 2016). According to Tiwasing (2021), infrastructure and internet connectivity are prioritised more in urban than rural areas. Similarly, Alliance for Affordable Internet (2017) states rural areas are excluded from existing infrastructure, due to distances and challenging landscapes. Furthermore, a new British Chamber of Commerce survey shows 58 percent of SMEs in rural areas do not have a reliable internet connection, compared to 39 percent in

urban areas (Phillips, 2023). As a result, connecting rural areas to the Internet is more difficult and expensive than connecting urban areas.

Due to the high cost and complexity of connecting rural areas, urban areas steadily build high-speed broadband networks, while rural areas are forsaken (Victor, 2019). Relatively, due to a lack of support to set up broadband infrastructure in rural areas, SMEs in the rural areas are still on 3G, whereas SMEs in the urbanised areas are now using 4G and 5 G (Gilbert, 2021). Unfortunately, prioritising access and usage to ICT in urban areas create a digital divide between urban and rural regions SMEs. Above all, given the existing digital divide in SMEs, it is necessary to investigate factors influencing ICT adoption in SMEs. To achieve this, this study used the Technology Organisation Environment (TOE) framework. The TOE framework was used to address the research question of this study. Nevertheless, the TOE framework is a framework that was developed by Tornatzky and Fleischer in 1990 (Salleh & Janczewski, 2016). The framework covers three contexts, namely, technological, organisational and environmental. The TOE is comprehensively discussed in Chapter 2.

To have the background of the study is important, which is why it is discussed in the following section.

## 1.2 BACKGROUND

ICT gives SMEs the freedom to operate anytime, anywhere, provided that the enterprises have the necessary ICT tools, such as hardware and software resources (Mohagheghi-Fard, 2019). Though ICT provides most SMEs with the freedom to exchange goods at their convenient time and place, there are compounding effects, such as "firmographics" (age of the SMEs, the industry, and SME employees) and behavioural characteristics (digital readiness) (Deloitte, 2020). These compounding effects determine the use of ICT in SMEs. Then again, ICT use creates the digital divide by characterising SMEs with digital literacy skills, those who can afford internet usage and those without digital literacy skills and financial resources to optimise internet usage (International Labour Organisation, 2021). Digital literacy is finding, assessing, producing, and sharing information using ICT (Visser, 2013). As digital literacy is defined above, Chang, Wu and Cho (2011) classify the digital divide in SMEs into "disadvantages in digital ability and literacy" and "disadvantages in receiving digital resources". Disadvantages in digital ability and literacy refer to a lack of knowledge and skills to effectively use ICT tools (Misty, 2005; Chang et al., 2011). On the other hand, disadvantages in receiving digital resources pertain to the challenges in integrating e-commerce supply and demand chains during the course of business (Mistry,2005). However,

other scholars argue that the digital divide in SMEs can result from the lack of financial investments in Information Technology (IT) and IT knowledge within the organisation (Mazur, 2012; Green, 2016).

The abovementioned studies are old; therefore, more literature is needed to determine what causes the digital divide among SMEs. To determine the cause of the digital divide, factors influencing ICT adoption among SMEs need to be known first. Also, by analysing these factors, the government and non-government institutions may be informed when developing policies that support SMEs in adopting ICT (Otieno, 2015). Even more important, to determine and measure the impact of these factors, this study used the location of SMEs (rural and urban).

The difference between rural and urban areas is discussed next and forms part of the background of the study.

### 1.2.1 Definition of “rural and urban"

What makes an area rural? What makes an area urban? The answer to these questions differs from country to country. According to the United Nations, it is impossible to have a global definition, due to different characteristics across the globe (Dijkstra & Poelman, 2014). Therefore, each country has its definition. As much as countries have their definitions, most countries use total population and population density to define urban. So, the total population and population density that is not urban, is classified as rural. According to Statistics South Africa (2001,2011), countries use the threshold locality population greater than 1000. Moreover, the locality population in South Africa is known as the main "place". In general, both locality population and population should be used to classify urban. Therefore, the proposed criteria are:

1. *The main location must have a population of 1000 or more and a population density of 500 or more per square kilometre in both the main location and its sub-locations.*
2. *The main location must have a population of 1000 or more per square kilometre and a population density of 1000 or more in both the main location and its sub-locations. (Statistics South Africa, 2001, 2011).*

As previously indicated, this study used the location of SMEs. The study used the location of SMEs, because no studies have been conducted in South Africa that investigates ICT adoption among rural and urban SMEs. The existing literature either focused on rural or urban. For example, Wolf (2001) studied the determinates and the impact of ICT use in rural

settlements of South Africa. Similarly, Nkosana and Skinner (2016) studied the barriers of ICT adoption and use in small rural restaurants. So, location and the industry are used as the control variables in this study. In research, control variables are not part of the study's objectives, but are controlled, because they can influence the outcomes of the research (Bhandari, 2021).

In the introduction, the digital divide has been mentioned and shortly defined. The following discussion provides more background on the term ‘digital divide’.

### 1.2.2 Digital divide

When the National Telecommunications and Information Administration (NTIA) published "Falling Through the Net: A Survey of the 'Have Nots' in Rural and Urban America", the term "digital divide" became prominent (Srinuan, 2012). During the mid-1990s, the digital divide was defined as a distinction between those who had access to ICT and those who did not have access to ICT. However, the aforesaid definition of the digital divide is too broad and only expresses the digital divide as physical access to ICT. In addition, the definition is outdated and vague (Riggins & Dewan, 2005; Warschauer, 2003). As a result, research developed, and some researchers narrowed the definition. For example, the study by Luyt (2003) and Van Dijk (2006), emphasises that the digital divide should be regarded in two dimensions: access to ICT and ICT use. Furthermore, Luyt (2003) highlighted that the digital divide exists both between countries and within the same country. Thereupon, new studies emerged and analysed the digital divide between nations or within nations (Coşkun, 2009; Hilbert, 2010; ÇİLAN & Özdemir, 2013). Nevertheless, other researchers still use the mid-1990s definition. For example, Schweitzer (2008) defines the digital divide as the "uneven distribution of ICTs in society". Similarly, Badran (2014) defines the digital divide as "the gap between those with permanent, effective access to ICT and those with none".

Researchers worldwide do not appear to agree on a common definition of the term "digital divide." Also, Van Dijk (2005) points out the flaws in existing definitions of the digital divide. Firstly, the previous definitions suggested a division between two groups that is difficult to bridge. Secondly, the term proposed that the division between two groups is fixed, whereas the gaps constantly change. According to Van Dijk (2005), it is erroneous to think that if two groups (rural and urban) equally get physical access to digital technology, that solves economic and societal problems. Thus, Gunkel (2003) suggests that the digital divide should be redefined beyond physical access. According to Ritzhaupt, Liu, Dawson et al. (2013), the

digital gap has numerous dimensions, including access, usage and skills. Moreover, the digital divide is shifting from access matter to intensity, frequency, and internet use matter (Araque, Maiden, Bravol, et al., 2013). Van Djik developed a model to demonstrate that the digital divide is not just about physical access to ICT, but other divides contribute to the digital divide.

The four divides contributing to the digital divide are motivation, material access, skills, and usage access (Ghobadi & Ghobadi, 2015). Motivation access is the desire to have physical access to the Internet and digital devices (Soomro, Kale, Curtis, et al., 2020). Similarly, motivation access means interest, motivation and confidence to use ICT tools (Ghobadi & Ghobadi, 2013). Motivation access is shaped by an attitude towards ICT (Van Deursen & Van Dijk, 2019). Thus, a negative attitude decreases the chances of organisations and individuals accessing ICT (Dutton & Reisdorf, 2019; Reisdorf & Groselj, 2017). Comparatively, material access connects the Internet and ownership of the digital device (Ghobadi & Ghobadi, 2015). However, to be able to use the Internet and digital devices, some skills are mandatory. Hence, Van Dijk's model proposed skill access.

Skill access (digital skills) consists of literacy, fluency and mastery. The difference between the three is that digital literacy is when SMEs have knowledge about the functions of digital tools. In contrast, digital fluency is when SMEs know how to analyse and process multiple streams of information (Chetty, Aneja, Mishra, et al., 2017). On the other hand, digital mastery is when SMEs can create new digital content, because they can fully use variations of digital tools. So, there is an interconnection between the four divides. For example, material access is dependent on motivational access. Secondly, to obtain skills access, an individual should have material access. Thirdly, an individual should have basic knowledge and skills to use ICT resources (Van Dijk, 2005). Lastly, once the usage access is used at its full capacity, an individual starts to seek better innovative ICT resources and begins again. Nevertheless, the digital divide alone may not alienate digital disparities among SMEs without explaining the factors influencing ICT adoption.

Academic research is needed to link factors influencing ICT adoption and the digital divide. Heponiemi, Jormanainen, Leemann, et al. (2020) show that access to the Internet differs, according to demographic characteristics, such as age, gender, socioeconomic status, ethnicity and geography. Also, the study indicated that some demographic characteristics determine the use and skills of the Internet. However, the study was more on individuals, not SMEs. According to Van Deursen, Van Dijk and Ten Klooter (2015), demographic factors affect online behaviours. Therefore, to understand the digital divide(s) within SMEs, this study investigated factors influencing ICT adoption, such as the location of the organisations. There is a gap in the literature, as mentioned above and underlying factors affecting ICT in rural and urban SMEs of South Africa. So, the next section highlights the existing problems.

## 1.3 PROBLEM STATEMENT

Research on the factors influencing ICT adoption has been undertaken throughout the years. However, there is little research on the factors influencing ICT adoption in SMEs, particularly in South Africa. According to Nagayya and Rao (2013), SMEs are more flexible than large firms, allowing them to adopt ICT more easily. However, research has shown that SMEs are slower to adopt ICT (Jaganathan, Ahmad, Ishak et al., 2018). Nonetheless, the failure of SMEs to adopt ICT is influenced by various factors.

In South Africa, ICT adoption is affected by many factors, including blackouts and poor infrastructure. For instance, when the country experiences blackouts, access to the Internet becomes a challenge. As a result, SMEs encounter problems operating through ICT, due to difficulties in accessing the Internet. Conversely, basic infrastructure, such as electrical connectivity has not been implemented in many deep rural areas in South Africa. According to Ismail, Jeffery and Van Belle (2011), the lack of infrastructure in rural areas does not support new technologies. Thus, SMEs in rural areas have more ICT challenges than SMEs from urban areas. Other factors could be lack of computer literacy, competencies (Leenders & Wierenga, 2002; Duncombe & Heeks, 2003), affordability (Hazan, 2002; Qureshi, Kamal, and Good), and lack of support (Wei & Morgan, 2004). Furthermore, according to Venkatesh, Bala, and Sambamurthy (2016), macro factors, such as politics, rural areas, etc., need to be analysed to reduce ICT barriers in developing countries. This study added to the existing body of knowledge on ICT adoption.

Next, research questions and objectives were developed to determine factors influencing ICT adoption in SMEs.

## 1.4 RESEARCH QUESTIONS

### 1.4.1 Main research question

Which factors are influencing ICT adoption among SMEs in South Africa using the digital divide approach?

### 1.4.2 Secondary research questions

1. What is the role of the technological environment on ICT adoption among SMEs in South Africa?
2. What is the role of the organisational environment on ICT adoption among SMEs in South Africa?
3. What is the role of the external environment on ICT adoption among SMEs in South Africa?

## 1.5 OBJECTIVES OF THE STUDY

### 1.5.1 Primary objective

To investigate the factors influencing ICT adoption among SMEs in South Africa using the digital divide approach.

### 1.5.2 Secondary objectives

*1.5.2.1 Theoretical*

- To review the literature on the digital divide.
- To review the literature on the digital divide between rural and urban areas.
- To review the literature on SMEs in South Africa.
- To review the literature on SMEs and ICT adoption.
- To conduct the literature review on the TOE model.

*1.5.2.2 Empirical*

- To investigate the role of the technological environment and ICT adoption among SMEs in South Africa.
- To investigate the role of the organisational and ICT adoption among SMEs in South Africa.
- To investigate the role of the external environment and ICT adoption among SMEs in South Africa.

## 1.6 SIGNIFICANCE OF THE STUDY

ICT has become an essential tool in the world of business. In addition, adopting ICT created an opportunity for SMEs to participate in the global market. However, while there is extensive research on ICT adoption, little research has been conducted to address the digital gap between South Africa's rural and urban areas. Moreover, many studies were conducted in developed countries with limited exposure and a lack of understanding, primarily using positivist quantitative approaches with inadequate explanations of factors influencing ICT adoption (Kamutuezu, Winschiers-Theophilus & Peters, 2021).

While acknowledging the opportunities and benefits of ICTs, it is also important to investigate the digital divide, factors influencing ICT adoption and find ways to bridge the gap between SMEs in rural and urban areas. Therefore, this study aimed to close the research gap and contribute to the body of knowledge on ICT adoption. This study used the TOE model to investigate the factors influencing ICT adoption among SMEs in rural and urban areas. The findings of this study benefit the government and non-government institutions to develop proper strategic plans to equip South African SMEs to compete in the digital economy. Also, the study is beneficial to SMEs, because the findings of the study indicate the advantages

and disadvantages of adopting ICT.

## 1.7 THEORETICAL FRAMEWORK

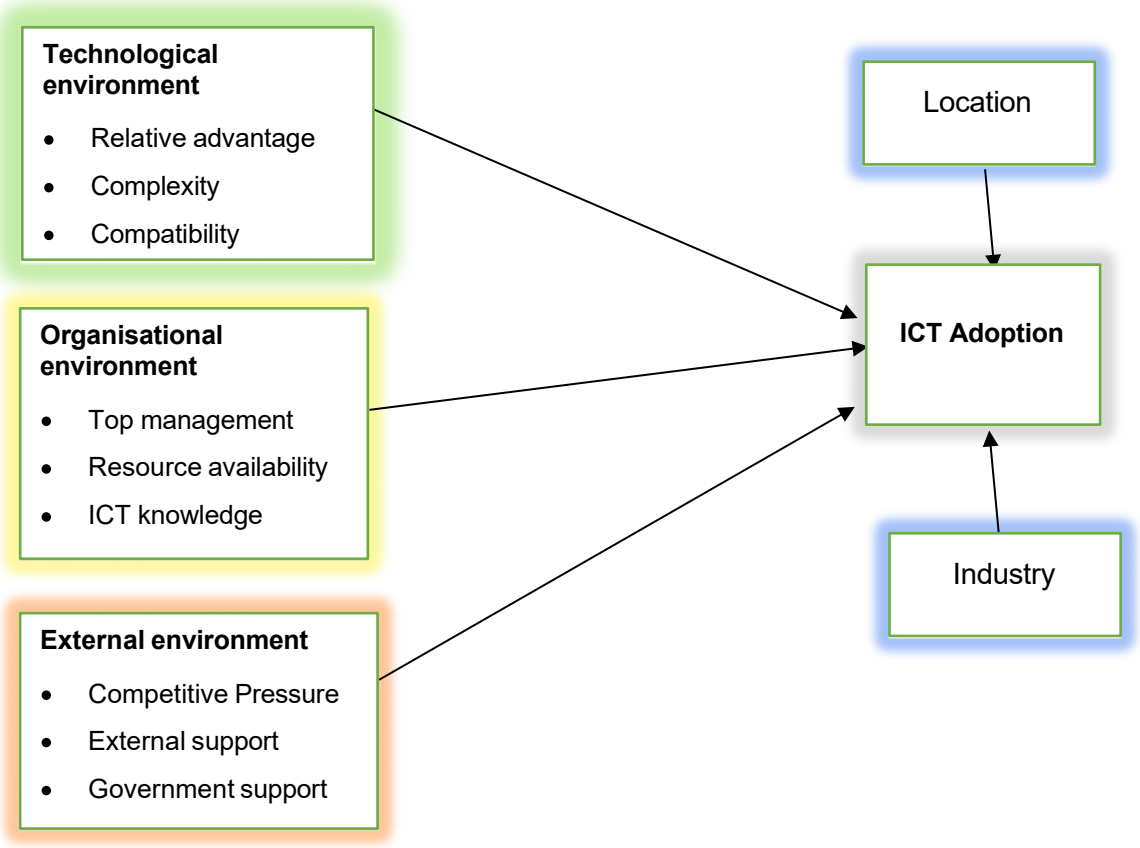
The study used the TOE model as a grounding theory that underpins this research. Tornatzky and Fleischer's (1990) TOE model comprehensively explains factors influencing ICT adoption in organisations, by proposing three contexts. The proposed contexts are technology, organisation and external environment (Nkhoma & Dang, 2013; Angeles, 2014; Oliveira & Martins, 2011). The technology context includes organisation and resources available in the market (Souza, Siqueira & Reinhard, 2017). Conversely, the organisational context characteristics are company size, centralisation, formalisation and complexity (Souza et al., 2017). Environmental context is enterprises market segment, competitors, resources provided by others, pressure from partners, competitors and government rules and regulations (Shiau, Huang, Yang & Juang, 2018). The expanded discussion on the TOE model is presented in Chapter 2. Some researchers have used technological, organisational, and environmental contexts to investigate factors influencing ICT adoption.

Brima and Sesay (2019) investigated the barriers to e-commerce adoption among SMEs in Sierra Leone and found that technological, organisational, and the external environment, influence adoption negatively. Similarly, Setiowati, Hartoyo, Daryanto et al. (2016) studied factors of ICT adoption among Indonesian SMEs in the fashion industry. Then, Usma, Ahmad and Zakaira (2019) studied the ICT adoption of Nigerian SMEs, focusing on the manufacturing sector. Therefore, this study also used the TOE model to determine factors influencing SMEs, using location and industry as control variables. This is illustrated in the conceptual framework below.

## 1.8 CONCEPTUAL FRAMEWORK

The TOE model created by Tornatzky and Fleischer (1990) serves as the conceptual foundation for this investigation. The model accurately depicts the effects of internal and external factors on adoption, considering technology, organisation, and the external environment (Nguyen, Le & Vu, 2022). Furthermore, each environment consists of components and Hashimy, Jain and Griefell-Tatjé (2023) explained the adoption process toward blockchain from the perspectives of technology (relative advantage, complexity components), the organisation using (competency, top management support components) and the external environment using (competitive pressure component). On the other hand, Tajudeen, Jaafa, and Ainin (2018) used TOE and found that technology using (relative advantage and compatibility components), the organisation using (top management support and entrepreneurial orientation component), and environment using (institutional pressure), significantly impact social media usage. Among all the components, this study used relative

advantage, complexity, compatibility and observability under the technology environment. Secondly, this study used top management, resource availability, and ICT knowledge in the organisational environment. Lastly, the study used competitive pressure and external and government support in the external environment. Testing control variables is common in ICT adoption research (Nguyen et al., 2022). For instance, Cruz-Jesus, Pinheiro and Oliveira (2019) found a significant influence of both company size and industry type on the adoption of Customer Relationship Management (CRM). As previously mentioned, this study used firm location and industry as control variables. In the next section, the research methodology of this study is discussed.




Proposed Model

Source: Tornatzky and Fleischer (1990)

## 1.9 RESEARCH METHODOLOGY

### 1.9.1 Research design

Research design is a blueprint for collecting, measuring, and analysing data (Akhtar,2016). This study used the quantitative method. The researcher used questionnaires and distributed them to rural and urban SMEs.

### 1.9.2 Population and sample

The target population of this study is SMEs in all industries across South Africa, specifically SMEs in Botshabelo, Thaba Nchu, Welkom and Bloemfontein. This study used a historical method to determine the sample size.

### 1.9.3 Sampling technique

This study used quota non-probability sampling. The SMEs were recruited verbally. The researcher visited SMEs' premises, asked them to participate in the study, and issued a questionnaire.

### 1.9.4 Instrumentation

A questionnaire is a set of questions designed to gather data regarding the views and experiences of respondents (Bhandari, 2021). This study used a questionnaire to evaluate access and usage of ICT in SMEs.

### 1.9.5 Data collection

Data collection is the process of gathering data (Bhandari, 2020). Data collection is done in two ways: primary and secondary (Sajjad Kabir, 2016). This study used primary and secondary methods to collect data.

#### *1.1.1.1 Primary data collection*

Primary data collection is an unprocessed data collection available for the first time (Muhammad & Kabir, 2016). This study used the questionnaire method to collect the primary data.

#### *1.1.1.2 Secondary data collection*

Secondary data collection is the data that has been made available before. For this study, the data was collected through academic textbooks and journal articles related to this study.

### 1.9.6 Data analysis

Data analysis is the most important research process, because it analyses and interprets the data (Faryadi, 2018). This study analysed data using Statistical Package for Social Sciences (SPSS) and Microsoft Excel. There are two types of data analysis: descriptive and inferential (Hillier,2023). This study used descriptive analysis, using frequencies and percentages to analyse. Also, descriptive analysis was used, using the mean and the standard deviation. Inferential data analysis was used by applying multiple linear regression. Hierarchical multiple regression analysis was used to investigate the effect of location and industry as control variables.

The researcher applied for ethical clearance to conduct the research. Permission to conduct research was granted by the General and Human Research Ethics Committee (GHREC) of the University of the Free State (Ethical Clearance No: UFS-HSD2023/0700).

## 1.10 DEFINITION OF TERMS

The following are the definitions of terms used in this study. Some of the terms are known and often interchangeably defined. However, this study attempted to make a distinction between these terms:

1.10.1 SME: The definition of SME differs from country to country. So, in the South African context, the revised definition is that "Small enterprise" means a separate and distinct business entity, together with its branches or subsidiaries, if any, including cooperative enterprises, managed by one owner or more, predominantly carried on in any sector or subsector of the economy (Government Gazette, 2019).

1.10.2 Digital divide: Digital divide is the gap between those who have access to ICT resources and those who do not have ICT resources (Buttice, 2021).

1.10.3 ICT adoption: ICT adoption is the use of ICT tools, such as computer hardware, software, and networks required for connecting to the Internet (Tan, Chong, Lin et al., 2009; Ghobakhloo, Arias-Aranda & Benitez-Amado, 2011).

## 1.11 CONCLUSION

Chapter 1 is an overview of this research. The chapter discussed the background and the expanded definition of the digital divide. In addition, the study comprehensively explained the existing problems related to this study, as well as why the study was important. Also, the study applied a common TOE model to analyse the factors that contribute to the problem of the study. Furthermore, the study presented the methodology that was used to answer the research questions and achieve the objectives of this study.

## CHAPTERS LAYOUT OF THE STUDY

The layout of the chapters in this dissertation is as follows:

- **Chapter 1 – Introduction, problem statement and objectives**

Chapter 1 covered the introduction and background of the study. Also, the study stated the existing problem and how the study contributed to solving the existing problem. In addition, Chapter 1 provided details on how this research was conducted in the research methodology. In brief, this chapter was fundamental to the entire research.

- **Chapter 2 – Literature review**

Chapter 2 presents the literature review on the digital divide. The chapter provides an overview of the existence of the digital divide for the past years. Also, Chapter 2 conceptualises the TOE model to understand the main factors that influence ICT adoption in SMEs.

- **Chapter 3 – Research methodology**

Chapter 3 presents a discussion on the research methodology that was used for this study. It gives an outline of how the data was collected and analysed.

- **Chapter 4 – Data analysis and results**

Chapter 4 presents the analysis and interpretation of the findings of this study.

- **Chapter 5 – Conclusion and recommendations**

Chapter 5 is the final note of this study. This chapter highlights data analysis and the interpretation of results.

# CHAPTER 2
# LITERATURE REVIEW

## 2.1 INTRODUCTION

The historical background of the digital divide was presented in Chapter 1, along with the problem statement, study objectives, and justifications for the importance of the study. Chapter 1 also provided a theoretical and conceptual framework. As a result, Chapter 2 seeks to expand on the theoretical framework for identifying the factors influencing ICT adoption in SMEs. The TOE model was the focus of this study to address the research questions.

## 2.2 DIGITAL DIVIDE

Globalisation and digitisation have changed how businesses operate and compete in global markets. Due to change, more organisations, including SMEs, have adopted ICT to transform their business activities (Najar & Dhaouadi, 2020). Firms from all industries progressively provided ICT tools to their employees (Organization for Economic Co-operation and Development (OECD), 2023). More than half of employees in SMEs now use computers with the Internet. However, the digital divide has been a growing societal concern (Lai & Widmar, 2021). The digital divide resulted from disparities in ICT access and use (Pethig & Kroenung, 2019). Furthermore, the research on the digital divide started with only observations of people who have access to computers and the Internet at their disposal (Van Dijk, 2006). Also, early research on the digital divide focused only on individuals with and without access to the Internet (Valedez & Durán, 2007). Access was correlated with demographics, such as education level, age and gender (Choudrie et al., 2005). As time went by, the research on the digital divide expanded, and around the year 2000, the study on digital divide was covered in various disciplines, such as economics, education, psychology, sociology and communication sciences (Van Dijk,2015).

In economics, the studies on the digital divide focused on the diffusion of innovation. In education, the studies on the digital divide were mainly on digital literacy. Conversely, in communication sciences, the digital divide was defined as access to and use of social media. Lastly, the digital divide in psychology was perceived as the attitude and motivation to use ICT tools (Van Dijk, 2015). The digital divide is broad and applies to various situations. Therefore,

analysing it requires considering many different factors, including geographic areas. For example, the Internet is not equally distributed within and among countries (Lopez-Sintas, Lamberti & Sukphan, 2020). Nevertheless, there is a lack of literature that comprehensively explains the digital divide. According to Scheerder, Van Deursen and Van Dijk (2017), previous studies on the digital divide lack more exhaustiveness, because many questions remain unanswered, such as how the digital divide is measured or what determines the digital divide. The above provided a comprehensive overview of the digital divide, its origins, and its implications across different academic disciplines. It emphasised the need for further research and understanding of this complex phenomenon. The next section discusses the measurement of the digital divide.

### 2.2.1 Measuring digital divide

As mentioned previously, the digital divide is broad. Thus, Van Dijk (2005) developed a model to measure the digital divide. The model measures the digital divide using motivation access, material access, skill access and usage access. Moreover, the model proposes that the digital divide results from the unequal distribution of resources and social divisions between individuals (Lopez-Sintas et al., 2020. The following is the discussion of variables Van Dijk used to measure the digital divide.

#### *2.2.1.1 Motivation access*

Motivational access is a prerequisite for using ICT tools. According to Van Deursen and Helsper (2018), the effect of factors, such as attitudes, interest, and motivation on internet usage is less studied. Therefore, motivation, as the digital divide's measuring variable, is poorly understood. Furthermore, motivation and attitude are used interchangeably by scholars. For instance, Reisdorf and Groselj (2017) measured motivation by asking participants' opinions about technologies and the Internet. Reisdorf and Groselj (2017) showed that attitude directly impacts internet adoption.

ICT is more accessible and available to most social systems. Therefore, the use of ICT does not only depend on its ownership. The desire to buy and use digital resources (such as online music and digital publications), technologies like computers and tablets, and the determination to acquire digital literacy, are examples of motivation access Lazar, Goldstein & Taylor, 2015; Lissitsa & Kol, 2016). Chang, Wang and Park (2015) contend that in order to comprehend the term "digital divide," motivation must be incorporated into the framework. Moreover, motivational access is significant in ICT adoption research (Davis, Bagozzi & Warshaw, 1992; Wu & Lu, 2003; Liaw, 2007), which warrants its inclusion in the studies on the digital divide.

Nevertheless, according to German and American surveys (ARD-ZDF, 1999a and National Telecommunications and Information Administration (NTIA), 2000), the main reasons that people do not use computers and connect to the Internet are as follows:

1. *There is little demand for or considerable usage opportunities,*
2. *Lack of time or interest,*
3. *Disapproval of the platform (deeming the Internet and computer games as 'risky' mediums) beyond,*
4. *A lack of funds - a lack of skills.*

The surveys, however, are outdated and only focus on developed countries. Since the surveys are old, the reasons for the lack of motivation in ICT could have changed over time. Also, according to Van Deursen and Van Dijk (2021), the reasons above created confusion about the digital divide. Thus, Di Giacomo et al. (2019) mentioned that it is important to include people's mental and psychological health, while examining the motive for the digital gap. To understand the obstacles of using computers and the Internet, it is vital to understand computer anxiety and technophobia. Computer anxiety is concept-specific and consists of scenarios in which people interact with computers (Gilroy & Desai, 1986, p.711). Technophobia is excessive fear or anxiety about the effects of modern technology, resulting in health issues and the inability to work efficiently (Brosnan,2002). Physical access to ICT tools is overemphasised in the study of the digital divide.

#### *2.2.1.2 Physical access*

The literature on the digital divide suggests that material access is the primary cause of the digital divide (Gonzales, 2016). For example, according to Van Deursen and Van Dijk (2019), there are significant factors other than material access that contribute to the digital gap. The first comprehensive study was conducted in developed countries towards the end of 1990 (NTIA,1990). The study was conducted in America and revealed widening access inequalities between those with high and low incomes or levels of education and between majority and minority racial and ethnic groups (Rachfal & Gilroy, 2019). However, the gender gap in physical access had already been bridged throughout those years. Only the nations of North America and North Western Europe completely closed this gap. Now, the question is why? To get answers to the above question, extensive research is needed. So, this study added to the body of knowledge that focuses on South Africa, a developing country. Also, this study did not focus on individual demographics, but more on SMEs' demographics. Nevertheless, physical access in Northern Europe, North America, and East Asia narrowed in 2000 and continued throughout 2002. For instance, those with high incomes and education levels were partially

saturated, and those with low incomes and education levels, began to catch up (Demunter, 2005; NTIA, 2002). Unfortunately, until the precise turning point is reached in rich countries, the physical access difference in poor countries continues to increase (Millennium Development Goals Indicators, 2015). As the research on the digital divide grows, some scholars argue that digital skill is a significant factor that plays a critical role in bridging the digital divide (Lybeck, Koiranen & Koivula, 2023).

#### *2.2.1.3 Skills access*

Some researchers look at skills on the technical side, while others look at the education level. Nevertheless, there are three categories of digital skills, such as literacy, fluency and mastery (Grissom, 2019). The term 'literacy' is usually the ability to read and write. However, the definition can be extended into the digital world. In the digital world, literacy is the ability to navigate, understand and redistribute information (Njenga, 2018). Thus, SMEs are deemed digitally literate if they can have these basics. Moreover, SMEs must go beyond digital literacy to digital fluency to get the most out of ICT. Digitally fluent SMEs find it easy to consume and understand the digital language. According to McGhee (2019), getting the job done is easier and faster if the team is digitally fluent. However, SMEs must strive for mastery if they want to improve digitally. Mastery is using basic ICT features, pushing the system beyond, and using more in-depth programs, such as automation tools. The ability to access and use the Internet is one factor that determines digital skill. Therefore, Van Deursen and Van Dijk (2014) developed a structure of five internet skills, which are operation skills (technical skills to use the Internet), formal skills (browsing), information skills (ability to search, find, select and evaluate the source of information on the Internet), communication skills (ability to interact, exchange information using the Internet), and creative skills (ability to create content and share on the Internet). The structure Van Dijk and Deursen developed goes beyond the technical use of the Internet. It applies to basic skills (literacy) needed to use the Internet and skills required to use the content on the Internet (fluency and mastery). Any SME can apply the structure developed by Van Dijk to be digitally competent. In order to close the digital gap between enterprises, public measures promoting ICT use in the workplace are crucial.

#### *2.2.1.4 Usage access*

Usage access refers to how frequently and what kinds of internet activities people engage in. Van Dijk (2017) claims that there are four ways to assess the quality of usage access: (1) usage duration and frequency; (2) quantity and variety of usage applications; (3) (with networks) use of broadband or narrowband; and (4) varying degrees of inventive or active use. Above all, SMEs can utilise the Internet for informational, social, commercial or amusement purposes. The usage of the Internet in business is essential for communicating

with clients, dealing with suppliers, and managing internal corporate processes (Cronin, 1995). Similarly, the usage of ICT tools is crucial for identifying (internal and external) communications, internationalisation, and competitive advantage (Ellsworth & Ellsworth,1995). However, the studies mentioned above are outdated, and the use of ICT in SMEs can extend beyond communication and be used to develop products. That is why more literature is needed, because the passionate authors on the digital divide are Van Dijk and Van Deursen. Figure 1.1 shows the digital divide measures in a sequential form.

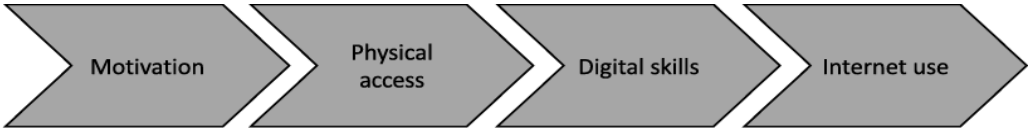



**Figure 1.1 Digital divide measures** (Van Dijk, 2005)

This study explained the measures of the digital divide to provide the foundation that the digital divide exists in SMEs, either due to a lack of motivation, physical access, skills and usage access or all of the above. However, all the measures co-exist. For example, if SMEs do not desire to use ICT tools, that leads to a lack of physical access. As a result, no ICT skills are developed, and there is no usage of ICT. Nevertheless, there are reasons for the lack of motivation, physical, skills and usage access. This is why this study investigated factors influencing ICT adoption. The section set the stage for further exploration of factors influencing ICT adoption in SMEs, as well as the potential differences in adoption between rural and urban areas. It provided a thorough framework for comprehending the complexities of the digital divide and its impact on businesses, particularly SMEs. In the next section, the researcher provided the definitions of rural and urban.

## 2.3 RURAL AND URBAN AREA INDICATORS

There is no universal definition for rural and urban. So, countries use settlement size, population density, or economic development (UN, 2018; Potts, 2017). Why is defining rural and urban areas important? Firstly, defining rural and urban can affect each country's level and rate of urbanisation. Also, an indicator of economic development may have an impact on decisions regarding the relative importance given to rural and urban areas (Potts, 2018), which can be applicable for the distribution of the national budget. Lastly, when comparing urbanisation, cross-country analyses can be complicated by varying definitions of rural and urban (Satterwaite, 2010; Cohen, 2004). Nonetheless, while many countries utilise criteria based on settlement size, there is still considerable confusion over where settlement boundaries should be placed and what threshold should be used. As a result, this has an impact on the countries' measured level of urbanisation. Furthermore, settlements of a few thousand people in many countries include shops, services, and manufacturing, whereas

larger settlements in some places are focused on farming (Satterthwaite, 2006).

Some countries may not define the term "urban" according to population density. However, 107 of the world's 231 nations identify urban zones according to settlement size or population density (UN, 2012). In addition, other countries define rural and urban areas according to economic criteria like agricultural land or employment (Potts, 2013). In 2011, 33 countries used economic characteristics to distinguish between rural and urban areas. The 33 countries included economic elements, such as paved streets and water or sewage systems (Potts, 2017; UN,2012). Furthermore, countries have different governments with different policies and regulations. Thus, policies cannot address the issues related to urbanisation if the government authorities are unsure of what constitutes rural or urban areas. Also, the government is only permitted to oversee settlements that fall under the definitions of rural and urban (Muzzini & Lindeboom, 2008), and demands for infrastructure, housing, health, education and financial services, may be met (Lazaro et al., 2017). The government situation is different in South Africa. For example, there are settlements that fall under the definition of rural and urban, but still lack infrastructure, housing, health, education and financial services. In addition, most rural areas in South Africa use river water for drinking, washing and farming, due to the need for piped water (Molobela, 2011). Moreover, in some rural areas, electricity is not available (Perkins, Fedderke & Luiz, 2005; Akbas, Kocaman, Nock, et al., 2022). Additionally, according to Murei, Mogane, Mothiba et al. (2022), limited access to water and sanitation in rural areas is no surprise, as this has been a problem for many years. As a result, a digital divide is created between rural and urban.

The definition of rural and urban was defined by StatsSA in 1996. StatsSA defined rural and urban, assigning census Enumeration Area (EA) in each geographical area, based on EA types. EA types classify EA according to the location and settlement type within an EA (StatsSA, 2001,2011). Locations reflected are urban areas with their own municipality, areas adjacent to urban areas without a municipality, and rural areas not adjacent to urban areas and have no municipality. In addition, the settlement types considered: urban formal, urban informal, rural formal, commercial farms, tribal authority, and other non-urban areas (StatsSA, 2001,2011). Settlement type is classified according to characteristics of the population of rural and urban. To simplify the definition of rural and urban areas, according to location types and settlement types, StatsSA created scenarios as follows:

1. Within the parameters of the urban area and its municipality, an EA can be classified as an ordinary town, city, vacant area or formal dwellings, such as houses, flats, hotels and others. Secondly, an EA can be classed as an area that is primarily made up of informal dwellings, such as squatter camps within the proclaimed urban area. Thirdly, an EA within the urban area can be categorised as an area with a concentration of hostels, such as mine hostels within proximities of the urban area. Lastly, an EA can be classified as an urban area with primarily hospitals and prisons.

2. An EA in adjacent areas to the municipality area (urban area), can be classified as a semi-town with formal houses outside the municipality area, but sharing at least one boundary with the municipality area. Also, an EA can be classified as an area with squatter camps outside the municipality area, but sharing at least one boundary with the municipality area. Furthermore, an EA can be classified as an area with primarily hospital and prison institutions outside the municipality area, but sharing at least one boundary with the municipality area.

3. An EA in a rural area, not sharing any boundary with the municipality area, can be coded as a semi-town in a rural area with no municipality, but has formal dwellings, such as mine houses for its employees. Therefore, electricity and water are provided by the mine. Secondly, as a village is not situated in a tribal area and has no form of authority, it has formal to semi-formal dwellings, such as houses, huts and rondavels. Thirdly, it is a tribal area with tribal authority, such as a chief. Then, it can also be classified as an informal dwelling, such as squatter camps in the rural area. Also, as an area where housing is provided by employees, such as hostels, factories and power stations, in non-urban (rural) areas, as well as an area with primarily hospital and prison institutions in the rural area. Lastly, it can be categorised as an area with farms, holiday resorts and agricultural schools/colleges owned by the owner of the agriculture area. (Statistics South Africa, 2001).

The 1991, the definition of rural and urban was not satisfactory, because the term "urban" was based on the local municipality (Atkinson, 2014). Therefore, in 2001 StatsSA redefined urban and rural and based the new definition on land use, economic activity and status. Furthermore, there were only four settlement types, the commercial farm was phased out, and ten EA types were established. So, the ten EA types were classified, and each EA fell into one of the four broad types: urban formal, urban informal, rural formal and tribal areas. Consequently, small towns and mining towns were urban (Statistics South Africa, 2001). In tribal areas, villages were identified as rural, but the bigger towns were classified as urban. In the 2011 census, the ten EA types were still used, but each EA fell into one of the three broad types: urban, rural and tribal areas. Therefore, the population in urban areas has increased over three censuses (Laldaparsad, 2012). Overall, the section provided a comprehensive exploration of the

complexities surrounding the definitions of rural and urban areas, with a particular focus on South Africa. It underscores the importance of clear definitions for various policy and planning purposes, including the allocation of resources and the implementation of infrastructure and services. Nevertheless, the location and the distance from rural areas have an impact on digital connectivity (Morris, Morris & Bowen, 2022)

### 2.3.1 Digital divide between urban and rural areas

The challenge of the digital divide faced by SMEs in rural areas, is still persistent. SMEs in rural areas remain with the challenge of the digital divide, due to difficulties in keeping up with digital connectivity and development (Velaga, Beecroft, Nelson et al., 2012). This suggests that they may lag behind their urban counterparts in terms of access to and utilisation of digital technologies. There are two levels of the digital gap between enterprises in rural and urban areas, which can be defined by geography (Salemink et al., 2017; Büchi et al., 2016; Scheerder et al., 2017). Access to ICT is the first level of the digital divide. Also, SMEs in rural locations may have internet connectivity, but the connection quality may be worse than in urban areas, according to Büchi et al. (2016) and Scheerder et al. (2017). This could lead to operational challenges and hinder their ability to fully leverage digital technologies. Therefore, regardless of location, digital connectivity should be equally prioritised between SMEs. This suggests a call for policies and initiatives that address the specific challenges faced by rural SMEs in accessing and utilising digital technologies. In summary, the section underscores the importance of addressing the digital divide between rural and urban SMEs, particularly in terms of ensuring equitable access to high-quality digital connectivity. This is crucial for enabling SMEs in rural areas to compete effectively in the digital economy.

## 2.4 SMALL MEDIUM ENTERPRISES (SMEs)

SMEs are a solution to the economic growth and development challenges in emerging economies (Damingo, 2017). Moreover, SMEs play a role in socio-economic aspects, such as generating employment, fostering entrepreneurship, promoting exports, and supporting industrial growth (Miroro, 2016; Nyeko, Kabaale, Moya et al., 2013; Tarutė & Gatautis, 2014). In most countries, SMEs contribute a substantial percentage of the GDP, provide economic stability, and are the driving force for new business ventures (Ashrafi & Murtaza, 2008; Chugtai & Alam, 2014; Ongori & Migiro, 2010). For example, in the US, 99.7 percent of jobs are created by SMEs and more than 95 percent worldwide. In the UK, SMEs create 62 percent of employment and contribute 25 percent of the GDP (OECD, 2018). Additionally, in Italy, 79 percent of employment is created by SMEs, while in France, SMEs account for 60 percent of employment and in Germany, 60 percent. Likewise, in Africa, SMEs play a significant role in economic development by contributing between 40-60 percent of the GDP in Sub-Saharan

(SSA) countries (Fjose, Grünfeld, and SQW, 2010) and employment (Muriithi, 2016). Nonetheless, SMEs significantly reduce poverty in developing countries and create business opportunities and entrepreneurial skills in rural areas (Okundaye, 2016). In South Africa, SMEs are the key drivers of the economy, contributing 34 percent of the GDP and 50-60 percent of employment in the country. However, SMEs in South Africa are stagnant, and only 14 percent are formalised, minimising job creation and the economy's contribution. According to Maseko and Manyani (2011), SMEs are stagnant, due to various factors, such as insufficient funds, entrepreneurship, accounting and management skills, and failure to adapt to market change. Considering SMEs' significant impact on the economy, it is very important to ensure that SMEs move from stagnation and survive for the long term. This means that all relevant action must be taken to ensure SMEs survive, including the usage of ICT. What are SMEs?

### 2.4.1 Definition of SME

A lot has been said about how SMEs contribute to the economy of South Africa. However, it is important to define SMEs. There is no universal, globally accepted definition of SMEs (OECD,2017). Instead, definitions vary from country to country, and they are often based on the economic growth stage of the respective country. In fact, scholars find it difficult and challenging to study all dimensions of SMEs in a single definition. As a result, different institutions and governments use various criteria, such as the number of employees, annual sales, total assets, and other factors to define SMEs (Liberto, 2022). While definitions may vary, common parameters used, include the number of employees, turnover, and business assets. These factors are widely accepted as standard instruments for defining SMEs (European Commission (EC),2020). According to OECD and IMF, SMEs employ at least 249 persons. Furthermore, the category is divided into micro (1-9 employees), small (10-49 employees) and medium (50-249 employees). In the USA and Canada, all enterprises that employ less than 500 people, are classified as small (Beyene,2002). In Egypt, however, enterprises are classified as small if they employ 1-10 permanent staff, while enterprises that employ 10-50 permanent staff, are classified as medium (Central Agency for Public Mobilization and Statistics (CAPMAS),2018).

In Kenya, small enterprises are all businesses with 10-50 permanent staff, while medium enterprises are all businesses with 50-100 permanent staff (CAPMAS,2018). Turnover is also used to define SMEs, and the threshold ranges between 50 million to 70 million US dollars in developed countries and between 1 million to 5 million US dollars in developing countries. For example, in Zimbabwe, SMEs are all businesses that employ 6-75 permanent staff with an

asset base of 250 000 million US dollars to 2 million US dollars and an annual turnover of 500 000 US dollars to 3 million US dollars (Dlamini and Schutte,2020). Theoretically, the definition of SMEs is subjected to the industry of SMEs, economic integration and population of the country (Kushnir, 2010). Nonetheless. in South Africa, SMEs are defined by the National Small Enterprise Act 2004 (Act No 29 of 2004). The definition is categorised according to the sector's turnover threshold, which is subjected to inflation. Secondly, the term is defined according to two proxies: the total number of full-time employees and total annual turnover. Lastly, SMEs are defined according to size (micro, small, medium). All in all, the section underscored the complexity and diversity in defining SMEs globally. It highlighted the importance of considering various factors, including the number of employees, turnover, and other economic indicators, in determining SME status. Additionally, it emphasised the need for flexible definitions that can adapt to different economic contexts and industry-specific characteristics. Table 2.1 shows SMEs are defined according to the National Small Enterprise Act 2004 (Act No 29 of 2004). The next section highlights the transformative impact of ICT on businesses, particularly SMEs, and points out the persistent challenges they face in adopting and effectively utilising ICT.

**Table 2.1: SCHEDULE 1: The new National Small Enterprise Act.**

| Sectors or sub-sectors in accordance with the Standard industrial classification | Size or class of enterprise | Total Full-time equivalent of paid employees | Total annual turnover |
|---|---|---|---|
| **Agriculture** | Medium | 51-250 | ≤ 35 million |
| | Small | 11-50 | ≤ 17 million |
| | Micro | 0-10 | ≤ 7 million |
| **Mining and Quarrying** | Medium | 51-250 | ≤ 21 million |
| | Small | 11-50 | ≤ 50 million |
| | Micro | 0-10 | ≤ 15 million |
| **Manufacturing** | Medium | 51-250 | ≤ 170 million |
| | Small | 11-50 | ≤ 50 million |
| | Micro | 0-10 | ≤ 10 million |

| | | | |
|---|---|---|---|
| **Electricity, Gas and Water** | Medium | 51-250 | ≤ 180 million |
| | Small | 11-50 | ≤ 60 million |
| | Micro | 0-10 | ≤ 10 million |
| **Construction** | **Medium** | **51-250** | ≤ 170 million |
| | **Small** | **11-50** | ≤ 75 million |
| | **Micro** | **0-10** | ≤ 10 million |
| **Retail, Motor Trade and repair services** | **Medium** | **51-250** | ≤ 80 million |
| | **Small** | **11-50** | ≤ 25 million |
| | **Micro** | **0-10** | ≤ 7.5 million |
| **Wholesome** | **Medium** | **51-250** | ≤ 220 million |
| | **Small** | **11-50** | ≤ 80 million |
| | **Micro** | **0-10** | ≤ 20 million |
| **Catering, Accommodation, and other trade** | **Medium** | **51-250** | ≤ 40 million |
| | **Small** | **11-50** | ≤ 15 million |
| | **Micro** | **0-10** | ≤ 5 million |
| **Transport, storage, and communications** | **Medium** | **51-250** | ≤ 140 million |
| | **Small** | **11-50** | ≤ 45 million |
| | **Micro** | **0-10** | ≤ 7.5 million |
| **Finance and Business Services** | **Medium** | **51-250** | ≤ 85 million |
| | **Small** | **11-50** | ≤ 35 million |
| | **Micro** | **0-10** | ≤ 7.5 million |
| | **Medium** | **51-250** | ≤ 70 million |

| | | | |
|---|---|---|---|
| **Community, social and Personal Services** | **Small** | **11-50** | ≤ 22 million |
| | **Micro** | **0-10** | ≤ 5 million |

Source: Government Gazette (2019)

## 2.5 SMEs AND ICT

ICT has changed how business is conducted and how the world creates and shares information or ideas. Thus, this has encouraged SMEs in both developed and developing countries to adopt ICT. In contrast, however, the International Trade Centre (ITC) (2022) reports that the digital divide gap between SMEs and large firms in Sub-Saharan countries is huge. This means that even though SMEs have access to ICT, they lack basic knowledge of how to use ICT, resulting in difficulty competing with larger firms. Due to the difficulty competing with large firms, SMEs remain stagnant, and large firms continue to thrive digitally. Also, despite the ongoing development in ICT across the globe, the gap between the use of ICT and SMEs' growth still increases. Relatively, the European Commission reports that only 2 percent of SMEs take the opportunity to use ICT. Therefore, some scholars have tried to study why SMEs fail to use ICT and its benefits (Chege, Wang & Suntu 2019). A study by Esselaar, Stork and Ndiwalana (2007) researched 13 African countries among others, Mozambique, South Africa and Tanzania. Also, Heeks (2010) and Chacko and Harris (2006) conducted a study, analysing the use of ICT in SMEs in the Asia Pacific region. Additionally, Grazzi and Pietrobelli (2016) explored the use of ICT in SMEs in Latin America and the Caribbean. Though there is growth of research in this area, the literature suggests the need for more context of ICT. The question that remains is, why do SMEs fail to use ICT? In a drive to answer the above question, it is paramount to understand the challenges SMEs face in adopting ICT.

### 2.5.1 Challenges to adopting ICT in SMEs

ICT adoption has become a centerpiece in SMEs, where its critical role and developing challenges have led policymakers to come up with strategies in order to support SMEs. Notwithstanding the advantages and opportunities that digital technology offers, many SMEs still lag in adoption. For instance, the OECD (2022) reports that in nations like Greece, Hungary, Poland, Portugal and Turkey, less than or equal to 40 percentage of employees in SMEs have access to connected computers and around 80 percentage of large organisations in Denmark, Finland and Sweden are currently connected to computers. The nations

mentioned above are, nonetheless, European nations. There is also the presumption that deploying ICT helps firms expand and prosper (Morawczynski & Ngwenyama, 2007; Modimogale and Kroeze, 2011). However, not all environments are the same, and the adoption of ICT faces both internal and external barriers (Mbuyisa & Leonard, 2017). Also, there are notable differences between industries in terms of the degree of effort and the instruments used.

ICT adoption is more prevalent in sectors characterised by a high reliance on knowledge, like information and communication services (Zhu, Xie & Chen, 2023). Conversely, in the accommodation and food industries, technologies, such as fast broadband connections, website maintenance, and employing cloud computing for data storage, are key factors associated with elevated value addition and noticeable disparities in digital capabilities. In the wholesale industry, e-sales and cloud computing to host databases and the training of ICT specialists, are the primary technologies that create gaps in ICT and value-added, while in retail trade, the same technologies are used to manage client relationships (OECD, 2021). The studies do show the difficulties faced by SMEs in many industries. However, they do not differentiate between SMEs in rural and urban areas. South Africa is notable for its urban bias in electricity, with the ratio of urban-rural access to electricity being almost 3.5 times that of other SSA countries (Sarkodie & Adams, 2020). The availability of electricity is necessary for the widespread adoption of ICT. Other obstacles to ICT adoption include:

1. The internal skills gap that stops managers and employees from finding the digital solutions they need to implement business models.

2. Finance gap: SMEs have trouble obtaining funding for intangible digital investments that cannot be readily pledged as security for a loan.

3. There is also an infrastructure gap. The digital transformation of SMEs depends on high-speed broadband.

This section highlighted the complex landscape of ICT adoption in SMEs, emphasising industry-specific variations, urban-rural disparities, and the multifaceted challenges faced by these enterprises. It also emphasised the importance of targeted policies and support mechanisms to facilitate ICT adoption in SMEs. Many SMEs are missing out on the benefits of incorporating ICT into their daily operations (Gandhi, Khanna & Ramaswamy, 2016).

### 2.5.2 Benefits of ICT in SMEs

ICT is one technique that has improved resource allocation, decreased the cost of production, and increased investment in economic aspects (Bahrini & Qaffas, 2017). ICT tools have a major positive impact on enterprises (Solek-Borowska, 2018). For instance, according to Pillay (2016), ICT reduces transaction costs by enabling better and faster access to information and communication among employees, suppliers and networks. Furthermore, ICT significantly increases the potential for trading services, which can help SMEs integrate into global markets by cutting the costs associated with border and transportation procedures. It also improves access to resources, such as financing (e.g., peer-to-peer lending), government services, training and recruitment channels. It also promotes innovation and easier access to innovation resources, as well as the ability for firms to generate data and undertake innovative analysis of their own operations, in order to improve performance (OECD,2021). Since there are benefits in adopting ICT, there is also a need for ICT adoption theories to be applicable across various disciplines, and this has been debated among scholars (Gruber,2020; Venkatesh, Thong & Xu, 2016). To sum up, this section emphasised the transformative impact of ICT on SMEs. Additionally, it highlighted how ICT facilitates efficiency, global integration, access to resources, and innovation, while also acknowledging the ongoing academic discourse on the theoretical frameworks surrounding ICT adoption.

## 2.6 ICT ADOPTION THEORIES

The debates on ICT adoption theories prompted further research into how people access and use ICT. For example, Jeyaraj, Rottman and Lacity (2006) investigated the impact of independent variables on ICT adoption as dependent variables. In addition, Venkatesh, Morris and Davis (2003) developed eight models to present a coherent theory of the adoption and application of technology. Nonetheless, several ICT adoption theories have been created to offer a thorough understanding of the phenomenon. In order to create theories or models that explain ICT adoption, the bulk of researchers use diverse techniques, such as factor theories (Weber,2012).

Factor theories are frequently applied to ICT adoption research. Factor theories also frequently employ reductionism (Burton-Jones, McLean & Monod, 2015; Weber,2012). According to the philosophy of reductionism, a phenomenon can be explained in terms of other, more basic and straightforward occurrences (Zsolnai, 2022). As a result, the reductionism approach adds up several components as independent or dependent factors to high statistical accuracy and parsimony when describing or forecasting individual behaviours (de Guinea & Webster, 2017).

Statistical accuracy tells how far results or measurements are from an actual value. Statistical parsimony refers to the use of a simple model with fewer parameters to explain a phenomenon (Fan, Chen, Shirkey et al., 2016). Nonetheless, as much as factor theories offer a straightforward explanation of ICT adoption, they only offer "snapshots of a scenario." (de Guinea & Webster, 2017, p. 150). Consequently, this limits the researchers' comprehension of the causes and mechanisms underlying acceptance and diffusion. Furthermore, to explain, anticipate, and comprehend ICT adoptions, researchers regularly criticise factor theories for their deterministic structures and excessively linear and mechanistic correlations. (Burton-Jones et al., 2015; Ortiz de Guinea & Webster, 2017).

Many of the adoption studies rely more on determinism, as if ICT is predictable and straightforward. Determinism is the belief that all decisions and actions in the universe are inevitable and necessary (Baumeister, Clark & Lau, 2021). For example, if a human makes certain decisions or takes a certain action, it is impossible that they would have taken any other action. Nevertheless, the above-stated studies show that it is not always a good idea to apply factor theory, particularly when there are a lot of enablers and obstacles to consider. In these situations, the number of factors required to explain ICT adoption can contradict each other (Gruber, 2020; Shove, 2010). Therefore, to bridge the deterministic of most factor theories, additional research is urgently needed to provide insight into the socio-economic dynamics of rising ICT adoption (Sunday & Vera, 2018). Hence, this study did not focus only on factors affecting ICT adoption, but also on how these factors affect ICT adoption and how it leads to a digital gap. The study sought ways to close the gap by first identifying the factors influencing ICT adoption. Several models exist to explain ICT adoption, such as the innovation diffusion theory and the technology acceptance model (Muriithi, Horner & Pemberton, 2016). This study used the TOE model to find factors influencing ICT adoption and how these factors impact the digital gap among SMEs.

### 2.6.1 TOE Model (Technology, Organisation, and External Environment)

The theoretical frameworks utilised to examine ICT adoption, serve as the foundation to study the digital divide. To study ICT adoption, several frameworks, including the Technology Acceptance Model (TAM), Diffusion of Innovation (DOI), and TOE, are used. The mentioned models all have one thing in common: they demonstrate that ICT adoption combines technical, social and environmental factors. Moreover, TAM, DOI, and TOE seek to ascertain the attitude of enterprises towards ICT adoption. (Skafi, Yunis & Zekri,

2020). The TOE framework was used in this study. TOE studies the effects of organisations and their constituent parts on ICT adoption. Moreover, TOE was applied in this study, because TAM and DOI emphasise more technological elements. However, technological features do not highlight the subjective nature of decision-makers' thoughts (Skafi, Yunis & Zekri, 2020).

The proposed three contexts by Tornatzky and Fleischer's (1990) TOE model thoroughly explain the elements driving ICT adoption in enterprises. The suggested contexts include technology, organisation and the external environment (Nkhoma & Dang, 2013; Angeles, 2014; Oliveira & Martins, 2011). Moreover, several studies utilise TOE to examine ICT adoption in organisations (Abed, 2020). Technology includes both established and developing technologies that are relevant to numerous industries. On the other hand, the organisational context shows businesses' scope, size and resources. According to Venkatesh, Thong, and Xu (2012), the external environment illustrates the context in which businesses operate in terms of the sector, competitors and government.

The TOE can be applied in a different context (Nguyen, Le & Vu, 2022). Several perspectives on technology are used by Hashimy, Jain and Grifell-Tatjé (2023) to explain the adoption procedure (i.e., relative advantage, complexity). Moreover, Tajudeen et al., (2018) used TOE and discovered that technology, organisation and environment have an impact on social media usage. El-Haddadeh, Osmani, Hindi et al. (2021) assert that technology, organisation and environment have an impact on top management, adoption, and value creation throughout UK enterprises. On the other hand, Khan, Khan, Bahadur et al. (2021) discovered how adoption and ICT usage behaviours for mobile are impacted by the TOE model in enterprises based in China and Pakistan. Mahakittikun, Suntrayuth and Bhatiasevi (2020) also used TOE to evaluate how Thai businesses operate when they accept mobile payments. The results above clearly show that additional research in South Africa, using the TOE model is needed, which is why this study is unique. Also, the studies above focus on organisations as a whole and do not differentiate between large firms and small firms. However, this study, to be specific, focused on SMEs. Various researchers, like Oliveira and Martins (2010), have been arguing that combining the factor theories/frameworks/models should be taken into consideration, because of its impact in organisations' decisions, strategies and policies. Oliveira, Thomas and Espadanal (2014) also identify factors of cloud computing adoption in the service industry and manufacturing, using the TOE and DOI theory. The studies mentioned above, unequivocally demonstrate the necessity for more research in South Africa, using the TOE paradigm. Despite the research's emphasis on organisations, they do not distinguish between large and small businesses. Due to influence on companies' decisions, strategies and policies, numerous academics, including Oliveira and Martins (2010), have stated that merging the factor theories, frameworks, and models should be

taken into consideration (Poulis, Poulis & Plakoyiannaki, 2013). Using the TOE and DOI theory, Oliveira et al. (2014) uncover factors influencing cloud computing adoption in manufacturing and the service sector.

Some studies have explored ICT adoption within enterprises by combining TOE with other common models (Nguyen, Le & Vu, 2022). For instance, Thong and Yap showed the importance of combining the characteristics of different models in developing a solid theory to study the adoption of innovation. Furthermore, Chatterjee, Rana, Dwivedi et al. (2020) combine the TOE and TAM models to explain why firms choose to integrate artificial intelligence (AI) into their manufacturing and production. Hiran and Henten (2020) use both the TOE and DOI models to show a connection between technological, organisational and social elements of cloud computing utilisation among educational organisations. Chatterjee et al. (2020) claim that TOE-TAM influences firms' adoption of AI. Additionally, according to Piaralal, Nair, Yahya et al. (2015), the integration of TOE and DOI theory provides SMEs with a clear theoretical framework for taking both internal and external issues into account when implementing ICT. TOE and DOI theories are thus combined by certain academics to explain ICT adoption in companies. For instance, TOE and DOI theories are combined by Ramdani, Kawalek and Lorenzo (2009) to identify adoption enterprise variables. Like this, Wang, Wang and Yang (2010) investigate factors impacting the adoption of Radio Frequency Identification (RFID) in the manufacturing industry, using the TOE and DOI theories. Moreover, Alshamaila, Papagiannidis and Li (2013) examine factors impacting SMEs' adoption of cloud computing, using the TOE and DOI theory. As mentioned above, this study used the TOE model, and the TOE model constitutes of three contexts, which are discussed below.

#### *2.6.1.1 Technology context*

Technology is reflected in many studies as a factor influencing the adoption of new technologies. Yet, Baker (2012) contends that for new technology to be embraced, the company needs to have a robust ICT infrastructure, technical staff members and user time. The level of technology adoption a company can handle, can be determined by the technology that is already in place. According to Metaxiotis (2009), who agrees with Baker, technology is more than merely having the right tools, but the organisation must have creative and talented individuals. Hence, if a corporation lacks the capacity, such as workers with suitable abilities, introducing new or advanced technologies would be a waste of resources. Nonetheless, accelerated technological development brought on by the Internet, globalisation, and growing digitalisation, has decreased product life. Furthermore, despite differences in size, kind and industry, businesses are forced to adapt, due to growing digitisation, internet-driven quick advancement, and globalisation that have reduced product life cycles.

The role of technology in advancing economies and giving businesses financial advantages, is significant enough (Rupeika-Apoga, Bule & Petrovska,2022). According to Rupeika-Apoga et al. (2022), Total Quality Management (TQM) and technology are both important determinants for the organisations' success. Moreover, technology is essential for improving an organisation's performance, according to Mahakittikun Suntrayuth and Bhatiasevi (2021). Mumtahana, Nita and Tito (2017) mention that several technological obstacles have a detrimental effect on the performance of SMEs. Thailand-based SMEs showed that technology and company performance were positively correlated. The market's structure and resources are part of the technology context (Souza et al., 2017). Furthermore, internal and external factors that affect organisational ICT adoption are included in the technological contexts (Huang, Janz & Frolick, 2008). The factors are relative advantage, complexity, compatibility and observability.

#### *2.6.1.1.1 Relative advantage*

The perception that new technology is better than an existing concept, is known as relative advantage (Wayne & LaMorte, 2022). Like this, the relative advantage is connected to the extent to which an innovation is anticipated to benefit businesses (Rogers, 2003). The advantages of the innovation over its alternatives are crucial in encouraging ICT adoption. It means that decisions about adoption are heavily dependent on the proportionate advantage that the innovation provides for businesses (Ali Abbasi, Abdul Rahim et al., 2022). Furthermore, businesses are more inclined to accept an innovation if they believe it would improve and be profitable for their operations (Chatterjee, Rana and Dwived, 2021). Researchers found that relative advantage influences adoption intentions towards big data (Park & Kim, 2021), blockchain (Hashimy, Jain & Grifell-Tatjé, 2023) and social media marketing (Ali Abbasi et al., 2022), as well as mobile data (Khan et., 2021).

While convenience, satisfaction, and a high standard are important, other metrics, such as financial gains, also evaluate whether the innovation offers a relative advantage. According to Chiu, Chen and Chen (2017), one of the important factors influencing ICT adoption in Malaysia, is relative advantage. Furthermore, SMEs’ owners or managers are more likely to employ ICT technologies if it would assist the company to succeed (Maduku, Mpinganjira & Duh, 2016). Nonetheless, existing research indicates that the availability of financial resources is more likely to impact the adoption of new ICTs (Nguyen & Petersen, 2017). Therefore, if other SMEs are more financial resourceful than the other SMEs, it leads to digital divide among SMEs.

#### *2.6.1.1.2 Complexity*

Complexity is the degree to which innovations are thought to be difficult to comprehend and apply, because of a lack of abilities and knowledge (Kumar & Krishnamoorthy, 2020; Senyo, Effah & Addae, 2016). Moreover, innovations that are easy to master, tend to be accepted more quickly, compared to innovations that are difficult to use (Jere & Ngidi, 2020). Moreover, complexity has been utilised in studies by several researchers (Ahmadi, Khanagha & Berchicci, 2017; Alsetoohy, Ayoun & Arous, 2019; Badi, Ochieng & Nasaj, 2021; Gökalp, Gökalp & Çoban, 2022). According to Ahmadi et al. (2017), the level of complexity affects the relationship between motivational factors and managers' preferences. Badi et al. (2021) study the adoption of smart contracts, using complexity as a factor. Chen, Hu, Zhou et al. (2023) use complexity to study the impact of AI adoption. On the other hand, Gökalp et al. (2022) also use complexity as a factor to study adoption in organisations. Nevertheless, owners' concerns about the potential risks and the fear of being left behind, have been cited as factors influencing their decision on whether or not to embrace ICT. The level of complexity associated with technological innovation, may be a key determinant between adopting and not adopting technology (Abualrob & Kang, 2016). Moreover, small-business owners and managers might believe that sending employees to expensive and time-consuming training would be costly. Complexity is a significant factor, influencing the adoption of new technologies, according to Abualrob and Kang (2016).

#### *2.6.1.1.3 Compatibility*

Compatibility is how innovation is aligned to the current value, past experiences and needs of potential visible adopters (Rogers, 1962; Shiau, Huang, Yang et al., 2018). Moreover, compatibility is a crucial technological feature that is vital for an organisation's behavioural pattern, value and requirements. It has been noted as a motivator for the adoption of innovation. Accepting new technology is easier if management believes in it and understands how it will interact with existing systems and operational procedures (Borgman, Bahli, Heier et al., 2013). According to Alsetoohy et al. (2019), businesses accept innovations in line with their principles and require little modification. Studies in the past showed a substantial link between compatibility and innovation adoption. According to Ghobakhloo and Hong Tang (2013), several studies have presented that compatibility has an impact on the adoption and use of ICT, particularly e-commerce. Relatively, to a Malaysian study on the use of ICT by SMEs, compatibility is a key consideration (Chiu et al., 2017). According to Verma and Bhattacharyya's (2017) empirical study, compatibility has an effect on BDA adoption in SMEs. Similarly, Tajudeen et al. (2018) endorsed the critical significance of compatibility in business involvement in social media marketing. With the use of TOE, Tajudeen (2018) discovered that social media usage for gaining knowledge of customer needs and enhancing organisational

communication and public relations, is highly impacted by compatibility. Khan et al.'s (2021) mobile payment solutions are more likely to be used if they are compatible with the technological architecture and work practices already in place across businesses in China and Pakistan. In contrast, Maroufkhani, Tseng, Iranmanesh et al.'s (2020) findings show that relative advantage and compatibility do not affect BDA adoption among SMEs.

#### *2.6.1.1.4 Observability*

A measure of innovation's observability is how clearly its effects can be seen (Rogers, 1962; Shiau et al., 2018). According to Rogers (2003), the visibility of anticipated results from an innovation, is interpreted as observability. The use of innovation will produce visible and measurable outcomes. Previous studies argued that the more observable an innovation is, the more likely it is to be adopted by an organisation (Jilani, Moniruzzaman, Dey et al., 2022). According to Maroufkhani, Desouza, Perron et al. (2022), there is a positive correlation between observability and the desire to adopt big data analytics. Thus, businesses are more likely to utilise big data if they are aware of the success factors of others. The adoption of cloud Enterprise Resource Planning (ERP) by businesses appears to be significantly predicted by observability, according to research by Ruiz-Alba, Guesalaga, Ayestarán et al. (2019). Businesses are more willing to interact with, promote, and express these innovations when successful outcomes are apparent. Khan et al. (2021) further highlighted the significance of observability in encouraging a firm acceptance of mobile payment systems. Jilani et al. (2022) agreed with the notion that by making health applications more visible to potential users, more users would express their involvement with the applications. In essence, more observability causes innovations to be adopted more quickly.

### *2.6.1.2 Organisational context*

The organisational context characteristics are company size, centralisation, formalisation and complexity (Souza et al., 2017). Equally, organisation context focuses on descriptive measures, such as availability and proficiency in using resources, the size and the scale of the firm, societal impacts, cultural and structural setups, sources of information and modes of communication, the level of centralization, and managerial perspectives (Zhu et al., 2023; Kannabiran & Dharmalingam, 2012; Pan & Jang, 2008). Conversely, the organisational context comprises internal factors such as management, employees, products and services (Shiau et al., 2018). According to Low et al.'s (2011) findings, the support from top management in the organisation is a significant factor influencing ICT adoption. Relatively, top management's support, influences the favourable disposition and encouragement of ICT. Also, top management's knowledge of technology favours ICT adoption in the enterprise (Awa,

Ojiabo & Emecheta, 2015; Yoon & George, 2013; Alatawi, Dwivedi & Williams, 2012). Hollenstein (2004) states that top management's knowledge, influences ICT adoption, and employees' knowledge, influences ICT adoption in SMEs. Moreover, the information intensity of a company's products and services impacts ICT adoption in SMEs (Al-Qirim, 2008, Shiau, et al., 2018). Also, the study by Spinellis and Giannikas (2012) indicates that that the size of an organisation has a significant impact on the adoption of new technology. Similarly, organisation size is a critical factor in RFID, e-commerce and ERP adoption (Wang et al., 2012; Hossain & Quaddus, 2011; Ramdani et al.,2009). In addition, the study by Siamagka and Balabanis (2015) uses organisation size as a control variable to study the adoption of social media. Furthermore, the firm scope influences the decision of enterprises to invest in new technology (Hitt, 1999; Zhu et al., 2023). To sum up, the studies above are relevant in explaining how organisation context influences ICT adoption, however, more literature is still needed, because the organisation structure changed over the years. Also, organisation context results will differ according to geographical location, since no global definition of SMEs exists. Which is why this study used location as a control variable.

#### *2.6.1.3 Environmental context*

Environmental context comprises of enterprises' market segment, competitors, resources provided by others, pressure from partners, competitors, and government rules and regulations (Shiau et al., 2018). Conversely, studies from the past show that competitive pressures influence the adoption of information technologies by enterprises (Ghobakhloo, Arias-Aranda, and Benitez-Amado, 2011). Relatively, Stockdale and Standing's (2006) findings show that trading partners play a role in influencing the adoption of e-commerce by Small and Medium-sized Enterprises (SMEs). According to Dahnil, Marzuki, Langgat, et al. (2014), the attitude, policies, and initiatives of governments also have an influence on SMEs' adoption of innovative technology. Additionally, Lee, Hwang, Kang et al. (2014) state that government support is important in encouraging the adoption of cloud computing among enterprises. To conclude, as much as SMEs decide to adopt ICT, it always boils down to individuals, such as business owners. A firm's strategic and tactical focus, or/and enterprise-level innovation adoption, is mainly dependent upon the firm's decision actors attitudes, perceptions, psychographics, motivation, and other individual difference factors (Hambrick & Mason, 1984; Awa et al., 2015)". The attitudes, beliefs, psychological traits, and motivations of decision-makers are frequently shaped by their social status. For instance, a study by Samson and Hornby in 1988, found that 73 percent of executives in major Chinese cities possess mobile phones, not solely for practical purposes, but to signal their social status. Additionally, individuals who engage with communication platforms tend to be more motivated by status. Various factors contribute to social status, leading to the emergence of a "digital

divide."

These dimensions include authority, financial resources, societal standing, educational attainment, occupational prestige and various others (Gabrenya, 2003; Aziz, 2015). Disparities in society are closely linked to discrepancies in digital access. As a result, numerous scholars aim to investigate sociological frameworks, such as Simmel's information model (Muschert & Gunderson, 2018), Weber's stratification theory (Ragnedda & Ruiu, 2017), Giddens' structuration theory (Helsper, 2012), and Bourdieu's constructivist structuralism (Straubhaar, et al. 2012; Villanueva-Mansilla, et al. 2015). Nevertheless, few studies that employed TOE to examine ICT adoption in enterprises, are included in Table 2.2. All the studies listed on Table 2.2, show that the study gained notoriety during COVID-19. As a result, this study will add to the body of literature that is still needed for this topic.

**Table 2.2.: Studies using TOE model**

| **Title** | **Reference** | **Methodology** | **Results of the study** |
|---|---|---|---|
| Digital Technology Adoption in SMEs: What Technological, Environmental and Organizational Factors Influence in Emerging Countries? | Shahadat, M.H., Nekmahmud, M., Ebrahimi, P. and Fekete-Farkas, M., 2023. Digital Technology Adoption in SMEs: What Technological, Environmental and Organizational Factors Influence in Emerging Countries?. *Global Business Review*, p.09721509221137199. | A quantitative method was used. 900 questionnaires were distributed to higher and middle-level managers of SMEs in Bangladesh | Relative advantage( β=0.167), Competive pressure(β=0.584), Complexity (β=0136), and Top management (β=0.113) positively influences ICT adoption. Government support (β=-0.135), and Perceived Cost (β=-0.139) negatively influence ICT adoption. |
| An Extended Technology-Organisation-Environment (TOE) Framework for Online Retailing Utilisation Evidence from Vietnam | Nguyen, T.H., Le, X.C. and Vu, T.H.L., 2022. An extended technology-organization-environment (TOE) framework for online retailing utilization in digital transformation: empirical evidence from vietnam. *Journal of Open* | A survey was used using a cross-sectional design. The study's target sample was managers, directors, and | The technological context (relative advantage and observers), organisational contexts (top management, technology orientation), and external context (government support) influence ORE adoption, |

| | | | |
|---|---|---|---|
| | *Innovation: Technology, Market, and Complexity*, *8*(4), p.200. | officers. | whereas competitive pressure does influence ORE adoption. |
| Factors Influencing SMEs' Adoption of Cloud Computing Services in Lebanon: An Empirical Analysis Using TOE and Contextual Theory | Skafi, M., Yunis, M.M. and Zekri, A., 2020. Factors influencing SMEs' adoption of cloud computing services in Lebanon: An empirical analysis using TOE and contextual theory. *IEEE Access*, *8*, pp.79169-79181. | The questionnaire was used to collect data from IT managers, and regression was used to test independent variables. | Technological, Organisational, and external factors influence cloud computing adoption in SMEs in Lebanon. |
| Factors affecting the adoption of information and communication technology in small and medium enterprises: a perspective from rural Saudi Arabia | AlBar, A.M. and Hoque, M.R., 2019. Factors affecting the adoption of information and communication technology in small and medium enterprises: A perspective from rural Saudi Arabia. Information Technology for Development, 25(4), pp.715-738. | The study was quantitative, and a cross-sectional survey was used to collect data. The data was analysed using prtial least square and statistical analyses technique. | The study found a positive relationship between environmental factors such as government regulations and ICT adoption. The relationship between technological factors such as owners' ICT knowledge and innovativeness and ICT adoption was statistically significant. Organisational factors( top management and culture) influence ICT adoption. However, factors such as complexity and compatibility do not influence ICT adoption. |

Source: Researcher's own

## 2.7 CONCLUSION

This chapter reviewed the literature on the digital divide, followed by the definition of rural and urban areas in South Africa. Furthermore, the study reviewed the literature on SMEs. The study unfolded the ICT adoption in SMEs, the challenges and the benefits of ICT. The study further discussed the TOE model and its three contexts. The following chapter discusses the methodology the researcher followed in this study.

# CHAPTER 3
# RESEARCH METHODOLOGY

## 3.1 INTRODUCTION

Research methodology is the process which researchers follow to conduct their research. Relatively, it shows the steps that researchers take to formulate the research problem and objectives. Research methodology shows how the research outcome was obtained, following the objectives of the study. This chapter focuses on research methods and procedures used during the research process. The chapter highlights the philosophical worldviews, research design, research methods, population, sampling techniques, sampling size, questionnaire, data collection, data analysis and ethical considerations.

## 3.2 PHILOSOPHICAL WORLDVIEWS

The choice of research design methods depends on a researcher's beliefs and philosophical assumptions. Creswell (2009) refers to these beliefs as "worldview" and they are based on discipline orientation, mentors and past research experiences. Philosophical worldviews remain hidden in research (Slife & Williams,1995). Philosophical worldviews refer to" a basic set of beliefs that guide action" (Guba, 1992, p.17). Additionally, philosophical worldviews play a significant role in research ,because they explain why the researcher chooses qualitative, or quantitative or mixed method. Therefore, this study briefly explains the common worldviews in literature.

### 3.2.1 Post-positivism

The post-positivist worldview is based on observations and measurements. Thus, generating numerical measures of observations and studying individual behaviour, becomes critical for a post-positivist. Furthermore, a post-positivist research philosophy makes inferences to the further truth. Hence, it is primarily used in quantitative studies.

The post-positivism is still known as positivism. However, positivism was replaced by post-positivism when Popper (2002) and Kuhn (2012) questioned the conventional belief in the absolute truth of knowledge. Nonetheless, the root of post-positivism research philosophy is the law of cause and effect (Saunders, Lewis & Thornhill, 2012). Therefore, the research problem studied by the post-positivist reflects the need to identify and access causes that influence results. Also, post-positivism intends to reduce ideas into small sections and test

variables, comprising hypotheses and research questions. Post-positivism's approach is that the researcher starts with a theory and collects data that either supports or disproves the theory and makes necessary tests.

### 3.2.2 Constructivism

A constructivist, or social constructivist approach, emphasises that people perceive the world through their own experiences (Honebein,1996). Therefore, individuals develop subjective meaning for their experiences, in order to understand the world around them (Creswell, 2014). So, as a researcher, the purpose is to rely on the perspectives of the participants. A researcher should also develop broad and general questions so that participants can give meaning to the situation. Furthermore, social constructivism aims to interpret people's perceptions of the world and builds a theory or pattern of meaning (Creswell, 2014).

### 3.2.3 Transformative

The transformative research philosophy emerged in the 1980s and 1990s from the belief that post-positivist theories and laws did not adequately support marginalised groups in society or address concerns related to power dynamics, social justice, discrimination and oppression (Creswell, 2014). This philosophy suggests that research should engage with politics and a political agenda to address instances of social oppression (Mertens, 2010). The transformative research philosophy centers on the well-being of communities.

### 3.2.4 Pragmatism

The pragmatist approach recognises that every method has limitations and that different approaches can support action (Kelemen & Rumens, 2012). Furthermore, pragmatism connects objectivism with subjectivism, facts and values, as well as knowledge and contextualised experience (Saunders et al., 2009). According to Saunders et al. (2009), pragmatism connects the above by assessing concepts, ideas, hypotheses and research findings, in terms of their importance as tools for thought and action. Moreover, the primary motivators of research design and strategy for the pragmatist are the research problem and research question (Elkjaer & Simpson, 2011). The research questions would emphasise practical outcomes. Subsequently, suppose a research problem does not suggest adopting a particular knowledge or method, in that case, pragmatism accepts that multiple realities can incorporate different types of knowledge and methods (Creswell, Klassen, Plano Clark et al., 2011).

In summary, pragmatists recognise that there are many ways of interpreting and undertaking research. It acknowledges that there are numerous realities. It does not, however, imply that philosophy employs many approaches. Instead, it collects data using credible, reliable, and

relevant approaches (Kelemen & Rumens, 2008). Table 3.1 summarises the common philosophical worldviews and highlights the main component of each worldview.

**Table 3.1: Philosophical worldviews**

| | |
|---|---|
| **Postpositivism**<br>• Determination<br>• Reductionism<br>• Empirical observation and measurement<br>• Theory verification | **Constructivism**<br>• Understanding<br>• Multiple participant meanings<br>• Social and historical construction<br>• Theory generation |
| **Transformative**<br>• Political<br>• Power and justice oriented<br>• Collaborative<br>• Change-oriented | **Pragmatism**<br>• Consequences of actions<br>• Problem-centered<br>• Pluralistic<br>• Real-world practice oriented |

Source: Creswell, 2014

In this study, the philosophical worldview used, was postpositivism. The researcher intended to study the relationship between the TOE and the ICT adoption - also, the study aimed at studying the moderating role of the location and the size of SMEs.

## 3.3 RESEARCH DESIGN

Research design is a structure and strategy used to answer research questions and control variance (Kerlinger, 1986). Additionally, Kerlinger (1986) defines research design as a tool used for collecting and analysing data in a way that aims to generalise the findings of the sample population. Nevertheless, the research design aims to minimise expenditure, collect relevant data and techniques, and provide a blueprint for plans, reliability and validity (Pandey & Pandey, 2021). Moreover, there are different research design methods, and the choice of the research design method depends on philosophy beliefs and assumptions of a researcher (Saunders, Lewis & Thornhill, 2019). The different research design methods are descriptive, causal and experimental. These research designs are explained below.

### 3.3.1 Reliability

Reliability refers to the degree to which data collection, research findings and analysis proceedings yield the same results, meaning that if the study was done again, it would produce the same results (Pandey & Pandey, 2021). According to de Andrade Martins (2006), reliability encompasses three key attributes: stability, internal consistency, and equivalence. Stability refers to how similar the results are when measured at two different times (Polit & Beck, 2011). On the other hand, internal consistency ensures that all components of an instrument measure the same underlying traits (Polit & Beck, 2011). Equivalence measures the similarity in scores among two or more observers (Souza, Alexandre & Guirardello, 2017). Nevertheless, to assess the reliability of an instrument, the choice of statistical test varies. So, the instrument of this study was pretested using Cronbach's alpha to determine its reliability. It is important to note that reliability and validity are interrelated concepts (Souza et al., 2017). Thus, high reliability does not ensure validity (Polit & Beck ,2011).

### 3.3.2 Validity

Validity is the degree to which the data collection method measures what it is intended to measure (Middleton, 2019). There are various types of validity. However, this study presents only the two main types of validity: content and construct validity. Content validity assesses how well the instrument reflects the intended construct (Mokkink, Terwee, Patrick et al., 2010). The supervisor provided guidance to ensure the instrument achieved content validity. Conversely, construct validity evaluates the extent to which a set of variables accurately represents the intended construct (de Andrade Martins, 2006). In order to achieve the construct validity, the researcher used factorial analysis. The factorial analysis provides tools to assess the correlation between a number of variables (Hair, Black, Babin, 2009).

### 3.3.3 Descriptive Research Design

A descriptive research design collects data about a particular group or phenomenon (Sirisilla, 2023). As the name suggests, descriptive research design describes characteristics of a specific group or phenomenon, such as age, without studying the cause and effect between variables (Heath, 2023). Descriptive research design aims to provide detailed and accurate data on the population or phenomenon. According to Heath (2023), this research design is often used in qualitative and quantitative studies and collects data through surveys or researcher observations. Also, it is said to be less expensive and less time-consuming. Hence,

this study used descriptive research design to study factors influencing ICT adoption in SMEs. The study used characters such as the industry, the location, the SMEs' annual revenue, and the company's size.

### 3.3.4 Causal Research Design

Causal research design is also known as explanatory research. The causal research design is used to study the cause and effect between variables (Dudovsky, 2020). Similarly, the causal test relationships between variables (Cherry, 2023), meaning the causal research design is used to determine changes occurring in a dependent variable, due to a change in an independent variable. In addition, a causal research design is said to have high validity (Zikmund, Babin, Carr, et al., 2013). Hence, this study used a causal research design to express the relationship between ICT adoption and TOE factors, and ICT adoption and the location of firms.

### 3.3.5 Experimental Research Design

Experimental research is commonly used in quantitative research. According to Sirisilla (2023), an experimental research design refers to a structured set of procedures and techniques, designed for conducting scientific experiments, involving two sets of variables. Experimental research is time-consuming and expensive, which is why the researcher did not apply this research design.

## 3.4 RESEARCH METHODS

Research methods refer to the instruments used to carry out research (Walwyn, 2017). The common research methods are quantitative, qualitative and mixed method (Creswell,2009; Techno, 2016). Moreover, this study used a quantitative research method. The difference between these research methods, is explained below**.**

### 3.4.4 Quantitative Method

Quantitative is the process of quantifying and analysing variables to get results (Apuke, 2017). According to Apuke (2017), the quantitative method involves collecting and analysing numerical data, using specific statistical techniques to answer who, what, how, and so on. In addition, Aliaga and Gunderson (2002) argue that quantitative research is used to explain a phenomenon by gathering numerical data and analysing it, using mathematical methods, such as statistics. Moreover, a quantitative research design main advantage is its flexibility. The researcher can carry out several comparative and statistical analyses. As a result, quantitative

research offers robust and consistent benefits, particularly in facilitating precise measurements and maintaining internal coherence, which significantly supports SMEs' ICT adoption. As a result, this research employed a quantitative methodology to address the research inquiries outlined in Chapter 1.

The quantitative method measures variables and studies relationships between variables, using the effects of statistics, such as correlation, relative frequencies and the difference between means (Bebli, 2012). Related studies, such as the study by Wessels and Jokonya (2022), use quantitative research to investigate factors affecting the adoption of big data as a service in SMEs. Additionally, Aithal, Choudhary, Maurya et al. (2023) use quantitative methods to study factors affecting technology adoption among small retailers.

### 3.4.5 Qualitative method

The qualitative method refers to the process of collecting and analysing non-numerical data, such as language (Mcleod, 2019). Moreover, the qualitative method is mostly used in the fields of humanities and social science and focuses on gathering data from a smaller sample group (Bhandari, 2020). According to Nedev (2014), qualitative research focuses on data that is not quantifiable, such as descriptions, opinions or observations. Additionally, some studies on ICT adoption, such as Frans and Pather (2022), use a qualitative approach. Analysing data using a qualitative method is challenging, time-consuming and expensive (Mcleod,2023). As a result, an expert in the field is required to interpret the data collected (Mcleod,2023). Mcleod continues to state that the major criticism about the qualitative research method is the validity and reliability. Qualitative research is said to be biased, and generalisations cannot be made in a wider context (Bhandari, 2020)

### 3.4.6 Mixed method

The mixed method involves the combination of both qualitative and quantitative research approaches. According to Bazeley (2018), mixed method research is utilising a combination of numerical and text-based data alongside various tools like statistics and analysis. Furthermore, it integrates qualitative and quantitative research techniques, methods, approaches, and concepts within a single study (Johnson, Onwuegbuzie & Turner, 2007). However, mixed-method research entails more than just gathering qualitative and quantitative data; it involves blending the data throughout the research process (Creswell, Fetters & Ivankova, 2004). According to Creswell et al. (2004), the research data yields more complete analyses when qualitative and quantitative methods are used. However, the challenge of using a mixed research method is that the researcher is forced to constantly monitor the requirements for the method (Chen, 1997; Cojocaru, 2010). Also, using both qualitative and quantitative in one study can lead to conflicts and competition between these two methods. (Cojoraru, 2010).

It is important to understand the distinction between qualitative and quantitative research methods. Table 3.2 provides a summary of these differences for reference.

**Table 3.2 Differences between quantitative and qualitative research method**

| Quantitative research | Qualitative research |
|---|---|
| The aim is to classify feature, count them, and construct statistical models in attempt to explain what is observed. | The aim is a complete, detailed description. |
| The researcher knows clearly in advance what he/she is looking for. | Researcher may only know roughly in advance what he/she is looking for. |
| Recommended during latter phases of research projects. | Recommended during earlier phases of research Projects. |
| All aspects of the study are carefully designed before data is collected. | The design emerges as the study unfolds. |
| The researcher uses tools such as questionnaires or equipment to collect numerical data. | Researcher is the data gathering instrument. |
| Data are in the form of numbers and statistics. | Data is in the form of words, pictures or objects. |
| Objective- seeks precise measurement and analysis of concepts e.g. uses of surveys, questionnaires etc. | Subjective – individuals' interpretation of events is<br>Important-uses participant observation, in-depth interviews etc. |
| Quantitative data are more efficient, able to test hypotheses, but may miss contextual detail. | Qualitative data is more 'rich', time consuming, and<br>less able to be generalised. |

Source: Miles and Huberman (1994, p. 40)

## 3.5 POPULATION

Researchers gather data from participants to contribute to academic knowledge (Asiamah, Mensah & Oteng-Abayie, 2017). These participants belong to a population. According to Polit and Beck (2006), a population is a group of people that fits a specific criterion. Moreover, Banerjee and Chaudhury (2010) state that sampling bias is influenced by misunderstanding the concept of population. Hence, a researcher must understand and clearly define a population during research. Pernecky (2016) expressed concern about the increasing number of flaws in defining a population in literature. There are different types of populations.

The types of populations include general, target and accessible population (Baškarada, 2014). However, many researchers confuse the three populations, resulting in poor specification and sampling bias (Asiamah et al., 2017). Nonetheless, some scholars, like Kotrlik and Higgins

(2001) and Creswell (2003), did try to explain the difference between the three populations.

### 3.5.4 General population

The general population is commonly used in many studies. Banerjee and Chaudhury (2010, p5) define the general population as "an entire group about which some information is required to be ascertained". According to Bartlett, Kotrlik and Higgins (2001), in the general population, participants must have at least one common interest. This population is the largest compared to the target and accessible population. However, the general population often includes participants whose participation violates the research goals and assumptions (Asiamah et al., 2017), which is why the target population is important.

### 3.5.5 Target population

The target population is a group of people with common interests (Creswell, 2003). Additionally, when compared to the general population, the target population is more narrowed and does not violate the research goals and assumptions (Casteel & Bridier, 2021). Moreover, if the target or accessible population is not specified, the research study may not reach an appropriate sample (Asiamah, 2017). Hence, it is wise to select a criterion for determining the target and accessible population after specifying the general population. The sample for the research is drawn from the target population, and if the target population is small enough, there is no need for an accessible population.

### 3.5.6 Accessible population

The accessible population is obtained after removing all individuals from the target population, who will or will not participate in the study or cannot be reached during the study period (Bartlett et al., 2001). It is the final group of participants, whose data is obtained from a sample of its members. Furthermore, the accessible population is smaller than the target population, and participants are willing to participate and are available during the study (University of Missouri, St. Louis, 2000). Figure 3.1 conceptualises the types of populations in research.

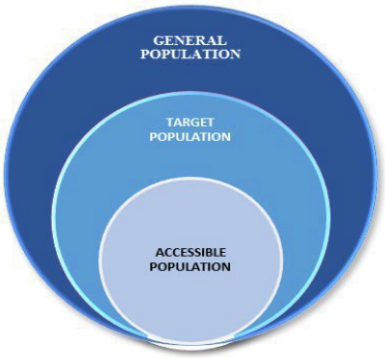



**Figure 3.1: Types of populations in research**
Source: (Asiamah, Mensah & Oteng-Abayie, 2017)

For this study, the target population was used. The target population for this research was owners, managers, marketing and IT department of SMEs in all industries. The research was focused on SMEs in urban and rural areas in South Africa. Also, considering costs, time and accessibility, the selected SMEs were based in the Free State in Bloemfontein, Welkom, Botshabelo and Thaba Nchu. Moreover, SMEs were selected based on the definition of National Small Enterprises, Act No.29 of 2004. According to the Act, SME is distinct and independent business entity, along with any branches or subsidiaries it may have, including cooperative enterprises, managed by one or more owners and primarily operating in any of the economy's sectors or subsectors listed in Column 1 of the Schedule; it is also designated as a micro, small, or medium enterprise by meeting the requirements listed in Columns 3 and 4 of the Schedule. criteria mentioned in Columns 3 and 4 of the Schedule. (Government Gazette, 2019, p1). The Act is tabulated in Table 2.1.

## 3.6 SAMPLING TECHNIQUE

The procedure by which we select a sample in research is important. Furthermore, the procedure we use for sampling will determine whether bias exists in the sample of the study. There are two types of sampling: probability and non-probability (Polit & Beck, 2006).

### 3.6.4 Probability sampling

Probability sampling involves selecting a population and ensuring that every element of the population has an equal chance of being selected. The probability sample is the result of the random selection process (Burns & Grove, 2001). The reason for the random sample is to prevent subjectivity and bias and allow results to be generalised to the target population. However, according to Statistics Canada (2021), probability sampling is complex, time-consuming and expensive. Nevertheless, there are four types of probability samples, and this study used the studies of Shantikumar (2018) and McCombes (2019) to explain each method.

#### *3.6.4.1 Simple random sampling*

In this method, every population unit has an equal chance of being selected. Also, simple random sampling allows the sampling error to be calculated and reduces selection bias.

#### *3.6.4.2 Systematic sampling*

Systematic sampling is like simple random sampling, where each member of the population is assigned a number and chosen at regular intervals. These intervals are crucial in ensuring a sufficient sample size. Additionally, this approach is more practical than simple random sampling and straightforward to implement. Nevertheless, if there are hidden patterns, it could

lead to a sample that is skewed and biased.

#### *3.6.4.3 Stratified sampling*

In this case, the population is categorised into smaller groups with common traits. It is used when the specific measurement of interest differs among these subgroups. Stratified sampling allows a researcher to make more accurate inferences by ensuring that each subgroup is adequately included in the sample. Moreover, stratified sampling increases accuracy and reduces sampling bias. However, it requires knowledge of the relevant sampling frame attributes, and deciding which characteristic(s) to stratify can be challenging.

#### *3.6.1.3 Cluster sampling*

In this method, the population is divided into subgroups. However, each subgroup should have similar characteristics to the whole sample. Clustered sampling is more efficient in large populations, but there is more sample error, as there could be a substandard difference between clusters.

### 3.6.5 Non-probability

In non-probability sampling, individuals are chosen based on specific criteria rather than through random selection, and not every individual has an equal likelihood of being chosen. Furthermore, as much as non-probability has a risk of sampling bias, it is easy to administer and cheaper to access. There are four types of non-probability sampling: convenience, quota, judgment (purposive), and snowball. (Shantikumar ,2018; McCombes, 2019).

#### *3.6.5.1 Convenience sampling*

This method selects participants based on their availability and willingness to participate. Convenience is convenient to the researcher and is inexpensive. However, this method has a high risk of bias, because there is no way to tell if the sample (respondents) is representative of the population. Therefore, the results cannot be generalised.

#### *3.6.5.2 Quota sampling*

This technique is often used by marketers. A quota is used in large populations, and it is not always possible or desirable to list all population members and randomly select elements from that list. With quota, the population is first divided into subgroups (strata). The participants within the subgroups are not chosen randomly. Instead, participants share similar characteristics. A quota sample is less expensive and easier to administer.

### *3.6.5.3 Both Judgement sampling*

Judgment sampling, also known as purposive, is based on the researcher's judgment on who participates in the study. This sampling is used more in qualitative research where the researcher wants to gain detailed knowledge about a specific phenomenon, rather than making statistical inferences. Judgment sampling is time- and cost-effective. However, it is prone to errors of judgment by the researcher and their findings.

### *3.6.5.4 Snowball sampling*

This sampling is used when the population is hard to reach. Therefore, existing participants are used to recruit other participants. This sampling is based on referrals. However, the downside of this method is the risk of selection bias and sample bias (choosing a population with the same views as the initial participants). Table 3.3 indicates the sampling techniques.

**Table 3.3: Sampling techniques**

| Probability Sampling methods | Non-Probability methods |
|---|---|
| Simple random sampling | Convenience sampling |
| Systematic sampling | Quota sampling |
| Stratified sampling | Judgement (Purposive) sampling |
| Cluster sampling | Snowball sampling |

Source: Samuels (2015)

For the purpose of this study, non-probability quota sampling was used. The researcher used this method, because it is inexpensive and easy to administer. Also, quota sampling was adopted, due to the difference in localities (urban and rural) and the sample size of the study the researcher chose.

## 3.7 SAMPLE SIZE

Researchers are always faced with the dilemma of determining how large a sample size should be. The sample size is determined by factors, such as demographic variability, statistical difficulties, economic factors, participant availability, and the importance of the problem (Lammers & Badia, 2005). The sample size is the number of people included in a sample to represent a population. This number is divided into demographics, such as age and geography, such that the overall sample represents the entire population (Kibuacha, 2021). One of the most significant aspects of statistical analysis is determining the right sample size (Elliot, 2020). A small sample size will not produce accurate results, and a large sample wastes money and time. As a result, the following factors should be considered while establishing a sample size (Kibuacha, 2021):

### 3.7.1 Confidence interval

The confidence interval quantifies the level of confidence or uncertainty, associated with sampling techniques. Additionally, it informs a researcher about the level of confidence they can have that the outcomes of a study accurately represent what they would anticipate if the entire population of the study was surveyed.

### 3.7.2 Confidence level

The confidence level represents the likelihood, expressed as a percentage, that the confidence interval will encompass the true population parameter when multiple random samples are taken. As the sample size increases, the confidence level becomes a more precise indicator of the entire population**.**

### 3.7.3 Standard deviation

The standard deviation plays a crucial role in determining the required sample size. It assesses the spread of data points around the mean. When computing the sample size, the standard deviation is important for measuring the expected variation of responses from both each other and the mean.

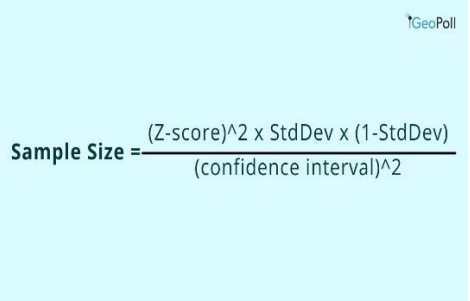
### 3.7.4 Population size

The population is the group a researcher wants to draw judgment about. A sample is drawn from the population using probability or non-probability samples. The population size may be known or unknown.

Andrew Fisher's formula is a common formula used to determine the sample size. The formula includes all the above considerations. According to Kibuacha (2021), a sample size of around 385 is suitable for drawing assumptions of practically any population size at the 95% confidence level with a 5% margin of error. However, according to UFS Health Science

Biostatistics (2021), a sample of 323 is required if the estimated recurrence rate is 30% and the researcher wished to be 95% confident that the sample results are within 5% of the true population value. Table 3.4 shows the Andrews-Fishers formula. The formula is used to determine the sample size.

**Table 3.4: Andrews-Fishers formula**




| Confidence level | z-score |
|---|---|
| 80% | 1.28 |
| 85% | 1.44 |
| 90% | 1.65 |
| 95% | 1.96 |
| 99% | 2.58 |

Source: (Kibuacha, 2021)

There is a limitation to utilising Fisher's formula to determine samples. The limitation is that the sample size generated, using the formula, is based on Type I and II errors and assumptions, such as effect size and standard variation (Kibuacha, 2021). Type I is when a researcher detects a false positive difference when there is no difference between variables. Type II is when a researcher detects no difference between variables when there is a difference between variables (Ayurveda, 2010). Due to the limitation mentioned above, the study used a historical method to determine the sample size. Also, bearing this in mind, to get valid results, the minimum sample size should be 100 (Bisits, 2022).

As stated in Chapter 1, the historical method is based on selecting a sample size, using existing literature. So, based on previous studies, the researcher distributed the questionnaire to SMEs, using a sample size of 300, because this is quantitative research. Figure 3.2 demonstrates how a researcher selects a sample from the population of interest and the target population within the sampling frame.

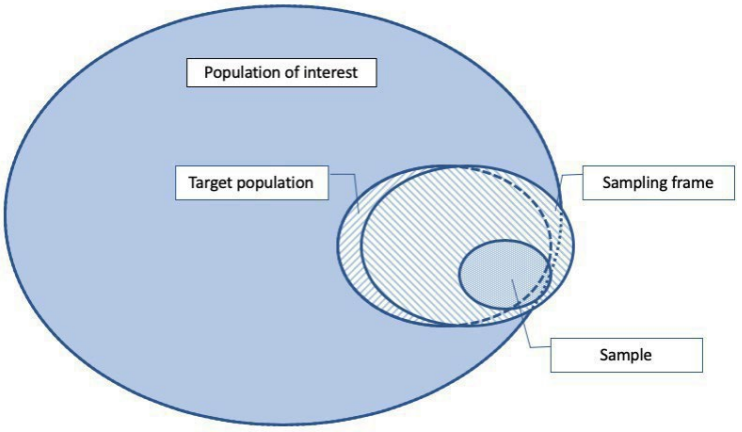



**Figure 3.2: Population and Samples**

Source: Casteel and Bridier,2021

## 3.8 INSTRUMENTATION

The study used questionnaires to collect data. A questionnaire is an instrument used to collect and record data of specific interest (Patel & Joseph, 2016). A questionnaire should have clear instructions and a purpose related to the research objectives. In this study, the questionnaire formulated, was guided by the literature view. Also, the questionnaire formulated contains closed-ended questions. The reason why this study used closed-ended questions instead of open-ended questions, is that this study used a quantitative research method. Additionally, the study used closed-ended questions because, with open-ended questions, participants are sometimes unsure how long to answer the question. Moreover, the questionnaire was adapted from previous studies, based on the literature reviewed with the psychometric properties of reliability and validity. According to Roach (2006), the effectiveness of the questionnaire depends on its psychometric properties. Reliability and validity are the two most important psychometric properties (Meier, 2021). Formulating new statements or questions requires much time, since they must be tested first. Since the questionnaire of this study was adopted, the researcher conducted a pilot study, because reliability changes over time. Also, the researcher conducted the factor analysis to determine the validity of the questionnaire.

The pilot study is often used to test whether the study instrument is asking the intended questions and whether the selected tool is appropriate for the target population (Hassan, Schattner & Mazza, 2006). Relatively, the main purpose of a pilot study is to validate the selected research approach or methodology and ensure the correctness of the prepared questionnaire (Kaur, Figueiredo, Bouchard et al., 2017). The questionnaire was distributed to 30 SMEs to assess whether the questions are clear, relevant, and effectively measure the

intended constructs. Cronbach's alpha was used to test the reliability of the study. Cronbach's alpha is used to measure the reliability of the research instrument (Komperda, Pentecost & Barbera, 2018).

The questionnaire was divided into three sections, and each section had a clear instruction. The questions and statements in the questionnaire were numbered and ordered. The funnel technique was used to arrange the questions and statements in order. Meaning that the questionnaire started with simple questions to put the respondents at ease. The first section of the questionnaire, namely Section A, was about the demographics of the respondents. Also, the questions were numbered and ordered to easily convert respondents' answers to numerical and statistical analysis (Pate & Joseph, 2015). Section A collected data on gender (A1), age (A2) and level of education of the respondents (A3). Also, A4-A8 collected data about firms in which respondents are located. The Section comprises of five items. The questions asked about the firm's location (A.4.1-A4.2), firm's competence in ICT (A5.1-A5.5), number of employees (A6), the industry of the firm (A7.1.-A7.5), and annual revenue of the firm (A8.1-A8.6). Moreover, the second Section of the questionnaire, Section B, consisted of statements based on the TOE model.

The first part of Section B aimed to collect data on the technology context. Therefore, statements from B1.1-B1.5 were based on relative advantage, and then statements from B2.1-B2.3 were on complexity. The statements from B3.1-3.4 were based on compatibility, and statements from B4.1-B4.3 were based on observability. The second part of the section aimed to collect data on organisational context. So, there were subheadings under organisational context, each with statements. The first subheading on organisational context was top management. It had statements from B5.1-B5.5, the second subheading was the availability of resources and had statements from B6.1-B6.4 and the last subheading under organisational context was ICT knowledge with statements from B7.1-B.7.3. The last part of Section B aimed to collect data on environmental context. The environmental context also had subheadings, each with its statements. The first subheading under the environmental context was competitive pressure (B8.1-B8.2), the second subheading was external support (B9.1-B9.4), and the third subheading was government support (B10.1-B10.3). The main aim of this section was to determine the relationship between ICT adoption and technology factors (relative advantage, complexity, compatibility, and observability), ICT adoption and organizational factors ( top management, availability of resources, and company size), and ICT adoption and environmental factors (competitive pressure, external environment, and government support). The last section of the questionnaire, Section C, aimed to study the participants' ICT adoption.

Section C had statements from C1 to C3 to determine respondents' ICT adoption. The statements on ICT adoption were used to measure ICT adoption as a dependent variable. Furthermore, the Likert scale was used in Section B and Section C. The Likert scale is one of

the most used scales used in research, because it is easy to administer and easy for respondents to understand. The Likert scale measures the extent to which respondents agree or disagree with the statement. The scale ranged from strongly disagree (1) to strongly agree (5).

## 3.9 DATA COLLECTION

Data collection is the systematic process of gathering and measuring variables (Bhandari, 2020). Furthermore, data collection allows researchers to answer research questions, test hypotheses, and evaluate outcomes (Kabir,2016). Data collection is one of the most important components in all fields of study. While methods and objectives may vary between areas, the general procedure for maintaining accurate and honest data collection stays the same (Most, Craddick, Crawford et al., 2003). According to Kabir (2016), data collection aims to capture quality evidence that translates to rich data analysis and enables the researcher to develop credible answers to research questions and solutions to research problems. Nevertheless, data collection can be classified into two: primary data collection and secondary data collection.

### 3.9.4 Primary data

Primary data can be collected first-hand for specific research areas (Hox & Boeije, 2005). Additionally, Kumar (2022) defines primary data as data, which has not yet been published and is therefore regarded as more reliable, authentic and objective. Primary data can be obtained through surveys, questionnaires, interviews and experiments. For this study, primary data was collected by distributing questionnaires to SMEs in South Africa—the specified areas are Botshabelo, Thaba Nchu, Welkom and Bloemfontein. The questionnaires were distributed using a direct, administrative retrieval method. This was to save cost and minimise wastage.

### 3.9.5 Secondary data

Secondary data is data that has been published before (Hox & Boeije, 2005). The literature review in research is based on secondary data. Secondary data is collected through books and research articles. Also, secondary data is less time-consuming. However, some researchers in the business and management area have concerns regarding its validity (Olabode, Olateju & Bakare, 2019). Nevertheless, secondary data is important in the research design, because it serves as a baseline to compare primary results (Taherdoost,

2021). Secondary data in this study was used, using journal articles and books to review the following:

1. Literature on the digital divide.
2. Literature on the digital divide between urban and rural areas.
3. Literature on SMEs in South Africa.
4. Literature on the TOE model.

## 3.10 DATA ANALYSIS

In order to get accurate results, it is critical to understand how to handle the data collected during the research process. Thus, data analysis is one of the important steps in research. According to Singh and Singh (2015), when data is acquired from multiple primary and secondary sources in its raw form, it is very useful, but sometimes overwhelming. It is practically hard for researchers to deal with all this data in its raw form. Data analysis presents such data in a suitable and summarised form without losing relevant information. Data can be presented in a table or graph (Singh & Singh, 2015). Data analysis refers to a series of closely connected processes undertaken to summarise and organise the acquired data to produce answers to the research questions or suggest hypotheses (Wilkinson & Bhandakar, 2015). Relatively, according to Mohan (2011), data analysis is the science of studying raw data, in order to develop conclusions about the information. Nevertheless, there are different data analysis types depending on the nature of the research. Data analysis types vary depending on whether the research is qualitative or quantitative. However, this study was quantitative, focusing only on data analysis types suitable for quantitative research. The quantitative data was analysed using SPSS, and Microsoft Excel.

### 3.10.4 Types of data analysis

#### *3.10.4.1* ***Descriptive analysis***

Descriptive analysis turns raw data into a format that is easy to understand and analyse (Zikmund et al., 2003). This study began by testing the reliability of the adapted questionnaire, using Cronbachs alpha coefficient. Additionally, the study used descriptive analysis to present profiles of participants and their firms. Descriptive analysis was utilised in this study to describe the demographics of participants and firms in Section A of the questionnaire. Also, frequency tables were used during descriptive analysis to illustrate and interpret the data. Frequency tables illustrate and interpret the data in a row-and-column format, displaying the number of observations for each category allocated to a variable (Zikmund et al., 2003). After the data was examined using frequency tables, graphs were created to demonstrate the data.

Furthermore, the mean was determined using descriptive statistical analysis for data collected in Sections B and C of the questionnaire. Moreover, the standard deviation was used to show how the data is distributed around the mean. According to El Omda and Sergent (2021), standard deviation measures the scattering of data around the mean.

#### *3.10.4.2* ***Inferential analysis***

Inferential statistical analysis was used to draw inferences about the population from a sample (Calvello, 2020). It uses data from a sample to draw conclusions about the entire population. According to Calvello (2020), inferential statistical analysis is frequently used to investigate the relationship between variables of a sample, allowing conclusions and generalisations to represent the population accurately. Moreover, inferential statistics analysis is used to test hypotheses through regression analysis. Hypothesis testing involves setting up null and alternative hypotheses and conducting a statistical significance test (Cuemath, 2022). An inference is drawn based on the value of the test statistic, critical value and confidence intervals. Simple linear regression analysis is used to determine how one variable will vary in relation to another (Cuemath, 2022). There are different methods of regression analysis, however, multiple linear regression was used in this study. Linear regression examines the

influence of the independent variables on the dependent variable. Also, this study used the hierarchical multiple regression analysis to test the control variables. A significance level of 0.05 was applied. Table 3.5 summarises the difference between descriptive and inferential statistical analysis.

**Table 3.5: Descriptive and Inferential Statistical Analysis**

| Inferential Statistics | Descriptive Statistics |
|---|---|
| Inferential statistics are used to make conclusions about the population by using analytical tools on the sample data. | Descriptive statistics are used to quantify the characteristics of the data. |
| Regression analysis is one of the analytical tools used to test hypothesis testing. | Measures of central tendency and measures of dispersion are the important tools used. |
| It is used to make inferences about an unknown population. | It is used to describe the characteristics of a known sample or population. |
| Measures of inferential statistics are t-test, z test, linear regression, etc. | Measures of descriptive statistics are variance, range, mean, median, etc. |

Source: CUEMATH, 2022)

## 3.11 ETHICAL CONSIDERATIONS

It is important to select appropriate methodologies to collect data. However, before collecting data, ethical consideration is just as important. Researchers must follow a specific code of conduct to protect the rights of participants (Bhandari, 2021). Ethical consideration is a set of principles that guide research design and practices (Bhandari, 2021). Nevertheless, in this study, the principles considered were voluntary participation, informed consent, anonymity, and confidentiality. Also, to enhance the validity and integrity of the research, the researcher obtained ethical clearance (ethical clearance number: UFS-HSD2023/0700) before collecting data. Ethical clearance sets rules and regulations the researcher needs to follow.

### 3.11.4 Voluntary participation

Voluntary participation was explained to the respondents, and they were informed that this study is voluntary, and the participants can withdraw at any time.

### 3.11.5 Informed consent

The informed consent form was attached to the questionnaire. The consent form informed the participants that the study was voluntary and confidential. The informed consent form indicated that the identities of participants would be protected. Furthermore, participants had to sign the consent form to give the researcher permission to use the collected data.

### 3.11.6 Anonymity and confidentiality

Participants were assured that their identities would not be disclosed. Therefore, confidentiality and anonymity were guaranteed to participants. Also, the questionnaire was structured in such a way that it does not ask personal questions. Moreover, participants were informed that the data they provided was strictly for research and would be stored in a safe place. Table 3.6 summarises the data analysis of this study.

**Table 3.6: Summary of Data Analysis**

| Objective | Data Analysis |
|---|---|
| Reliability | Cronbach's Alpha |
| Descriptive Statistics | Mean and Standard Deviation |
| Inferential Statistics | Multi-linear regression and Hayes Process |

Source: Researcher

## 3.12 CONCLUSION

The research methodology was covered in Chapter 3. The chapter described the methods and procedures applied in this study. The chapter also discussed philosophical perspectives, population, and sample techniques. Furthermore, the chapter went into detail on data collection and data analysis. Finally, the chapter described how ethical considerations were considered in this study. The following chapter provides the data analysis and research findings of the study.

# CHAPTER 4
# DATA ANALYSIS AND INTERPRETATION OF RESULTS

## 4.1. INTRODUCTION

This chapter discusses the analysis and interpretation of the data collected from the participants. The chapter interprets the data collected to answer this study's research questions. The analysis and interpretation are divided into two phases. The first part discusses the descriptive statistics of the collected data. The second part discusses inferential statistics by using multiple linear regression. Lastly, the hierarchical multiple linear regression was used to test the moderating role of SME location and SME industry on the relationship between TOE factors and ICT adoption.

A total of 300 questionnaires were distributed to the participants, and only 200 of the questionnaires were filled out and completed. The 200 completed questionnaires were used to analyse and interpret the findings of the data collected. Getting participants to fill out and complete a questionnaire is not easy (Lindemann, 2016). According to Babbie (1990) and Chang (2006), a response rate of 60 percent is good, and 70 percent is very good. Similarly, according to Walliman (2006) and Al-Zubi (2010), a response rate above 85 percent is excellent, 70-85 percent is very good, 60-70 percent is acceptable, 50-60 percent is barely acceptable, and less than 50 percent is not acceptable. In this study, the response rate was 67 percent, which is good, according to Babbie and acceptable according to Walliman. This is congruent with the study of Nuryyev, Wang, and Achyldurdyyeva et al. (2020), who studied the technology adoption in Tourism and Hospitality SMEs. Nevertheless, the main reason that the response rate for this study was 67.3 percent, is that the participants were recruited verbally, as stated in Chapter 3. So, at times, the participants were too busy to complete the whole questionnaire. During business hours, there were only employees available and not the top management who were available. Another reason is that in rural areas, the language was a challenge. As a result, participants needed help to complete the questionnaire.

## 4.2. RELIABILITY

This section describes the data collected through questionnaires distributed to SMEs. The section presents the findings and outcomes of the pilot study. Following the pilot study's results, this section provides an overview of the main data collected from the SMEs.

### 4.2.1 Pilot study results

A pilot study was carried out to test the reliability of the items within the research instrument. As outlined by Nelson (2018), such a pilot study is imperative, particularly when a researcher endeavours to gather data in a new format or location. In this study, data was gathered in the Free State, where comparable studies have not previously been undertaken. Consequently, 30 questionnaires were distributed to SMEs prior to the commencement of the main study. As mentioned in Section 3.8, the reliability of the questionnaire in this research was tested using Cronbach's alpha. The findings are detailed in Table 4.1. According to McNeish (2018), a Cronbach's alpha value of 0.7 or higher is considered acceptable.

**Table 4.1: Results of the Pilot Study**

| Section B and C | NO. items | N | Cronbach's Alpha |
|---|---|---|---|
| **Technology context** | **15** | **30** | **0.87** |
| Relative Advantage (B1.1-B1.5) | 5 | 30 | 0.97 |
| Complexity (B2.1-B2.3) | 3 | 30 | 0.12 |
| Compatibility (B3.1-B3.4) | 4 | 30 | 0.83 |
| Observability (B4.1-B4.3) | 3 | 30 | 0.53 |
| **Organisational Context** | **12** | **30** | **0.80** |
| Top Management (B5.1-B5.5) | 5 | 30 | 0.96 |
| Resource Availability (B6.1-B6.4) | 4 | 30 | 0.87 |
| ICT Knowledge (B7.1-B7.3) | 3 | 30 | 0.85 |
| **Environmental Context** | **9** | **30** | **0.71** |
| Competitive Pressure (B8.1-B8.2) | 2 | 30 | 0.54 |
| External Support (B9.1-B9.4) | 4 | 30 | 0.90 |
| Government Support (B10.1-B10.3) | 3 | 30 | 0.88 |
| **Intentions to Adopt ICT (C.1-C.3)** | **3** | **30** | **0.73** |
| **Total Cronbach's Alpha** | **39** | **30** | **0.91** |

If the predetermined alpha threshold is set at 0.7, as recommended by MacNeish (2018), the items listed in Table 4.1 demonstrate varying levels of reliability. For instance, within the technology context, the complexity item yields an alpha value of 0.12, while observability yields a value of 0.53. Both of these values fall below the acceptable threshold of 0.7, indicating their lack of reliability. Similarly, in the environmental context, competitive pressure is considered unreliable, due to its alpha value of 0.54. As a result, all three factors were removed in the final questionnaire. Table 4.2 illustrates the guidelines to interpret Cronbach alpha coefficients.

**Table 4.2: Cronbach's Alpha coefficients**

| Cronbach's alpha | Internal consistency |
|---|---|
| α ≥ 0.9 | Excellent |
| 0.9 > α ≥ 0.8 | Good |
| 0.8 > α 0.7 | Acceptable |
| 0.7 > α ≥ 0.6 | Questionable |
| 0.6 > α ≥ 0.5 | Poor |
| 0.5 > α | Unacceptable |

Source: Glen (2014)

### 4.2.2 Reliability of the main study

In the pilot study, there were factors affecting the reliability of the questionnaire, such as complexity, observability and competitive pressure. Therefore, the researcher removed the factors from the questionnaire for the main study. Table 4.3 presents Cronbach alpha values of the main study, and the alpha values ranged between 0.88-0.96. Therefore, the reliability of the research instrument of the main study is good.

**Table 4.3: Results of the reliability of the main study**

| Section B and C | NO. items | N | Cronbach's Alpha |
|---|---|---|---|
| **Technology context** | **9** | **200** | **0.94** |
| Relative Advantage (B1.1-B1.5) | 5 | 200 | 0.95 |
| Compatibility (B2.1-B2.4) | 4 | 200 | 0.89 |
| **Organisational Context** | **12** | **200** | **0.93** |
| Top Management (B3.1-B3.5) | 5 | 200 | 0.95 |
| Resource Availability (B4.1-B4.4) | 4 | 200 | 0.88 |
| ICT Knowledge (B5.1-B5.3) | 3 | 200 | 0.90 |
| **Environmental Context** | **7** | **30** | **0.86** |
| External Support (B6.1-B6.4) | 4 | 200 | 0.93 |
| Government Support (B6.1-B6.3) | 3 | 200 | 0.88 |
| **Intentions to Adopt ICT (C.1-C.3)** | **3** | **200** | **0.90** |
| **Total Cronbach's Alpha** | **31** | **200** | **0.96** |

## 4.3. DESCRIPTIVE STATISTICS

Descriptive statistics are used to summarise and describe the main features of the data. The descriptive data analysis was used to describe the participants' demographics and SME information, using frequencies and percentages. The demographics included participants' gender, age, education, and ICT competencies. The SME information is the location of the

organisation, the number of employees, the annual turnover and the industry of the organisation. Furthermore, the researcher used tables and charts to present the demographics of the participants and SME information.

### 4.3.1 Demographic profile of participants

#### *4.3.1.1 Participants' gender*

The participants of the study were requested to provide information regarding their gender. There was a total of 200 participants, including both males and females. However, a larger number of males, specifically 116, participated in the study, while the number of female participants was 84. Male participants constituted 58 percent of the total, while female participants made up 42 percent, as indicated in Table 4.4.

These findings are consistent with the research conducted by Kyakulumbye and Pather (2022), which examined ICT adoption among SMEs in Uganda. In their study, male participants comprised 56.5 percent, while female participants made up 43.5 percent. This briefly suggested that there is a higher representation of male ownership in SMEs, compared to female ownership. However, it is important to note that this study's primary focus was not on gender differences in SMEs, unlike studies, such as Malebana (2015), which specifically address this aspect.

**Table 4.4. Gender of Participants**

| Gender | Frequency | Percent % |
|---|---|---|
| Male | 116 | 58 |
| Female | 84 | 42 |
| Total | 200 | 100 |

#### *4.3.1.2 Participants age*

Table 4.5 offered a comprehensive overview of participants' distribution, based on age. The study included individuals whose ages ranged from 18 to 60 years and above. The largest segment of participants fell within the 30-39 years age bracket, making up 34 percent, amounting to 68 individuals. Following closely, the second largest group belonged to the 40-49 years age range, comprising 28.5 percent of participants, equivalent to 57 individuals. The third most substantial group consisted of participants aged 50-59 years, constituting 16.5 percent of the overall participant count, amounting to 33 individuals. The age group of 21-29 years accounted for 13 percent of the total participants, totalling 26 individuals.

Additionally, the age group of 60 years and above constituted 7 percent of the total participants, comprising 14 individuals.

The results indicate that most of the SME owners among the participants fall within the 30-39 years age group, closely followed by the 40-49 years age group. This aligned with the Department of Small Business Development's findings in 2014, which suggested that most SME owners in South Africa are aged between 36 to 55 years. Furthermore, a report from the International Finance Corporation (IFC) and the World Bank in 2020, indicated that SME ownership in South Africa is more prevalent among those aged 35 years and above. Given South Africa's high unemployment rate, it raised questions about why individuals in the 18-29 years age bracket are not starting their own businesses. However, it is essential to note that this study's primary focus was on ICT adoption.

**Table 4.5: Age of Participants**

| Age | Frequency | Percent % |
|---|---|---|
| 18-20 Years | 2 | 1.0 |
| 21-29 Years | 26 | 13.0 |
| 30-39 Years | 68 | 34.0 |
| 40-49 Years | 57 | 28.5 |
| 50-59 Years | 33 | 16.5 |
| 60 and above | 14 | 7.0 |
| **Total** | **200** | **100** |

#### *4.3.1.3 Educational background of participants*

Table 4.6 offers a summary of the educational background of the participants. The data indicated that the largest proportion of participants, constituting 43.5 percent of the total, possess a high school qualification, corresponding to 87 individuals. The second most common educational attainment among participants is a diploma, accounting for 21 percent, or 42 individuals. The third highest educational level attained, is a Bachelor's degree, making up 17.5 percent of the total participants, equivalent to 35 individuals. Other educational levels, such as primary school, comprised 6 percent of the total participants, equivalent to 12 individuals. Honours and Masters degrees accounted for 5.5 percent each, totalling 11 individuals each. The highest level of education was a Doctorate, making up 1 percent of the total participants, equivalent to 2 individuals. According to a report by the Small Enterprise Development Agency (SEDA) from 2016, 60 percent of SME owners have a high school education level, while 19 percent have a tertiary education level.

**Table 4.6: Education Level of Participants**

| Education | Frequency | Percent % |
|---|---|---|
| High School | 87 | 43.5 |
| Diploma | 42 | 21.0 |
| Bachelor's Degree | 35 | 17.5 |
| Honour's Degree | 11 | 5.5 |
| Masters Degree | 11 | 5.5 |
| Doctorate | 2 | 1.0 |
| Other | 12 | 6.0 |
| **Total** | **200** | **100** |

The findings are intriguing, and exploring why most business owners do not pursue education beyond high school, would be engaging. The researcher conducted a cross-tabulation of education level and location to add depth to the analysis. It was observed that business owners in urban areas tend to have higher education levels compared to their counterparts in rural areas. Table 4.7 displays the cross-tabulation results between location and education level. However, in line with Saah's research in 2022, it is suggested that business failures in South Africa may be linked to low education levels among SME owners and managers. This raised the question of whether SMEs in rural areas experience higher failure rates, compared to those in urban areas, due to lower levels of education. However, this was not the main purpose of this study.

**Table 4.7: Location and Education Level**

| | LOCATION | | |
|---|---|---|---|
| **Education level** | **Rural** | **Urban** | **Total** |
| High School | 58 | 29 | **87** |
| Diploma | 17 | 25 | **42** |
| Bachelor's degree | 15 | 20 | **35** |
| Honors Degree | 0 | 11 | **11** |
| Master's degree | 3 | 8 | **11** |
| Doctorate | 1 | 1 | **2** |
| Other | 6 | 6 | **12** |
| **Total** | **100** | **100** | **200** |

#### *4.3.1.4 Geographic distribution of SMEs*

Table 4.8 describes the geographical distribution of Small and Medium-sized Enterprises (SMEs) from which data was gathered. As previously expounded in Section 3.7, the investigation employed a quota sampling approach, resulting in an equitable allocation of questionnaires across the chosen locations. The overall participant count amounted to 200, with half representing SMEs situated in rural areas, and the remaining 100 comprising SMEs in urban local. Consequently, rural SMEs constituted 50 percent of the total, while urban SMEs similarly accounted for 50 percent.

**Table 4.8: Location of SMEs**

| Location | Frequency | Percent % |
|---|---|---|
| Rural | 100 | 50.0 |
| Uban | 100 | 50.0 |
| **Total** | **200** | **100** |

#### *4.3.1.4 ICT competency*

Table 4.9 illustrates the ICT competency level of participants. The participants were requested to indicate their level of competency. As a result, most participants, 52 percent or 104, reported being competent. The second highest category consisted of slightly competent participants, making up 22.5 percent or 45 individuals. Those who indicated not competent, accounted for 13.5 percent or 27 individuals. Lastly, very competent participants amounted to 12 percent or 24 individuals. These findings suggested that a substantial portion of business owners possess satisfactory ICT competency. It is worth noting that only 52 percent of managers are aware of the established ICT competency standards, as Van Dijk (2020) reported.

**Table 4.9: ICT Competency of Participant**

| ICT Competency level | Frequency | Percent % |
|---|---|---|
| Not Competent | 27 | 13.5 |
| Slightly Competent | 45 | 22.5 |
| Competent | 104 | 52.0 |
| Very Competent | 24 | 12.0 |
| **Total** | **200** | **100** |

#### *4.3.1.5 Number of employees within SMEs*

Table 4.10 presents a breakdown of the number of employees within the SMEs studied. The data revealed that a significant majority of these enterprises, approximately 89.5 percent, employed between 0 and 10 individuals, amounting to 179 SMEs. The subsequent category, consisting of SMEs with 11 to 50 employees, constituted 8 percent of the total, equating to 16 SMEs. Conversely, SMEs with 51 to 250 employees represented the smallest segment, comprising 2.5 percent of the overall participants, or 5 SMEs.

As outlined in Section 2.4.1 of the study, the number of employees is a critical factor in SME size classification. According to De Wet (2019), there is a standardised employee thresholds across all organisational sectors. Specifically, micro-enterprises are defined as those with 0-10 employees, small businesses encompass 10 to 50 employees, and medium-sized enterprises employ between 51 and 250 individuals. These findings supported those reported by OECD in 2022, which estimated that approximately 37 percent of South Africa's 2.6 million SMEs operate formally. Furthermore, the data indicated that 54 percent of these enterprises qualify as micro-enterprises. In addition, Small Business Institute (SBI) reported that in 2016 there were 176,333 micro-enterprises, 66 percent of the total, 68,494 small firms, 26 percent of the total, and 17,397 medium-sized enterprises, 6.5 percent of the total (SBI,2019).

**Table 4.10 Number of Employees in SME**

| No. of Employees | Frequency | Percent % |
|---|---|---|
| 0-10 Employees | 179 | 89.5 |
| 11-50 Employees | 16 | 8.0 |
| 51-250 Employees | 5 | 2.5 |
| **Total** | **200** | **100** |

#### *4.3.1.6 Industry of SMEs*

Table 4.11 illustrates the industries of SMEs. The descriptive statistics reveal that most of the SME who took part in the study are 38 percent, equivalent to 76 SMEs, are engaged in the sectors of retail, wholesale, distribution, and other industries, respectively. Subsequently, SMEs within the manufacturing sector account for 11 percent, constituting 22 SMEs. The technology, media, and telecommunications industry encompass 7.5 percent, encompassing 15 SMEs. The least participation is observed among SMEs involved in financial services, comprising 5.5 percent or 11 SMEs. According to Bhorat, Asmal, Lilenstein et al. (2018), 30 percent of SMEs operate in retail, wholesale and distribution.

**Table 4.11 Industry of SME**

| Industry | Frequency | Percent % |
|---|---|---|
| Manufacturing | 22 | 11.0 |
| Retail, Wholesale& Distribution | 76 | 38.0 |
| Financial Services | 11 | 5.5 |
| Technology, Media& Telecommunication | 15 | 7.5 |
| Other | 76 | 38.0 |
| **Total** | **200** | **100** |

### *4.3.1.7 Annual turnover of SMEs*

Table 4.12 illustrates the annual turnover generated by SMEs. Most of the SMEs fall within the less than R1 million annual turnover, constituting 79 percent or 158 SMEs. The second-largest group falls within the R2-R5 million annual turnover range, making up 13.5 percent or 27 SMEs. The third most significant category involves SMEs, with an annual turnover between R6-R10 million, representing 3 percent or 6 SMEs. Following this, there is a group with an annual turnover ranging from R16-R20 million, comprising 2 percent or 4 SMEs. SMEs generating an annual turnover above R20 million account for 1.5 percent or 3 SMEs. Lastly, SMEs with an annual turnover between R11-R15 million, make up 1 percent, encompassing 2 SMEs. These findings align with those outlined in the SME Landscape Report. As per the report, most of the small businesses in South Africa generate less than R200,000 annually, and nearly half of SMEs employ between two to five individuals (SME Landscape, 2019).

**Table 4.12: Annual Turnover**

| Annual Turnover | Frequency | Percent % |
|---|---|---|
| Below R1 Million | 158 | 79.0 |
| R2-R5 Million | 27 | 13.5 |
| R6-R10 Million | 6 | 3.0 |
| R11-R15 Million | 2 | 1.0 |
| R16-R20 Million | 4 | 2.0 |
| Above R20 Million | 3 | 1.5 |
| **Total** | **200** | **100** |

## 4.3.2 Tabulation

This section provides the distribution percentages of responses for each item of the questionnaire of this study. Table 4.13 and Table 4.14 show each item's percentages in Sections B and C, respectively.

### *4.3.2.1 Percentage distribution for Section B*

The results in Table 4.13 show, in terms of the technological context, the majority of the respondents agreed with the following: 39 percent agreed that ICT helps their organisation finish tasks faster in item B1.1. 43 percent agreed that ICT improves the quality of their work in item B1.2. 40.5 percent agreed that ICT makes their job easier in item B1.3. 47 percent agreed that ICT makes them more effective at their jobs in item B1.4. 39 percent agreed that ICT increases their organisation's productivity in item B1.5. 47.5 percent agreed that ICT fits well with the way their firm does business in item B2.1. 46.5 percent agreed that ICT fits well with their organisation's values and culture in item B2.2. 43.5 percent agreed that ICT fits well with their existing ICT infrastructure in item B2.3. Lastly, 41.5 percent agreed that ICT fits well with their organisation's existing distribution channel in item B2.4.

**Table 4.13: Percentage distribution of Technological environment.**

| Scale Item | Statements | Strongly Disagree | Disagree | Neither Agree or disagree | Agree | Strongly Agree |
|---|---|---|---|---|---|---|
| | **Technological Context** | **1** | **2** | **3** | **4** | **5** |
| B1.1 | ICT enable our organisation to complete tasks more quickly. | 4.5% | 6.5% | 12% | 39% | 38% |
| B1.2 | ICT improves the quality of the work we do. | 4% | 5% | 11% | 43% | 37% |
| B1.3 | ICT makes it easier for us to do our job. | 4.5% | 6.5% | 10.5% | 40.5% | 38% |
| B1.4 | ICT enhance our effectiveness on the job. | 3% | 7.5% | 9.5% | 47% | 33% |
| B1.5 | ICT increases our organisation's productivity. | 3.5% | 6.5% | 16,5% | 39% | 34% |
| B2.1 | ICT fits well with the way our firm does business. | 3% | 8.5% | 16.5% | 47.5% | 24.5% |
| B2.2 | ICT fits well with our organisation's values and culture. | 4% | 8.5% | 18.5% | 46.5% | 22.5% |
| B2.3 | ICT fits well with our existing ICT infrastructure. | 2% | 11.5% | 22.0% | 43.5% | 21.0% |
| B2.4 | ICT fits well with our organisation's existing distribution channel. | 3.5% | 10.5% | 21.0% | 41.5% | 23.5% |

The results in Table 4.14 show, in terms of the organisational context, most of the respondents agreed with the following: 45 percent agreed that top management considers ICT for their organisation's success in item B3.1. 40 percent agreed that top management allocates resources for ICT adoption in item B3.2. 45 percent agreed that top management encourages ICT in their organization in item B3.3. 45 percent agreed that top management supports the adoption of ICT in their organisation in item B3.4. 44.5 percent agreed that top management believes that ICT is important in their organisation to gain a competitive advantage in item B3.5. 37.5 percent agreed that their organisation has the technological resources to adopt ICT in item B4.1. 36.5 percent agreed that their organisation has skilled staff that can use ICT tools effectively B4.2. 28.5 percent agreed that financial resources are available in their organisation to adopt ICT B4.3. However, 29.5 percent disagreed that their organisation has technical staff to maintain ICT in item B4.4. Nevertheless, 30 percent agreed that most of their employees are computer literate in item B5.1. 29.5 percent agreed that most of their employees have access to computers in item B.5.2. 38.5 percent agreed their employees are connected to the Internet in item B5.3.

**Table 4.14 Percentage distribution of Organisational environment.**

| Scale Item | Statements | Strongly Disagree | Disagree | Neither Agree or disagre | Agree | Strongly Agree |
|---|---|---|---|---|---|---|
| | **Organisational Context** | **1** | **2** | **3** | **4** | **5** |
| B3.1 | Top management considers ICT for our organisation's success. | 2.5% | 7% | 14% | 45.0% | 31.5% |
| B3.2 | Top management allocates resources for ICT adoption. | 4% | 12.5% | 17.5% | 40.0% | 26.0% |
| B3.3 | Top management encourages ICT in the organisation. | 2.5% | 9.0% | 13.5% | 45.0% | 30.0% |
| B3.4 | Top management supports the adoption of ICT in the organisation. | 2.5% | 8.0% | 14.5% | 45.0% | 30.0% |
| B3.5 | Top Management believes that ICT is important in our organisation to gain a competitive advantage. | 2.5% | 7.0% | 11.0% | 44.5% | 35.0% |
| B4.1 | Our organisation has the technological resources to adopt ICT. | 4.5% | 24.5% | 20.5% | 37.5% | 13% |
| B4.2 | Our organisation has skilled staff that can use ICT tools effectively. | 5.5% | 21.5% | 18.0% | 36.5% | 18.5% |
| B4.3 | Financial resources are available in our organisation to adopt ICT. | 9.5% | 27.5% | 19.5% | 28.5% | 15.0% |
| B4.4 | Our organisation has technical staff to maintain ICT | 17.5% | 29.5% | 19.0% | 20.5% | 13.5% |
| B5.1 | Most of our employees are computer literate. | 6.5% | 19.5% | 23.5% | 30% | 20.5% |
| B5.2 | Most of our employees have access to computers. | 11.0% | 20.5% | 15.0% | 29.5% | 24.0% |
| B5.3 | Our employees are connected to the Internet. | 5.5% | 12.0% | 15.5% | 38.5% | 28.5% |

The results in Table 4.15 show in terms of the environmental context, the majority of the respondents agreed with the following: 26.5 percent agreed that their technology supplier provides training for the effective use of ICT in item B6.1. 33 percent agreed that their technology supplier provides relevant information and resources in item B6.2. 33 percent agreed that their technology supplier has high integrity in item B6.3. 32.5 percent agreed that their technology supplier offers effective support to our organisation in item B6.4. However, 30 percent neither agreed or disagreed that the government offers grants and loans for ICT adoption among SMEs in item B7.1. 30 percent neither agreed nor disagreed that the government's IT rules and regulations favour ICT adoption among SMEs B7.3. Lastly, 29 percent neither agreed nor disagreed that the government offers ICT infrastructure to SMEs in item B7.3.

**Table 4.15: Percentage distribution of Environmental Context**

| Scale Item | Statements | Strongly Disagree | Disagree | Neither Agree or disagree | Agree | Strongly Agree |
|---|---|---|---|---|---|---|
| | **Environmental Context** | **1** | **2** | **3** | **4** | **5** |
| B6.1 | Our technology supplier provides training for the effective use of ICT. | 9.0% | 24.0% | 22.0% | 26.5% | 18.5%% |
| B6.2 | Our technology supplier provides relevant information and resources. | 6.5% | 21.0% | 22.0% | 33.0% | 17.5% |
| B6.3 | Our technology supplier has high integrity. | 7.5% | 17.5% | 23.5% | 33.0% | 18.5% |
| B6.4 | Our technology supplier offers effective support to our organisation. | 8.0% | 21.5% | 22.5% | 32.5% | 15.5% |
| B7.1 | The government offers grants and loans for ICT adoption among SMEs. | 25.5% | 23.0% | 30.0% | 14.5% | 7.0% |
| B7.2 | The government IT rules and regulations favour ICT adoption among SMEs. | 15.5% | 14.0% | 30.0% | 33.0% | 7.5% |
| B7.3 | The government offers ICT infrastructure to SMEs. | 20.5% | 24.0% | 29.0% | 18.5% | 8.0% |

The results in Table 4.16 show, in terms of the ICT adoption, the majority of the respondents agreed with the following: 42 percent agreed that their organisation plans to use ICT in the future in item C1. 41.5 percent agreed that their organisation intends to continue using ICT in item C2. 43 percent agreed that ICT usage is appropriate for their organisation in item C3.

**Table 4.16: Percentage distribution of ICT Adoption**

| Scale Item | Statements | Strongly Disagree | Disagree | Neither Agree or disagree | Agree | Strongly Agree |
|---|---|---|---|---|---|---|
| | ICT Adoption | 1 | 2 | 3 | 4 | 5 |
| C.1 | Our organisation plan to use ICT in the future. | 2.0% | 2.0% | 12.0% | 42.0% | 42.0% |
| C.2 | Our organisation intends to continue using ICT. | 2.0% | 4.5% | 12.5% | 41.5% | 39.5% |
| C.3 | ICT usage is appropriate for our organisation. | 2.0% | 2.5% | 10.0% | 43.0% | 42.5% |

## 4.4 DESCRIPTIVE STATISTICS OF VARIABLES

This study was conducted with the aim of investigating the factors influencing ICT adoption among SMEs in South Africa, using the digital divide approach. In pursuit of this objective, the researcher formulated secondary research questions outlined in Section 1.4.2. Table 4.17 presents the mean and standard deviation for the technological environment.

### 4.4.1 Mean and standard deviation for technological environment

The result of the study, as presented in Table 4.17, shows the mean and standard deviation for technological environment. According to the result of the study on relative advantage, the majority of the respondents agree that ICT enables their organisation to complete tasks more quickly ($\bar{x}$= 3.99, SD = 1.08), ICT improves the quality of the work they do ($\bar{x}$ = 4.04, SD = 1.02), ICT makes it easier for them to do their job ($\bar{x}$ = 4.01 SD = 1.08), ICT enhances their effectiveness on the job ($\bar{x}$= 4.00, SD = 1.00), and ICT increases their organisation's productivity ($\bar{x}$= 3.94, SD = 1.04). The cluster mean of 4.00, with a standard deviation of 1.08, implies that based on relative advantage, the technological environment plays an important role in the SMEs.

The result also shows that based on compatibility, the majority of the respondents equally agreed that ICT fits well with the way their firm does business ($\bar{x}$ = 3.82, SD = 0.99), ICT fits well with their organisation's values and culture ($\bar{x}$= 3.75, SD = 1.02), ICT fits well with their existing ICT infrastructure ($\bar{x}$= 3.70, SD = 0.99) and ICT fits well with their organisation's existing distribution channel ($\bar{x}$= 3.71, SD = 1.04). The cluster mean of 3.74, with a standard

deviation of 0.88, implies that the technological environment equally plays an important role among SMEs in South Africa, based on compatibility. The overall cluster mean of 3.88, with a standard deviation of 0.84, means most of the respondents agreed that the technological environment plays a positive role among SMEs. This decision is based on the mean response, which is above 3.00.

**Table 4.17: Mean and Standard deviation for technological environment**

| Variables | N | Mean | Standard Deviation |
|---|---|---|---|
| **Relative Advantage** | | | |
| B1.1 | 200 | 3.99 | 1.08 |
| B1.2 | 200 | 4.04 | 1.02 |
| B1.3 | 200 | 4.01 | 1.08 |
| B1.4 | 200 | 4.00 | 1.00 |
| B1.5 | 200 | 3.94 | 1.04 |
| **Cluster mean** | **200** | **4.00** | **1.08** |
| **Compatibility** | | | |
| B2.1 | 200 | 3.82 | 1.00 |
| B2.2 | 200 | 3.75 | 1.03 |
| B2.3 | 200 | 3.70 | 0.99 |
| B2.4 | 200 | 3.71 | 1.05 |
| **Cluster mean** | **200** | **3.75** | **0.89** |
| **Technology Context (Overall mean)** | **200** | **4.00** | **0.95** |

### 4.4.2 Mean and standard deviation for organisational environment

The result of the study, as presented in Table 4.18, shows the mean and standard deviation for organisational environment. According to the result of the study on top management, the majority of the respondents agree that top management considers ICT for their organisation's success ($\bar{x}$= 3.96, SD = 0.98), top management allocates resources for ICT adoption ($\bar{x}$ = 3.72, SD = 1.10), top management encourages ICT in their organization ($\bar{x}$ = 3.91 SD = 1.01), top management supports the adoption of ICT in their organisation. ($\bar{x}$= 3.92, SD = 0.99), and top management believes that ICT is important in their organisation to gain a competitive advantage($\bar{x}$= 4.03, SD = 0.98). The cluster mean of 3.91, with a standard deviation of 0.93, implies that based on top management, the organisational environment has a positive role to play among SMEs.

The result also shows that based on resource availability, the majority of the respondents agreed that their organisation has the technological resources to adopt ICT ($\bar{x}$ = 3.30, SD =

1.11), their organisation has skilled staff that can use ICT tools effectively ($\bar{x}$= 3.41, SD = 1.17), and financial resources are available in their organisation to adopt ICT ($\bar{x}$= 3.12, SD = 1.24). However, the majority of the respondents disagreed that their organisation has technical staff to maintain their ICT resources ($\bar{x}$= 2.83, SD = 1.31). This means that most of the SMEs do not have technical staff to maintain their ICT resources. Nevertheless, the cluster mean of 3.17, with a standard deviation of 1.04, implies that the organisational environment has a positive role among SMEs.

Following the results based on ICT knowledge, the majority of the respondents agreed that most of their employees are computer-literate ($\bar{x}$ = 3.39, SD = 1.20), most of their employees have access to computers ($\bar{x}$= 3.35, SD = 1.34), and their employees are connected to the internet ($\bar{x}$= 3.73, SD = 1.16). The cluster mean of 3.49, with a standard deviation of 1.13, implies that the organisational environment has a positive role on ICT adoption among SMEs in South Africa, based on ICT knowledge. Moreover, the overall cluster mean of 3.55, with a standard deviation of 0.89, means the majority of the respondents agreed that the organisational environment plays a positive role among SMEs. This decision is based on the mean response, which is above 3.00, set as a criterion for accepting an item as having a positive role on ICT adoption, among SMEs in South Africa.

**Table 4.18: Mean and Standard deviation for organisational environment**

| Variables | N | Mean | Standard Deviation |
|---|---|---|---|
| **Top Management** | | | |
| B3.1 | 200 | 3.96 | 0.98 |
| B3.2 | 200 | 3.72 | 1.10 |
| B3.3 | 200 | 3.91 | 1.01 |
| B3.4 | 200 | 3.92 | 0.99 |
| B3.5 | 200 | 4.03 | 0.98 |
| **Cluster mean** | **200** | **3.91** | **0.93** |
| **Resource Availability** | | | |
| B4.1 | 200 | 3.30 | 1.11 |
| B4.2 | 200 | 3.41 | 1.17 |
| B4.3 | 200 | 3.12 | 1.24 |
| B4.4 | 200 | 2.83 | 1.31 |
| **Cluster mean** | **200** | **3.17** | **1.04** |
| **ICT Knowledge** | | | |
| B5.1 | 200 | 3.39 | 1.20 |
| B5.2 | 200 | 3.35 | 1.34 |
| B5.3 | 200 | 3.73 | 1.16 |
| **Cluster mean** | **200** | **3.49** | **1.13** |
| **Organisational Context (Overall mean)** | **200** | **3.55** | **0.86** |

### 4.4.1 Mean and standard deviation for the external environment

The result of the study, as presented in Table 4.19, shows the role of the external environment on SMEs in South Africa. According to the result of the study on external support, the majority of the respondents agree that their supplier provides training for effective use of ICT ($\bar{x}$= 3.22, SD = 1.25), their technology supplier provides relevant information and resources ($\bar{x}$ = 3.34, SD = 1.18), their technology supplier has high integrity ($\bar{x}$ = 3.38 SD = 1.89), and their technology supplier effectively supports their organisation. ($\bar{x}$= 3.26, SD = 1.19). The cluster mean of 3.30, with a standard deviation of 1.09, implies that based on external support, the external environment has a positive role among SMEs.

The result also shows that, based on government support, the majority of the respondents disagreed that the government offers grants and loans for ICT adoption among SMEs ($\bar{x}$ = 2.55 SD = 1.22). This means that participants believe that there are no funds the government grants for SMEs to adopt ICT. Nevertheless, most SMEs agreed that the government's IT rules and regulations favour ICT adoption ($\bar{x}$= 3.03, SD = 1.18), and the majority disagreed that the government offers ICT infrastructure to SMEs ($\bar{x}$= 2.70, SD = 1.22). This means that most SMEs do not think the government offers ICT infrastructure to SMEs. Furthermore, the cluster mean of 2.76, with a standard deviation of 1.08, implies that government support has no role on ICT adoption among SMEs. Moreover, the overall cluster mean of 3.07, with a standard deviation of on 0.89, means that most respondents agreed that the external environment has a positive on ICT adoption among SMEs. This decision is based on the mean response, which is above 3.00, set as a criterion for accepting an item as having a positive role on ICT adoption among SMEs in South Africa.

**Table 4.19: Mean and Standard deviation for the external environment**

| Variables | N | Mean | Standard Deviation |
|---|---|---|---|
| **External Support** | | | |
| B6.1 | 200 | 3.22 | 1.25 |
| B6.2 | 200 | 3.34 | 1.18 |
| B6.3 | 200 | 3.38 | 1.19 |
| B6.4 | 200 | 3.26 | 1.19 |
| **Cluster mean** | **200** | **3.30** | **1.09** |
| **Government Support** | | | |
| B7.1 | 200 | 2.55 | 1.22 |
| B7.2 | 200 | 3.03 | 1.18 |
| B7.3 | 200 | 2.70 | 1.22 |
| **Cluster mean** | **200** | **2.76** | **1.08** |
| **Environmental Context** | **200** | **3.07** | **0.89** |

## 4.5 FACTOR ANALYSIS

Through the data reduction technique, known as factor analysis, researchers can examine concepts that are challenging to assess (Glen, 2022). Factor analysis is often used to determine the link between variables of a given data set. There are two factor analysis methods: Exploratory Factor Analysis (EFA) and Confirmatory Factor Analysis (CFA). The EFA method is used when formulating a hypothesis, regarding the relationship between two variables. On the other hand, the CFA method is used to verify a theory about the relationship between two variables. As mentioned in previous chapters, EFA was applied to the 32 items in the measurement model, using Direct Oblimin rotation and principal component analysis. Furthermore, to determine the factorability of the data, the Kaiser-Meyer-Olkin (KMO) measure of sample adequacy and the Bartlett's test of sphericity were used. The table presents the measures of KMO values as follows:

**Table 4.20: KMO Values**

| | |
|---|---|
| 0.00-0.49 | Unacceptable |
| 0.50-0.59 | Miserable |
| 0.60-0.69 | Mediocre |
| 0.70-0.79 | Middling |
| 0.80-0.89 | Meritorious |
| 0.90-1.00 | Marvellous |

Vitalina. (2018)

### 4.5.1 KMO and Bartlett’s test (technological environment)

Table 4.21 presents the entire output of the KMO and Bartlett’s test of sphericity for the technological environment. The KMO value is 0.897. This indicates the presence of a meritorious correlation, hence the sampling size is appropriate for analysis. The second statistic is Bartlett’s test of sphericity, which tells whether there is an adequate number of correlations between the variables for factor analysis. In this case, the ideal significance should be less than the alpha value, which is $p<0.05$. In this study, Bartlett’s test of the sphericity value was significant at $p< 0.000$, supporting the factorability of the data (Malhotra, 2010).

**Table 4.21: KMO and Bartlett's test of sphericity for the technological environment.**

| KMO and Bartlett's Test | | |
|---|---|---|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. | | .897 |
| Bartlett's Test of Sphericity | Approx. Chi-Square | 1628.079 |
| | df | <.001 |
| | Sig. | |

Table 4.22 below illustrates how each item loads on the two factors after rotation. The five items that load on Factor 1 are all inclined towards the aspect of relative advantage. The items that load most strongly on Factor 2 seem to refer to statements surrounding compatibility.

**Table 4.22: Rotated component matrix for technological environment.**

| Rotated Component Matrix[a] | | |
|---|---|---|
| | Component | |
| | 1 | 2 |
| B1.3 | .883 | |
| B1.5 | .855 | |
| B1.4 | .848 | |
| B1.1 | .822 | |
| B1.2 | .815 | |
| B2.3 | | .856 |
| B2.4 | | .802 |
| B2.1 | | .796 |
| B2.2 | | .779 |
| **Eigenvalue** | **6.072** | **1.099** |
| **%Variance** | **67.466** | **12.211** |
| **Cumulative %** | **67.466** | **79.677** |
| Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. | | |
| a. Rotation converged in 3 iterations. | | |

### 4.5.2 KMO and Bartlett's test (organisational environment)

Table 4.23 presents the entire output of the KMO and Bartlett's test of sphericity for the organisational environment. The KMO value is 0.893. This indicates the presence of a meritorious correlation, hence the sampling size is appropriate for analysis. The second statistic is Bartlett's test of sphericity, which tells whether there is an adequate number of correlations between the variables for factor analysis. In this case, the ideal significance should be less than the alpha value, which is $p<0.05$. In this study, Bartlett's test of the sphericity value was significant at $p< 0.000$, as it is less than $P<0.05$.

**Table 4.23: KMO and Bartlett's test of sphericity for the organisational environment**

| KMO and Bartlett's Test | | |
|---|---|---|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. | | .893 |
| Bartlett's Test of Sphericity | Approx. Chi-Square | 2132.801 |
| | df | <.001 |
| | Sig. | |

Table 4.24 below illustrates how each item loads on the three factors after rotation. The five items that load on Factor 1 are all inclined towards the aspect of top management. The items that load most strongly on Factor 2 seem to refer to statements surrounding resource availability. Factor 3 seems to comprise items referring to ICT knowledge.

**Table 4.24: Rotated matrix for the organisational environment**

| Rotated Component Matrix[a] | | | |
|---|---|---|---|
| | Component | | |
| | 1 | 2 | 3 |
| B3.3 | .891 | | |
| B3.1 | .878 | | |
| B3.5 | .870 | | |
| B3.4 | .853 | | |
| B5.2 | .814 | | |
| B5.1 | | .871 | |
| B5.2 | | .843 | |
| B5.3 | | .831 | |
| B5.4 | | | .849 |
| B6.3 | | | .843 |
| B6.1 | | | .707 |
| B6.2 | | .533 | .555 |
| **Eigenvalue** | **7.040** | **58.666** | **58.666** |
| **%Variance** | **1.717** | **14.307** | **72.973** |
| **Cumulative %** | **1.054** | **8.781** | **81.754** |
| Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. | | | |
| a. Rotation converged in 5 iterations. | | | |

### 4.5.3 KMO and Bartlett's test (external environment)

Table 4.25 presents the entire output of the KMO and Bartlett's test of sphericity for external environment. The KMO value is 0.815. This indicates the presence of a meritorious correlation, hence the sampling size is appropriate for analysis. The second statistic is Bartlett's test of

sphericity, which tells whether there is an adequate number of correlations between the variables for factor analysis. In this case, the ideal significance should be less than the alpha value, which is p<0.05. In this study, Bartlett's test of the sphericity value was significant at p< 0.000, as it is less than P<0.05.

**Table 4.25: KMO and Bartlett's test of sphericity for the external environment**

| KMO and Bartlett's Test | | |
|---|---|---|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. | | .815 |
| Bartlett's Test of Sphericity | Approx. Chi-Square | 1105.804 |
| | df | 21 |
| | Sig. | <.001 |

Table 4.26 below illustrates how each item loads on the two factors after rotation. The four items that load on Factor 1 are all inclined towards the aspect of external support. Factor 2 seems to comprise items referring to government support.

**Table 4.26: Rotated matrix for the external environment**

| Rotated Component Matrix[a] | | |
|---|---|---|
| Component | | |
| | 1 | 2 |
| B6.2 | .941 | |
| B6.3 | .932 | |
| B6.4 | .907 | |
| B6.1 | .813 | |
| B7.1 | | .895 |
| B7.3 | | .890 |
| B7.2 | | .876 |
| **Eigenvalue** | **3.893** | **1.860** |
| **%Variance** | **55.616** | **26.579** |
| **Cumulative %** | **55.616** | **82.194** |
| Extraction Method: Principal Component Analysis. Rotation Method: Varimax with Kaiser Normalization. | | |
| a. Rotation converged in 3 iterations. | | |

### 4.5.4 KMO and Bartlett's test (ICT Adoption)

Table 4.27 presents the entire output of the KMO and Bartlett's test of sphericity for external environment. The KMO value is 0.742. This indicates the presence of a middling correlation, hence the sampling size is appropriate for analysis. The second statistic is Bartlett's test of sphericity, which tells whether there is an adequate number of correlations between the variables for factor analysis. In this case, the ideal significance should be less than the alpha value, which is p<0.05. In this study, Bartlett's test of the sphericity value was significant at p< 0.000, as it is less than P<0.05.

**Table 4.27: KMO and Bartlett's test of sphericity for ICT Adoption**

| KMO and Bartlett's Test | | |
|---|---|---|
| Kaiser-Meyer-Olkin Measure of Sampling Adequacy. | | .742 |
| Bartlett's Test of Sphericity | Approx. Chi-Square | 359.902 |
| | df | 3 |

Table 4.28 below illustrates how each item loads on the one factor after rotation. The three items that load on Factor 1 are inclined towards the intention to adopt ICT adoption, hence this factor is concluded to be ICT adoption.

**Table 4.28: Rotated matrix for ICT Adoption**

| Component Matrix[a] | | |
|---|---|---|
| Component | | |
| **ITEM NO.** | **ITEM** | **FACTOR LOADING** |
| C3 | ICT usage is appropriate for our organisation. | .924 |
| C2 | Our organisation intends to continue using ICT. | .915 |
| C1 | Our organisation plan to use ICT in the future. | .889 |
| **Eigenvalue** | | **2.480** |
| **%Variance** | | **82.678** |
| **Cumulative %** | | **82.678** |

## 4.6 INFERENTIAL STATISTICS OF VARIABLES

### 4.6.1 Correlation analysis

The researcher in this section used the Pearson correlation coefficient to measure the linear relationship between variables, specifically TOE factors, and ICT adoption. According to Berman (2018), the Pearson correlation coefficient ranges from positive one to negative one. Therefore, if the coefficient is 0, there is no relationship between variables. To determine the strength of the relationship between variables, the researcher followed the guidelines set by Meghanathan (2016). Table 4.19 shows the range of correlation and the strength level.

**Table 4.29: Range and level of Correlation**

| Range of Correlation (r) | Level of Correlation |
|---|---|
| 0.8-1.00 | Very strong positive |
| 0.6-0.79 | Strong positive |
| 0.4-0.59 | Moderate positive |
| 0.2-0.39 | Weak positive |
| 0.00-0.19 | Very weak positive |

Source: Meghanathan (2016)

The researcher in this section used the Pearson correlation coefficient to measure the linear relationship between variables, specifically TOE factors, and ICT adoption. According to Berman (2018), the Pearson correlation coefficient ranges from positive one to negative one. Therefore, if the coefficient is 0, there is no relationship between variables. To determine the strength of the relationship between variables, the researcher followed the guidelines set by Meghanathan (2016). Table 4.19 shows the range of correlation and the strength level.

**Table 4.30: Correlation Matrix**

| | | RA | CM | TP | RSA | IK | ES | GA | IA |
|---|---|---|---|---|---|---|---|---|---|
| RA | Pearson Correlation | 1 | .686** | .665** | .469** | .507** | .497** | .188** | **.563**** |
| | Sig. (2-tailed) | | <.001 | <.001 | <.001 | <.001 | <.001 | .008 | **<.001** |
| | N | 200 | 200 | 200 | 200 | 200 | 200 | 200 | **200** |
| CM | Pearson Correlation | .686** | 1 | .753** | .642** | .556** | .597** | .183** | **.577**** |
| | Sig. (2-tailed) | <.001 | | <.001 | <.001 | <.001 | <.001 | .010 | **<.001** |
| | N | 200 | 200 | 200 | 200 | 200 | 200 | 200 | **200** |
| TP | Pearson Correlation | .665** | .753** | 1 | .607** | .500** | .585** | .251** | **.601**** |
| | Sig. (2-tailed) | <.001 | <.001 | | <.001 | <.001 | <.001 | <.001 | **<.001** |
| | N | 200 | 200 | 200 | 200 | 200 | 200 | 200 | **200** |
| RSA | Pearson Correlation | .469** | .642** | .607** | 1 | .642** | .743** | .292** | **.447**** |
| | Sig. (2-tailed) | <.001 | <.001 | <.001 | | <.001 | <.001 | <.001 | **<.001** |
| | N | 200 | 200 | 200 | 200 | 200 | 200 | 200 | **200** |
| IK | Pearson Correlation | .507** | .556** | .500** | .642** | 1 | .554** | .251** | **.510**** |
| | Sig. (2-tailed) | <.001 | <.001 | <.001 | <.001 | | <.001 | <.001 | **<.001** |
| | N | 200 | 200 | 200 | 200 | 200 | 200 | 200 | **200** |
| ES | Pearson Correlation | .497** | .597** | .585** | .743** | .554** | 1 | .320** | **.425**** |
| | Sig. (2-tailed) | <.001 | <.001 | <.001 | <.001 | <.001 | | <.001 | **<.001** |
| | N | 200 | 200 | 200 | 200 | 200 | 200 | 200 | **200** |
| GS | Pearson Correlation | .188** | .183** | .251** | .292** | .251** | .320** | 1 | **.160*** |
| | Sig. (2-tailed) | .008 | .010 | <.001 | <.001 | <.001 | <.001 | | **.024** |
| | N | 200 | 200 | 200 | 200 | 200 | 200 | 200 | **200** |
| **IA** | **Pearson Correlation** | **.563**** | **.577**** | **.60_1**** | **.447**** | **.510**** | **.425**** | **.160*** | 1 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | **Sig. (2-tailed)** | **<.001** | **<.001** | **<.001** | **<.001** | **<.001** | **<.001** | **.024** | |
| | **N** | **200** | **200** | **200** | **200** | **200** | **200** | **200** | **200** |
| **. Correlation is significant at the 0.01 level (2-tailed). | | | | | | | | | |
| *. Correlation is significant at the 0.05 level (2-tailed). | | | | | | | | | |

RA= Relative Advantage; CM= Compatibility;TP= Top Management;RSA= Resource Availability;IK= ICT Knowledge
ES= External Support; GS= Government Support; IA= ICT Adoption

### 4.6.2 Multiple-linear regression analysis

The study used a standard multiple linear regression analysis to examine the impact of Technological, Organisational and External (TOE) factors, serving as independent variables, on the adoption of Information and Communication Technology (ICT), the dependent variable. Table 4.31 Indicates the model summary to provide information about the influence of TOE factors on ICT adoption. For this study, the $R^2$ value is 0.433. This means TOE factors contribute 43.3 percent to the variation of ICT adoption. The results show that 56.7 percent of the variation in ICT adoption is due to other factors that future research must consider. Nevertheless, the influence and contribution of TOE on ICT adoption are deemed to be statistically significant, with the p-value less than 0.5.

To ensure that the multiple regression analysis assumptions were not broken, a preliminary analysis was carried out. In accordance with Pallant's recommendation (2013), the correlation in all cases between the independent and dependent variables is above 0.30. Table 4.33 indicates that the tolerance value is 1.000, while the VIF value is 1.000. These were acceptable values, as recommended by Pallant (2013). The tolerance value must not be less than 0.10, and VIF must not be more than 10. Table 4.33 also depicts beta values of each of TOE. Accordingly, the beta value for the technological environment is β=0.334, which indicates that 33.4 percent of the variance of ICT adoption is a result of the technological environment. The p-value for the technological is 0.000 ($p<0.05$), indicating that the influence of the technological environment on ICT adoption is statistically significant. The organisational

environment has a beta value of β=0.364, meaning that the organisational environment contributes 36.4 percent to the variance of ICT adoption. The p-value for the organisational environment is 0.000 (p<0.05), indicating that the influence of the organisational environment on ICT adoption is statistically significant. Moreover, the results show a beta value of β=-0.061 for the external environment, meaning that the external environment contributes -6.1 percent in the variance of ICT adoption. The p-value for the external environment is 0.363 (p<0.05), indicating that the influence of the external environment on ICT adoption is statistically insignificant. Previous findings reveal a significant technological and organisational environment influence on e-commerce and an insignificant influence of the external environment on e-commerce adoption (Tirtana, Hasudungan, Tjong et al., 2022)

**Table 4.31: Influence of TOE factors on ICT Adoption**

| **Model Summary** | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | Change Statistics | | | |
| | | | | | R Square Change | F Change | df1 | df2 |
| **1** | **.658[a]** | **.433** | **.424** | **.616311465 376572** | **.433** | **49.896** | **3** | **196** |
| a. Predictors: (Constant), Technological Environment, Organisational Environment, External Environment | | | | | | | | |

**Table 4.32: ANOVA**

| **ANOVA[a]** | | | | | | |
|---|---|---|---|---|---|---|
| **Model** | | **Sum of Squares** | **Df** | **Mean Square** | **F** | **Sig.** |
| 1 | Regression | 56.858 | 3 | 18.953 | 49.896 | <.001[b] |
| | Residual | 74.449 | 196 | .380 | | |
| | Total | 131.306 | 199 | | | |
| a. Dependent Variable: Employee retention | | | | | | |
| b. Predictors: (Constant), Technological environment, Organisational environment, External environment (TOE) | | | | | | |

**Table 4.33: Coefficients for influence of TOE factors on ICT Adoption**

| Coefficients[a] | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Model | | Unstandardised coefficients | Standardised coefficients | | t | Sig. | Correlations | | | Collinearity Statistics | |
| | | B | Std. Error | Beta | | | Zero-order | Partial | Part | Tolerance | VIF |
| 1 | (Constant) | 1.740 | .213 | | 8.176 | <.001 | | | | | |
| | Technological Environment | .343 | .080 | .357 | 4.271 | <.001 | .619 | .292 | .230 | 1.000 | 1.000 |
| | Organisational Environment | .364 | .092 | .387 | 3.948 | <.001 | .614 | .271 | .212 | 1.000 | 1.000 |
| | External Environment | -.061 | .067 | -.067 | -.911 | .363 | .382 | -.065 | -.049 | 1.000 | 1.000 |
| a. Dependent variable: ICT Adoption | | | | | | | | | | | |

### 4.6.3 Hierarchical multi-linear regression analysis

#### *4.6.3.1 The role of location as a control variable between TOE and ICT adoption*

The study used a hierarchical multiple regression analysis to investigate the role of location as a control variable between the relationship between Technological, Organizational and Environmental (TOE) factors and ICT adoption. The findings are presented in Table 4.34. First, model summary 1 reveals a $R^2$ value of 0.374 for TOE factors and ICT adoption, implying that TOE factors account for 37.4 percent of the variance in ICT adoption. This demonstrates a statistically significant and positive relationship between TOE factors and ICT adoption, as the p-value falls below the significance threshold of 0.05 ($p<0.001$). Additionally, model summary 2 in Table 4.34 shows a $R^2$ value of 0.376 when location is incorporated. Therefore, the inclusion of location results in a slight increase in the variance of ICT adoption to 0.376. In other words, location strengthens the relationship between TOE factors and ICT adoption by 0.002. This is reflected on the change statistics output, as the $R^2$ change value is 0.002 when location is added. Furthermore, the influence of location on ICT adoption is statistically significant, as the ANOVA table below (Table 4.35) shows a significance value below 0.05 ($p<0.001$). According to Awa, Emecheta and Ukoha (2014), location connects Mobile Marketing Technology (MMT) adoption and SME managers' demographic characteristics.

To ensure that the multiple regression analysis assumptions were not broken, a preliminary analysis was carried out. In accordance with Pallant's recommendation (2013), the correlation

in all cases between the independent and dependent variables is above 0.30. Table 4.36 indicates that the tolerance value ranged between 0.983-1.000, while the VIF value ranged between 1.000-1.018. These were acceptable values, as recommended by Pallant (2013). The tolerance value must not be less than 0.10, and VIF must not be more than 10.

**Table4.34: Location as control variable (Hierarchical Multiple Regression)**

**Model Summary**

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | Change Statistics | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | R Square Change | F Change | df1 | df2 | Sig. F Change |
| **1** | **.611[a]** | **.374** | **.370** | **.64456996036 7584** | **.374** | **118.042** | **1** | **198** | **<.001** |
| **2** | **.613b** | **.376** | **.369** | **.64514888625 0712** | **.002** | **.645** | **1** | **197** | **<.001** |

a. Predictors: (Constant), Technological environment, Organisational environment, and External environment (TOE)

b. Predictors: (Constant), TOE, Location

c. Dependent Variable: ICT Adoption

**Table 4.35: ANOVA**

**ANOVA[a]**

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|---|---|---|---|---|---|---|
| 1 | Regression | 49.043 | 1 | 49.043 | 118.042 | <.001[b] |
| | Residual | 82.263 | 198 | .415 | | |
| | Total | 131.306 | 199 | | | |
| 2 | Regression | 49.311 | 2 | 24.656 | 59.238 | <.001[c] |
| | Residual | 81.995 | 197 | .416 | | |
| | Total | 131.306 | 199 | | | |

a. Dependent Variable: ICT Adoption

b. Predictors: (Constant), Technological environment, Organisational environment, and External environment (TOE)

c. Predictors: (Constant), TOE, Location

**Table 4.36: Coefficients for location as control variable between TOE and ICT adoption**

| Coefficients[a] | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Model | | Unstandardised coefficients | Standardised coefficients | | t | Sig. | Correlations | | | Collinearity Statistics | |
| | | B | Std. Error | Beta | | | Zero-order | Partial | Part | Tolerance | VIF |
| 1 | (Constant) | 1.891 | .215 | | 8.780 | <.001 | | | | | |
| | TOE | .653 | .060 | .611 | 10.865 | <.001 | .611 | .611 | .611 | 1.000 | 1.000 |
| 2 | (Constant) | 1.803 | .242 | | 7.449 | <.001 | | | | | |
| | TOE | .647 | .061 | .605 | 10.654 | <.001 | .611 | .605 | .600 | .983 | 1.018 |
| | Location | .074 | .092 | .046 | .803 | .423 | .125 | .057 | .045 | .983 | 1.018 |
| a. Dependent variable: ICT Adoption | | | | | | | | | | | |

### *4.6.3.2 The role of industry as a control variable between TOE and ICT adoption*

The study used a hierarchical multiple regression analysis to investigate the role of industry as a control between Technological, Organizational and Environmental (TOE) factors and ICT adoption. The findings are presented in Table 4.37. First, model summary 1 reveals a $R^2$ value of 0.374 for TOE factors and ICT adoption, implying that TOE factors account for 37.4 percent of the variance in ICT adoption. This demonstrates a statistically significant and positive relationship between TOE factors and ICT adoption, as the p-value falls below the significance threshold of 0.05 ($p<0.001$). Additionally, model summary 2 in Table 4.37 shows a $R^2$ value of 0.380 when industry is incorporated. Therefore, the inclusion of industry results in a slight increase in the variance of ICT adoption to 0.380. In other words, industry strengthens the relationship between TOE factors and ICT adoption by 0.007. This is reflected on the change statistics output, as the $R^2$ change value is 0.007 when industry is added. Furthermore, the influence of industry on ICT adoption is statistically significant, as the ANOVA table below (Table 4.38), which shows a significance value below 0.05 ($p<0.001$). The findings are congruent to Zhong and Moon's (2023) study on the impact of industry 4.0 technology through a TOE model.

To ensure that the multiple regression analysis assumptions were not broken, a preliminary analysis was carried out. In accordance with Pallant's recommendation (2013), the correlation in all cases between the independent and dependent variables is above 0.30. Table 4.39

indicates that the tolerance value ranged between 0.987-1.000, while the VIF value ranged between 1.000-1.013. These were acceptable values, as recommended by Pallant (2013). The tolerance value must not be less than 0.10, and VIF must not be more than 10.

**Table 4.37: Industry as control variable between TOE environment and ICT Adoption**

| **Model Summary** | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | Change Statistics | | | | |
| | | | | | R Square Change | F Change | df1 | df2 | Sig. F Change |
| **1** | .611[a] | .374 | .370 | .644569960367584 | .374 | 118.042 | **1** | **198** | **<.001** |
| **2** | .617[b] | .380 | .374 | .642601736013862 | .007 | 2.215 | **1** | **197** | .138 |
| a. Predictors: (Constant), Technological environment, Organisational environment, and External environment (TOE) | | | | | | | | | |
| b. Predictors: (Constant), TOE, Industry | | | | | | | | | |
| c. Dependent Variable: ICT Adoption | | | | | | | | | |

**Table 4.38: ANOVA**

| **ANOVA[a]** | | | | | | |
|---|---|---|---|---|---|---|
| **Model** | | **Sum of Squares** | **df** | **Mean Square** | **F** | **Sig.** |
| 1 | Regression | 49.043 | 1 | 49.043 | 118.042 | <.001[b] |
| | Residual | 82.263 | 198 | .415 | | |
| | Total | 131.306 | 199 | | | |
| 2 | Regression | 49.958 | 2 | 24.979 | 60.490 | <.001[c] |
| | Residual | 81.349 | 197 | .413 | | |
| | Total | 131.306 | 199 | | | |
| a. Dependent Variable: ICT Adoption | | | | | | |
| b. Predictors: (Constant), Technological environment, Organisational environment, and External environment (TOE) | | | | | | |
| c. Predictors: (Constant), TOE, Industry | | | | | | |

**Table 4.39: Coefficients for industry as a control variable between TOE and ICT adoption**

| Coefficients[a] | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Model | | Unstandardised coefficients | Standardised coefficients | | t | Sig. | Correlations | | | Collinearity Statistics | |
| | | B | Std. Error | Beta | | | Zero-order | Partial | Part | Tolerance | VIF |
| 1 | (Constant) | 1.891 | .215 | | 8.780 | <.001 | | | | | |
| | TOE | .653 | .060 | .611 | 10.865 | <.001 | .611 | .611 | .611 | 1.000 | 1.000 |
| 2 | (Constant) | 1.998 | .226 | | 8.824 | <.001 | | | | | |
| | TOE | .663 | .060 | .621 | 10.997 | <.001 | .611 | .617 | .617 | .987 | 1.013 |
| | Industry | -.044 | .030 | -.084 | -1.488 | .138 | -.013 | -.105 | -.083 | .987 | 1.013 |
| a. Dependent variable: ICT Adoption | | | | | | | | | | | |

Figure 4.2 presents the model of the study. The beta values represent the influence of the TOE factors on ICT adoption.

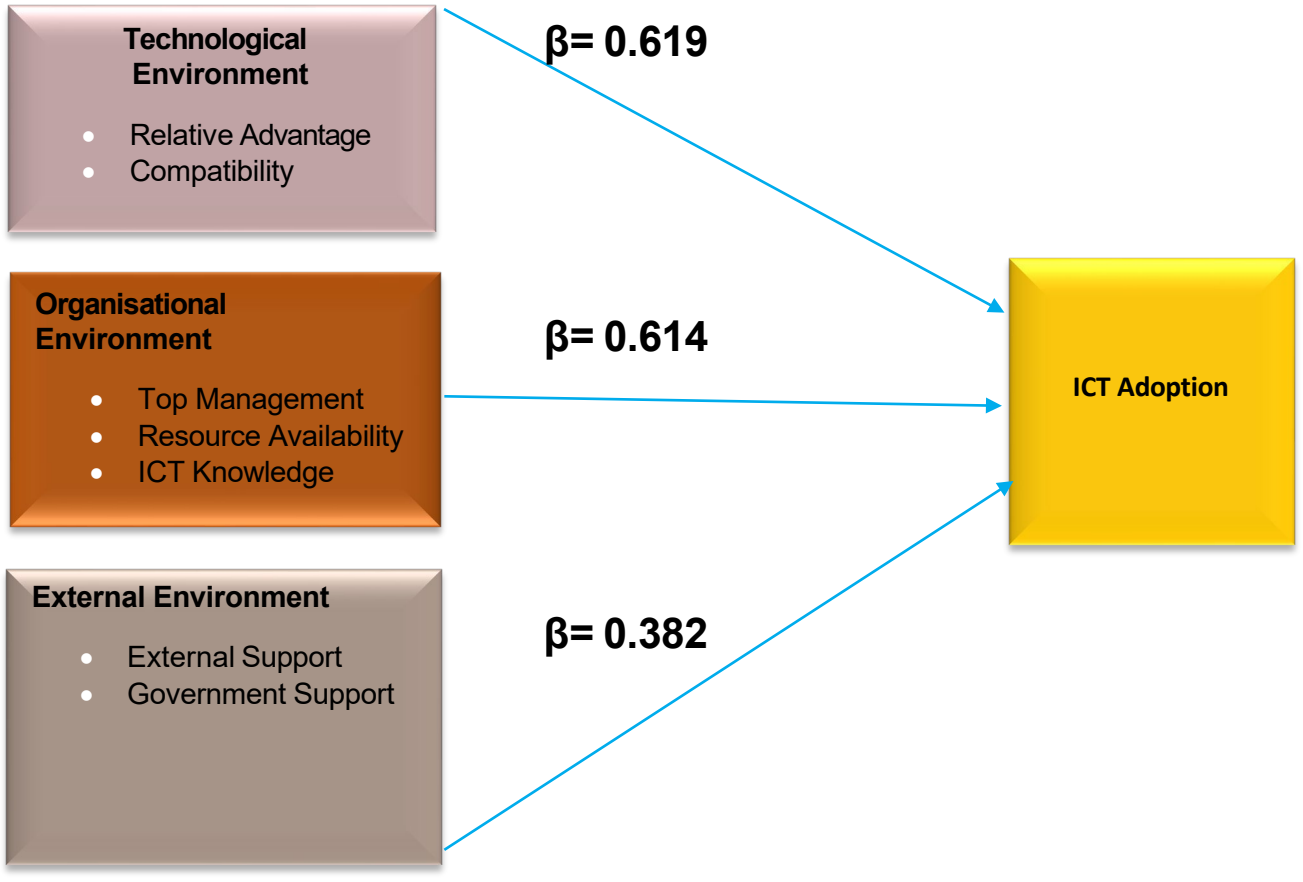



**Figure 4:2 Model of the study**

## 4.7 CONCLUSION

This chapter presented the research findings of the study. It began by addressing the reliability of both the pilot and main studies. It then proceeded to discuss the descriptive statistics using tables and figures. Additionally, the chapter outlined the results obtained from the factor analysis. Finally, the study presented inferential statistics using correlation, multiple linear, and hierarchical regression analyses. The following chapter explores the conclusions and recommendations of the study.

# CHAPTER 5
# CONCLUSIONS AND RECOMMENDATIONS

## 5.1 INTRODUCTION

This chapter presents conclusions and recommendations based on the findings of the study in Chapter 4. The chapter provides an overview of the study, a summary of the research findings, the general conclusions of the study, the limitations of the study, and the recommendations and avenues for future research, bringing the study to a close.

## 5.2 OVERVIEW OF THE STUDY

Chapter 1 presented the introduction and the background of the study. The chapter introduced the term digital divided in the context of Information and Communication Technology (ICT). In addition, it highlighted how the digital divide affects individuals and organisations, especially Small and Medium Enterprises (SMEs). Furthermore, factors influencing ICT adoption in SMEs were identified as key in bridging this divide, and the study focused on understanding these factors in South Africa, especially between rural and urban areas. The chapter also outlined the problem statement, research questions, objectives, and significance of the study. It also provided a clear framework for how the data was collected, analysed and interpreted. Lastly, ethical considerations were discussed to ensure the responsible conduct of research, followed by the layout of the chapters.

Chapter 2 conducted a comprehensive literature review aligned with the theoretical objectives of the study. It presented the literature concerning the digital divide, encompassing its measurements, implications, and disparities between SMEs in urban and rural settings. Additionally, the chapter presented an extensive definition of SMEs in the South African context and explored the challenges and benefits associated with ICT in SMEs. Lastly, it examined theories related to ICT adoption, specifically emphasising the Technology, Organization and External Environment (TOE) model.

Chapter 3 thoroughly explained the research methodology used in this study. The chapter expanded upon elements, including research design, research methods, target population, sampling technique, sample size, instrumentation, data collection, data analysis, and ethical considerations.

Chapter 4 focused on the analysis and the interpretations of the data collected to address the study's research questions. The analysis and presentation included the pilot study and the findings from both descriptive and inferential statistics.

## 5.3. FINDINGS OF THE STUDY

The findings addressed the study's primary and secondary objectives, which were theoretical and empirical.

### *5.3.1. Theoretical findings*

The first theoretical objective was to review the literature on the digital divide. This was addressed in Section 2.2. The Section provided a thorough overview of the digital divide, its measures, and the interconnectedness of various factors. It also highlighted the need for continued research in this area, particularly in the context of SMEs and different geographic regions.

The second theoretical objective was to review the literature on the digital divide between rural and urban areas. This was achieved in Section 2.3. The Section highlighted the persistent challenge of the digital divide faced by SMEs, especially those in rural areas. The Section pointed out that SMEs in rural areas struggle to keep pace with digital connectivity and technology advancements. As a result, they may need to catch up to their urban counterparts, regarding access to, and effective use of, digital tools.

The third theoretical objective was to review the literature on SMEs in South Africa. This objective was achieved in Section 2.4. The Section provided a comprehensive overview of the significance of SMEs in economic development, especially in emerging economies. Additionally, it discussed the situation of SMEs in South Africa. It pointed out that while SMEs in South Africa play a crucial role in the economy, only a small percentage are formalised, which limits their potential for job creation and economic impact. Factors contributing to the stagnation of SMEs in South Africa were identified, including issues related to funds, entrepreneurial skills, accounting, and management. Furthermore, the Section also highlighted the varying definitions of SMEs across different countries and regions. In South Africa, the National Small Enterprise Act of 2004 is used to define SMEs, which classifies them based on turnover thresholds and size categories.

The fourth theoretical objective was to review the literature on SMEs and ICT adoption. This objective was accomplished in Section 2.5. This Section indicated that ICT adoption presents immense potential for SMEs, offering opportunities for efficiency, global integration, resource accessibility, and innovation. However, addressing challenges and targeted policy support is essential to ensure SMEs can fully harness the benefits of ICT.

The fifth theoretical objective was to review the literature on the TOE model. This objective was achieved in Section 2.6. The Section highlighted the various theories and models used to understand and explain ICT adoption. These included factor theories, reductionism,

determinism and their limitations in providing a comprehensive understanding of ICT adoption. Additionally, the Section highlighted multiple studies and research findings, indicating the importance of empirical research in understanding ICT adoption and its impact on SMEs.

### *5.3.2. Empirical findings*

The first empirical objective was to investigate the role of technological environment and ICT adoption. This was achieved in Section 4.6.1 and 4.6.2 through correlation and regression analysis. The results showed that there is a positive moderate relationship and that technological environment influence ICT adoption

The second empirical objective was to investigate the role of the organisational environment and ICT adoption. This was achieved in Section 4.6.1 and 4.6.2. The results showed that there is a moderate to strong relationship between the organisational environment and ICT adoption and that the organisational environment influences ICT adoption.

The third empirical objective was to investigate the role of the external environment. This was achieved in Section 4.6.1 and 4.6.2. The results showed that there is a weak to moderate relationship between the external environment and ICT adoption.

## 5.4. CONCLUSIONS

The study was carried out to explore factors influencing ICT adoption among SMEs in South Africa, using the digital divide approach. The data was analysed, using quantitative analysis and focused on the three research questions. The TOE model, proposed by Tornatzky and Fleischer (1990) formed the theoretical framework and explained that technology, organisational and external environment are the determinant factors of ICT adoption (see Chapter 2).

The research findings of the current study indicated Technological, Organisational and External environmental (TOE) influences on ICT adoption. This was confirmed by correlation and regression analysis, which showed that TOE has a significant positive relationship with ICT adoption. The technological environment includes relative advantage and compatibility. The organisational environment includes top management, relative advantage and ICT knowledge. The external environment includes external support and government support. Therefore, the research findings showed a positive correlation between relative advantage and ICT adoption. In other words, the advantages of ICT influence SMEs to adopt ICT. Furthermore, there is a positive correlation between compatibility and ICT adoption. This

means SMEs believe that ICT is suitable for their businesses, which is why it positively influences ICT adoption.

In terms of the organisational environment, the top management influences ICT adoption. Top management is the key to ICT. If the management believes in the benefits of ICT, it is easy to adopt ICT, and if they do not, it is also easy not to adopt ICT. Nevertheless, this study's results showed a positive relationship between top management and ICT adoption. Therefore, the top management is willing to adopt ICT. Resource availability also influences ICT adoption. If no resources are available, the SMEs will likely not adopt ICT. However, if resources are available, SMEs are more likely to adopt ICT. The study results showed a positive relationship between resource availability and ICT adoption. Moreover, there is a positive correlation between ICT knowledge and ICT adoption. Therefore, more SMEs have knowledge of ICT, which is why they are likely to adopt ICT. The research anticipated that there would be a lack of resources and ICT knowledge in rural areas to adopt ICT. Interestingly, this was never the case. This also opens avenues to new studies.

There is a positive correlation between external support and ICT adoption in terms of the external environment. This implies that SMEs also adopt ICT when there is support outside the business, regarding suppliers. If the SMEs' supplier uses ICT, SMEs are likely to adjust and adopt ICT. However, a weak positive correlation exists between government support and ICT adoption. Also, the cluster mean of government support is 2.76, which means SME owners are of the view that government does not provide ICT support. The reason for the weak correlation is that SMEs do not know of the government's support in ICT.

The existing literature shows that there is a gap in the ICT adoption between rural and urban SMEs, which means a digital divide. Thus, the research findings of this study showed that location strengthens the relationship between TOE factors and ICT adoption by 0.002. This slight increase indicates that location is not the main factor influencing ICT adoption. Therefore, there is an avenue for future research to study other geographical areas. Similarly, the SMEs industry strengthens the relationship between TOE factors and ICT adoption by 0.007. The slight increase indicates that industry is not the main factor influencing ICT adoption.

In conclusion, this study shed light on the factors influencing ICT adoption among SMEs in South Africa. The analysis, anchored in the TOE model, showed roles played by technological, organisational, and external environmental factors. As stated, relative advantage, compatibility, top management support, resource availability, ICT knowledge, and external support, all significantly impact the adoption of ICT within SMEs. Moreover, the findings challenged initial assumptions regarding the presence of a digital divide, particularly between

rural and urban SMEs. While location and industry do play a role, the effect sizes indicate that they are not the primary factors. This insight opens new avenues for further research, both geographically and across different industries.

## 5.5. RECOMMENDATIONS

Regarding the role of the organisational environment, the results showed that most participants do not have technical staff to maintain their ICT resources. This is understandable because most of the SMEs have few staff, and the annual turnover is below R1 million, as indicated in subsection 4.3.1.6 and subsection 4.3.1.8. However, SMEs should conduct audits and assessments for their ICT resources and identify areas that need improvement. Also, it is recommended that SMEs establish relationships with ICT suppliers to maintain and support their ICT resources. For the long term, SMEs should implement risk management strategies to identify and mitigate potential threats to their ICT resources.

The multi-linear regression results show a beta value of β=-0.061 for the external environment. This means the external environment has a negative influence on ICT adoption. This is mainly due to the results of the government support. For instance, most participants disagreed that the government offers grants and loans for ICT adoption in SMEs. The government should inform SMEs of the available grants and loans for ICT adoption, using various platforms, such as social media or collaborate with institutions to spread information about available funding opportunities. Additionally, the government can simplify and streamline the application process for grants and loans for SMEs to understand and navigate. Moreover, the SMEs did not agree or disagree that the government IT rules and regulations favour ICT adoption among SMEs. This indicated that most SMEs are not certain of the existing rules and regulations, regarding ICT. Therefore, the government should compile materials for SMEs, explaining ICT regulations. The documentation should be written in a simplified manner and avoid technical jargon. Furthermore, most SMEs neither agreed nor disagreed that the government offers ICT infrastructure to SMEs. The government need to enhance communication about the available ICT infrastructure. Also, researchers can gather feedback from SMEs to understand their specific concerns or uncertainties regarding the government's existing ICT infrastructures.

Regarding the moderating relationship of location between TOE factors, location does not have much influence on ICT adoption. The recommendation is that similar research should be conducted in other geographical areas. Also, with the industry, there is little influence on ICT adoption. Therefore, similar research should be conducted, but by diversifying industries.

## 5.6. RESEARCH CONTRIBUTIONS

The study contributed to business management by exploring the TOE factors influencing ICT adoption. Also, the study's research findings showed that other factors influence ICT adoption, which opens other avenues of research. For instance, understanding specific factors influencing ICT adoption allows the development of tailored solutions. Different SMEs may face unique challenges based on factors like industry, size, location, and market focus. Additionally, by studying the factors influencing ICT adoption, researchers can assess the economic impact of technology implementation on SMEs, including productivity gains, cost savings and revenue growth. Furthermore, studying the factors influencing ICT adoption can also highlight disparities in access and use among different types of SMEs, potentially leading to policies aimed at reducing the digital divide.

The study contributed to the government sector by revealing which factors influence ICT adoption. Thus, the empirical findings are essential to help the government make informed decisions about policies, strategies and interventions, to promote ICT adoption. Moreover, the study contributed to the existing literature in relation to the below topics:

- Factors influencing the intension to adopt ICT among SMEs in South Africa.
- The influence of SMEs' location on ICT adoption.
- The effect of the SMEs' industry on ICT adoption.
- The digital divide in rural and urban SMEs.
- The influence of technological factors in ICT adoption.
- The influence of Organisational factors on ICT adoption.
- The influence of the external environment on ICT adoption.
- The effect of ICT adoption on the environmental sustainability of SMEs.

## 5.7. LIMITATIONS

There were challenges in identifying locally owned businesses in various regions, and immigrants hesitated to complete the questionnaire. Additionally, some SME owners lacked comprehension of the term "ICT." Given limited financial resources and time, the study focused solely on the Free State region. However, it is worth noting that rural areas within the Free State are transitioning toward semi-urban status, despite being classified as rural by StatsSA. To enhance future studies, it is recommended that the government and StatsSA revise their definitions of such areas. Generalising findings from the Free State to other rural and urban regions, is also problematic, as rural areas in different provinces may exhibit distinct characteristics. Thus, future research should explore additional provinces. Furthermore, rural areas tend to have smaller populations and limited numbers of existing SMEs, with a

prevalence of informal SMEs, like street vendors. Therefore, future studies should consider including informal SMEs in their research. Lastly, it is important to note that the SME industry in rural settlements primarily focuses on retail and is often dominated by large businesses.

## 5.8 AVENUE FOR FUTURE RESEARCH

A mixed-method approach is suggested for future studies, as some SMEs may not thoroughly comprehend the questionnaire and simply complete it. This could involve incorporating qualitative interviews to gain deeper insights into SME perspectives and practices, related to ICT adoption. Additionally, given the hesitancy of some SMEs to respond to the questionnaire, a mixed-method approach is considered more effective.

Sub-section 4.6.2 indicates that TOE factors account for 43.3 percent of the variation in ICT adoption. This implies that 56.7 percent of the variance in ICT adoption is influenced by factors other than TOE. Thus, future research could explore other factors impacting ICT adoption. This may entail conducting a comprehensive review of SMEs and ICT adoption literature and empirical studies to pinpoint these factors. Furthermore, extending research beyond the Free State Province and conducting comparative studies between this province and other regions is recommended. This could involve examining socio-economic, regulatory, and infrastructural factors that may influence ICT adoption. In addition, given that immigrant-owned SMEs outnumber locally-owned, future research should focus on understanding the reasons behind the scarcity of locally owned-SMEs. This research could involve surveys, interviews, or case studies to uncover immigrant and locally-owned SMEs' motivations, challenges, and strategies.

Consideration should also be given to conducting longitudinal studies to monitor the evolution of ICT adoption over time. This approach would offer insights into trends, patterns, and the influence of external factors on SMEs' ICT adoption. Additionally, broadening the research to encompass various industries other than retail within the SME sector would shed light on potential sector-specific disparities in ICT adoption and the underlying influencing elements.

## 5.9. CONCLUSION

This chapter is the conclusion of the study, which aimed to investigate factors influencing ICT adoption among SMEs in South Africa using the digital divide approach. The study successfully achieved its objectives, finding a positive correlation between TOE factors and ICT adoption. In essence, TOE factors were identified as key determinants of ICT adoption.

Additionally, SMEs' location and industry were found to correlate positively with ICT adoption. Therefore, while TOE factors are significant, they are not the only determinants of ICT adoption. The chapter also provided the recommendations and research contributions of the study. Furthermore, the study's limitations were highlighted, and areas for future research were suggested.

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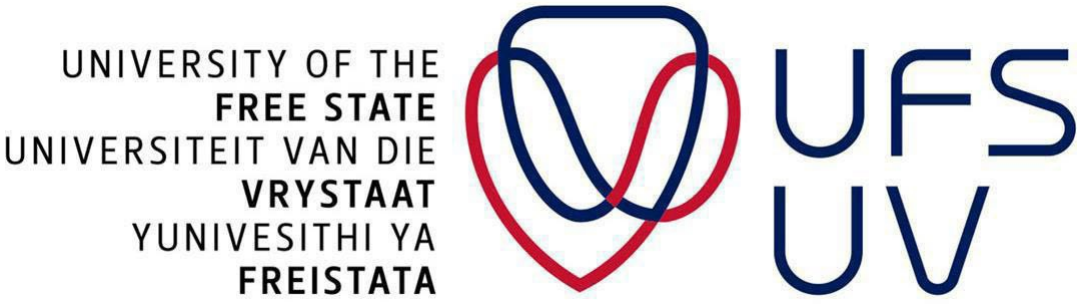
# APPENDIX A
# QUESTIONNAIRE




## SMEs DIGITAL DIVIDE: AN ANALYSIS OF FACTORS INFLUENCING ICT ADOPTION

My name is Zoleka Dikana, Master of Commerce (Business Management) student at the University of the Free State, Bloemfontein campus. I am conducting research in the field of business management. The aim of my study is to investigate factors influencing ICT adoption among SMEs in South Africa using the digital divide approach. I, therefore, request your assistance in providing the data for my study. In achieving this, I would appreciate it if you could kindly complete this questionnaire as truthfully and accurately as possible.

This research is conducted strictly for academic purposes, and therefore, your participation in the study is strictly confidential; anonymity is guaranteed as you do not have to provide your name. All data provided will be treated in the strictest confidence.

Thank you

Zoleka Dikana

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**Section A: Demographics**

Please select the option that best describes your gender by marking the appropriate option with an **X**.

| | | |
|---|---|---|
| A1 | Male | 1 |
| | Female | 2 |
| | Other | 3 |

Please select the option that best describes your age by marking the appropriate option with an **X**.

| | | |
|---|---|---|
| A2 | 18-20 | 1 |
| | 21-29 | 2 |
| | 30-39 | 3 |
| | 40-49 | 4 |
| | 50-59 | 5 |
| | 60 or above | 6 |

Select the option that best describes the highest level of your education by marking the appropriate with an **X.**

| | | |
|---|---|---|
| A3 | High School | 1 |
| | Diploma | 2 |
| | Bachelor's Degree | 3 |
| | Honour's Degree | 4 |
| | Masters Degree | 5 |
| | Doctorate | 6 |
| | Others | 7 |

Select the option that best describes the location of your organisation by marking the appropriate with an **X.**

| | | |
|---|---|---|
| A4.1 | Rural | 1 |
| A4.2 | Urban | 2 |

Select the best description of your ICT competencies by marking the appropriate option with an **X.**

| | | |
|---|---|---|
| A5.1 | Not competent | 1 |
| A5.2 | Slightly competent | 2 |
| A5.3 | Competent | 3 |
| A5.4 | Very competent | 4 |

A.6 How many employees are currently employed at your company?

_____

Which industry best describes your organisation? Please mark the appropriate option with

an **X**.

| | | |
|---|---|---|
| A7.1 | Manufacturing | 1 |
| A7.2 | Retail, Wholesale &Distribution | 2 |
| A7.3 | Financial Services | 3 |
| A7.4 | Technology, Media and Telecommunication | 4 |
| A7.5 | Other (please describe in the row below | 5 |
| Other | | |

Select the value which best describes your annual estimated turnover by marking the appropriate statement with an **X.**

| | | |
|---|---|---|
| A8.1 | Below R1 million | 1 |
| A8.2 | R2-5 million | 2 |
| A8.3 | R6-10 million | 3 |
| A8.4 | R11-15 million | 4 |
| A8.5 | R16-20 million | 5 |
| A8.6 | Above R20 million | 6 |

**Section B: Technology Organisation External (TOE) Environment**

Please indicate the degree to which you agree or disagree with the following statements by marking the appropriate statement with an **X**.

**Technology Environment**

| **B1** | **Relative Advantage** | **Strongly disagree** | **Disagree** | **Neither agree or disagree** | **Agree** | **Strongly agree** |
|---|---|---|---|---|---|---|
| B1.1 | ICT enable our organisation to complete tasks more quickly. | 1 | 2 | 3 | 4 | 5 |
| B1.2 | ICT improves the quality of the work we do. | 1 | 2 | 3 | 4 | 5 |
| B1.3 | ICT makes it easier for us to do our job. | 1 | 2 | 3 | 4 | 5 |
| B1.4 | ICT enhance our effectiveness on the job. | 1 | 2 | 3 | 4 | 5 |
| B1.5 | ICT increases our organisation's productivity. | 1 | 2 | 3 | 4 | 5 |
| **B2** | **Compatibility** | **Strongly disagree** | **Disagree** | **Neither agree or disagree** | **Agree** | **Strongly agree** |
| B2.1 | ICT fits well with the way our firm does business. | 1 | 2 | 3 | 4 | 5 |

| | | | | | | |
|---|---|---|---|---|---|---|
| B2.2 | ICT fits well with our organisation's values and culture. | 1 | 2 | 3 | 4 | 5 |
| B2.3 | ICT fits well with our existing ICT infrastructure. | 1 | 2 | 3 | 4 | 5 |
| B2.4 | ICT fits well with our organisation's existing distribution channel. | 1 | 2 | 3 | 4 | 5 |

**Organisational Environment**

| **B3** | **Top Management** | **Strongly disagree** | **Disagree** | **Neither agree or disagree** | **Agree** | **Strongly agree** |
|---|---|---|---|---|---|---|
| B3.1 | Top management considers ICT for our organisation's success. | 1 | 2 | 3 | 4 | 5 |
| B3.2 | Top management allocates resources for ICT adoption. | 1 | 2 | 3 | 4 | 5 |
| B3.3 | Top management encourages ICT in the organisation. | 1 | 2 | 3 | 4 | 5 |
| B3.4 | Top management supports the adoption of ICT in the organisation. | 1 | 2 | 3 | 4 | 5 |
| B3.5 | Top Management believes that ICT is important in our organisation to gain a competitive advantage. | 1 | 2 | 3 | 4 | 5 |
| **B4** | **Resource Availability** | **Strongly disagree** | **Disagree** | **Neither agree or disagree** | **Agree** | **Strongly agree** |
| B4.1 | Our organisation has the technological resources to adopt ICT. | 1 | 2 | 3 | 4 | 5 |
| B4.2 | Our organisation has skilled staff that can use ICT tools effectively. | 1 | 2 | 3 | 4 | 5 |
| B4.3 | Financial resources are available in our organisation to adopt ICT. | 1 | 2 | 3 | 4 | 5 |
| B4.4 | Our organisation has technical staff to maintain ICT. | 1 | 2 | 3 | 4 | 5 |
| **B5** | **ICT Knowledge** | **Strongly disagree** | **Disagree** | **Neither agree or disagree** | **Agree** | **Strongly agree** |
| B5.1 | Most of our employees are computer literate. | 1 | 2 | 3 | 4 | 5 |
| B5.2 | Most of our employees have access to computers. | 1 | 2 | 3 | 4 | 5 |
| B5.3 | Our employees are connected to the Internet. | 1 | 2 | 3 | 4 | 5 |

**External Environment**

| B6 | External Support | Strongly disagree | Disagree | Neither agree or disagree | Agree | Strongly agree |
|---|---|---|---|---|---|---|
| B6.1 | Our technology supplier provides training for the effective use of ICT. | 1 | 2 | 3 | 4 | 5 |
| B6.2 | Our technology supplier provides relevant information and resources. | 1 | 2 | 3 | 4 | 5 |
| B6.3 | Our technology supplier has high integrity. | 1 | 2 | 3 | 4 | 5 |
| B6.4 | Our technology supplier offers effective support to our organisation. | 1 | 2 | 3 | 4 | 5 |
| **B7** | **Government Support** | **Strongly disagree** | **Disagree** | **Neither agree or disagree** | **Agree** | **Strongly agree** |
| B7.1 | The government offers grants and loans for ICT adoption among SMEs. | 1 | 2 | 3 | 4 | 5 |
| B7.2 | The government IT rules and regulations favour ICT adoption among SMEs. | 1 | 2 | 3 | 4 | 5 |
| B7.3 | The government offers ICT infrastructure to SMEs. | 1 | 2 | 3 | 4 | 5 |

Please indicate the degree to which you agree or disagree with the following statements by marking the appropriate statement with an **X.**

**Section C: ICT Adoption**

| | Adopt ICT | Strongly disagree | Disagree | Neither agree or disagree | Agree | Strongly agree |
|---|---|---|---|---|---|---|
| C.1 | Our organisation plan to use ICT in the future. | 1 | 2 | 3 | 4 | 5 |
| C.2 | Our organisation intends to continue using ICT. | 1 | 2 | 3 | 4 | 5 |
| C.3 | ICT usage is appropriate for our organisation. | 1 | 2 | 3 | 4 | 5 |

## Thank you for your participation