



**DURBAN UNIVERSITY OF TECHNOLOGY**  
**INYUVESI YASETHEKWINI YEZOBUCHWEPHESHE**

**Adoption of Mobile Cloud Computing by Small and Medium-Sized  
Enterprises (SMEs) in Rural Areas**

By

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## DECLARATION

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**Signature:** *Noxolo Cele*

Date: 25/03/2024

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## ABSTRACT

This study was conducted in the rural areas of KwaZulu-Natal (KZN) province of the Republic of South Africa. These rural areas includes uMbumbulu, Hlokozi, Eluphepheni, and KwaMakhutha. The main aim was to examine various factors that affect the adoption of Mobile Cloud Computing (MCC) by SMEs located in these areas. This study was motivated by benefits of MCC in various sectors around the world. This includes the provision of cloud-based services to users through the Internet and mobile devices. The current study is of the view that providing MCC to small and medium-sized enterprises (SMEs) in rural areas can help them leverage cloud computing resources to improve their performance and delivery of services to customers. A quantitative research strategy was employed to obtain greater knowledge and understanding of the factors that affect the implementation of MCC by SMEs in the indicated rural areas, aiming to produce objective data that can be clearly communicated through statistics and numbers. The online survey was administered to owners, managers, employees and customers of these SMEs. The collected data was later analysed through Excel and the Statistical Package for the Social Sciences (SPSS) version 25. The results of this study reveal that, according to the customers' point of view, SMEs in rural areas will be able to adopt MCC if there are adequate technological devices. The results suggest that relative advantage (RA), perceived security, perceived ease of use (PEU), and attitude are some of the factors that need to be considered for SMEs in rural areas to successfully adopt MCC. The findings also signal a strong correlation between perceived need, technological devices, compatibility, RA, complexity, trialability, and observability, when measured against MCC. In summary, the results indicate the importance of doing proper research before adopting cloud-based services in order to identify the need for MCC adoption. Significantly few respondents showed resistance or doubt regarding SMEs' adoption of MCC.

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## LIST OF ABBREVIATIONS

ANOVA	Analysis of variance
CC	Cloud computing
DIT	Diffusion of Innovations Theory
ICT	Information and communications technology
IT	Information technology
KZN	KwaZulu-Natal
MC	Mobile computing
MCC	Mobile cloud computing
PEU	Perceived ease of use
PU	Perceived usefulness
RA	Relative advantage
SaaS	Software as a service
SMEs	Small and medium-sized enterprises
SPSS	Statistical Package for the Social Sciences
TAM	Technology Acceptance Model
TOE	Technology-Organisation-Environment
TPB	Theory of Planned Behaviour
UTAUT	Unified Theory of Acceptance and Use of Technology

## LIST OF TERMINOLOGY

**Cloud computing (CC):** Cloud computing involves delivering different services over the Internet. Everything can be delivered via the cloud, from software and analytics to secure and safe data storage and networking resources.

**Mobile computing (MC):** The mobile cloud is Internet-based data, applications, and related services accessed through smartphones, laptops, tablets, and other portable devices.

**Mobile cloud computing (MCC):** MCC technology combines CC and MC on a wireless network. This innovative technology makes it possible to deliver and execute high-quality applications on mobile devices, regardless of the latter's operating system, storage capability, and computing tasks.

**Small and medium-sized enterprises (SMEs):** non-subsidary, independent firms which employ fewer than a given number of employees

# CHAPTER ONE

## INTRODUCTION AND BACKGROUND

### 1.1 Introduction

According to the reviewed literature, organisational growth and business approach in the twenty-first century emphasise product quality and the significance of productivity. Many businesses are incorporating newly developed technologies into their operations to exploit the numerous benefits of these technologies (Almaiah and Al-Khasawneh, 2020). When these new technologies are integrated into organisations, changes in the architecture of these businesses are sometimes necessary in order to maximise the improvements that this technology can bring and to minimise losses (Chege & Wang, 2020). The usage of cloud-based services has increased over the last few decades, and companies are increasingly integrating cloud-based services into their operations to take advantage of the benefits of this technology.

This study examines the implementation of mobile-based services by SMEs in rural areas. According to Khayer et al. (2020), large organisations have been exploiting the benefits of mobile cloud computing (MCC) for a number of years. However, the question remains as to whether SMEs in rural areas will be able to adopt these kinds of platforms. Khayer et al. (2020) note that many studies have been conducted to understand the significant role MCC can play in SMEs, especially in developing countries. However, there is a lack of information on the feasibility of adopting information and communications technology (ICT) in rural areas of KwaZulu-Natal (KZN) province, and even less information on the adoption of cloud-based services by SMEs located in rural villages. Therefore, this study will explore various factors regarding the adoption of MCC by SMEs. These factors include perceived ease of use (PEU), usefulness, security and privacy.

This chapter describes the background and aim of this study, and outlines the research problem, objectives, and questions. It highlights the importance of this research and defines the scope and delimitation of this study. This chapter also discusses the

research methodology used in this study, and presents the structure of this dissertation.

## **1.2 Background of the study**

Jin, Hua, Wang, and Chen (2022) state that small and medium-sized enterprises (SMEs) can significantly contribute to the country's economy when the necessary support is provided. SMEs are a specific type of firm where the sales, assets, or number of employees is below a specific threshold (Palanisamy and Shi, 2023). Chege and Wang (2020) claim that SMEs play a significant role in various countries by employing many individuals and assisting in reshaping innovation in those countries. Chege and Wang (2020) further indicate that the usage of ICT resources can maximise the effectiveness of SMEs by lowering costs and developing the market. ICT adoption can provide many advantages to individual SMEs, such as creating jobs and generating income (Ogujiuba et al., 2020). This study focuses on SMEs located in five rural areas of KZN province in the Republic of South Africa: Highflats, uMbumbulu, Hlokozi, Eluphepheni, and KwaMakhutha. There is little knowledge about the adoption of MCC in these areas.

According to the reviewed literature, while ICT has shown numerous advantages in well-established businesses in developed countries, some constraints and difficulties have also been identified. These challenges include what Yeboah (2022) call legal deficiencies. Sathye, Goundar, and Bhardwaj (2022) note that the complexities of technology, poor technical infrastructure, and lack of skilled human resources pose even more challenges in many developed businesses. Therefore, if well-developed companies are facing challenges regarding technology, it is interesting to examine whether SMEs in a developing country like South Africa can leverage the benefits of ICT through the adoption of MCC.

MCC is a computing approach involving mobile devices to leverage cloud-based services to improve performance and expand SMEs' ability to provide goods and services. Fakieh, Busch, and Blount (2022) define MCC as a computing approach that supports outsourcing mobile device computation and storage to large-scale computing infrastructure to maximise the ability of mobile devices to facilitate computing. Hossain

(2022) note that MCC enables a variety of users to gain full accessibility to computing services, and one of its advantages is that it is flexible as it can be accessed anywhere. Chiu, Chen, and Chen (2022) note that this technology involves providers of cloud computing (CC) services renting their services to consumers, who then use these services in whatever platform they prefer.

### **1.3 Statement of the problem**

According to Fortuin (2021), cloud-based services are crucial in SMEs as they provide various strategies such as e-marketing applications, cheaper Internet packages, and online support platforms and resources. Almaiah and Al-Khasawneh (2020) assert that SMEs use Internet-based services only to send emails and transfer documents, and do not make use of cloud-based services for business automation and internal processing of business information and knowledge. Rice (2021) suggests that SMEs in rural areas need to enhance the availability of their services by including platforms like CC, which will provide services such as e-commerce. AlAhmad et al. (2021) also state that CC offers SMEs in rural areas a great opportunity to make their products accessible to the market. The introduction of MCC enables SMEs to consolidate communication with their suppliers, product promotion, and customer relationships, enabling market transactions and providing them with other internet-enabled services (Hartono and Alianto, 2020). According to Kari and Kleinreesink (2020) MCC can also offer SMEs in rural areas applications such as e-payments or M-payments and an information system to facilitate business transactions.

AlAhmad, Kahtan, Alzoubi, Ali, and Jaradat (2021) note that despite the advantages of adopting MCC, there are also problematic issues such as energy consumption when wireless signals are weak. Yasiukovich and Haddara (2020) note that constantly searching for a lost wireless signal on a mobile device can drain its power, resulting in unexpected energy waste. Palanisamy and Shi (2023) identify challenges associated with the use of MCC in business, including issues such as data integrity and increased portability. These problems have left cloud customers vulnerable to issues such as reliability when vendors stop serving requests, data extraction from hosting servers, and a price hike (Palanisamy & Shi, 2023). Nguyen and Liaw (2022) identified further challenges facing small businesses in rural areas, such as the constraints of mobile

devices, the quality of communication, and the grouping of application services. In view of these challenges, it is a significant question whether MCC can be adopted by SMEs in rural areas.

#### **1.4 Research aim, objectives, and questions**

The aim, objectives and research questions of this study will be discussed in this section.

##### **1.4.1 Research aim**

The aim of this study is to examine the factors that impact the adoption of MCC by SMEs in rural areas of the KZN province of the Republic of South Africa, including uMbumbulu, Hlokozi, Eluphepheni, and KwaMakhutha.

##### **1.4.2 Research objectives**

The aim of this study will be accomplished through the following objectives:

- Establish the perceived need for the adoption of MCC by SMEs in rural areas
- Ascertain whether stakeholders (customers, owners, managers, and employees) of SMEs can easily use CC
- Identify technological devices that are being used by SMEs currently
- Determine whether the devices used by owners of SMEs, managers of SMEs, and employees of SMEs are compatible with CC
- Identify and measure factors that affect the adoption of MCC by SMEs in rural areas.
- Test the identified factors

##### **1.4.3 Research questions**

The above-mentioned research objectives will be achieved by answering the following research questions:

*RQ1. What is the need to adopt MCC by SMEs in rural areas?*

*RQ2. How can owners, managers and employees of SMEs in rural areas use CC efficiently?*

*RQ3. What kind of devices are SMEs using in rural areas?*

*RQ4. Is CC compatible with SMEs in rural areas?*

*RQ5. Can the identified factors be measured?*

### **1.5 Significance of the study**

Naik (2019) asserts that MCC is viewed as a growing trend, and major improvements are required in many sectors to enable organisations to adopt it. Some areas for improvement relate to MCC's effectiveness in different geographical areas, such as network and electricity issues in rural areas. This study seeks to provide new insight into the factors that affect the adoption of MCC by SMEs in rural areas. This will contribute to developing a framework that can be utilised by stakeholders in KZN and South Africa in their initiatives to develop SMEs in rural areas. This study will also help the provincial government and the country by identifying several factors to be considered when organisations integrate new technologies into their businesses. This study will assist non-users of MCC to establish whether there are any possibilities for its incorporation into their businesses. It will also assist existing users of MCC to determine how they can improve their present cloud-based services.

### **1.6 Scope and delimitations of the study**

This study was conducted in the rural areas of KZN province in the Republic of South Africa. The rural areas that were involved are as follows: Highflats, uMbumbulu, Hlokozi, Eluphepheni, and KwaMakhutha. The SMEs in these areas have not utilised this technology in their businesses. There is a lack of technological adoption, which is supported by the reviewed literature in this study. The population comprised customers and other stakeholders such as owners, managers, and employees.

## **1.7 Overview of research methodology**

A quantitative research methodology is applied in this study. According to Mohajan (2020) quantitative research produces measurable results. Mohajan (2020) further indicated that quantitative data is mathematical and statistical, which is the reason for using the quantitative method in this study.

A questionnaire-based survey was distributed to the participants and collected for the purpose of analysis. Several sampling approaches were adopted, including cluster, stratified, accidental, and simple random sampling. According to Barbu, Zhu, Barbu, and Zhu (2020) cluster sampling involves population subcategories rather than individuals. Simkus (2022) state that in cluster sampling, the population is classified into subgroups that are randomly selected to be included in a particular study. Cluster sampling was applied in this study as the population involved various categories. Stratified sampling was applied to ensure a more realistic and accurate estimation of the population that has been used in this study. Zhang et al. (2022) recommend the use of a stratified sampling method to assure representation from all the subcategories where the measurement of interest among different subcategories is expected to differ. An accidental sampling method was applied with regard to customers participating in this study, as the population sample was close at hand rather than carefully determined and obtained. Wang, Yang, and Ouyang (2023) state that accidental sampling is appropriate in studying the sampling population, mostly used among sellers or newspaper researchers. After all the above approaches had been applied, a simple random sampling method was applied to this population according to the number of employees of the above-mentioned rural SMEs. In a simple random sampling method, the selection of the participants depends on chance or probability; hence, this technique is also known as the method of chance. This method was used to extract a sample from a larger population.

## **1.8 Structure of the dissertation**

This study is presented in five chapters, which are arranged in the following manner:

### 1.8.1 Chapter One: Introduction and background

Chapter One presents the background and purpose of the study, as well as the research problem, objectives, and questions. The chapter also highlights the importance of this study, which includes proposing methods in which SMEs in rural areas of KZN province can utilise technology to expand their business.

### 1.8.2 Chapter Two: Literature review

Chapter Two presents a review of the literature relevant to this study, which includes a theoretical framework involving the Diffusion of Innovations Theory (DIT) with its important characteristics such as relative advantage (RA), compatibility, complexity, trialability, and observability. Each of these characteristics is discussed in depth. This chapter further discusses CC and MCC, which are central to this study. The chapter ends with a further discussion of SMEs from a broader perspective and an overview of MCC in various SMEs. The perceived need for the adoption of MCC, the use of CC by managers and employees, and factors influencing the adoption of MCC are also discussed.

### 1.8.3 Chapter Three: Research methodology

Chapter Three provides an overview of the methods and research design strategy used to answer the research questions posed in this study. Sampling techniques, design, data collection methods, and data analysis methods are outlined in this chapter.

### 1.8.4 Chapter Four: Presentation of results and discussion

Chapter Four presents the results of the data gathered from the customers and other stakeholders (owners, managers and employees) surveyed in this study regarding the adoption of MCC by SMEs in rural areas. The collected data was analysed using the Statistical Package for the Social Sciences (SPSS). The reliability of the variables is examined, and descriptive and inferential statistics are outlined. This chapter concludes by presenting the empirically validated model proposed in this study.

### 1.8.5 Chapter Five: Summary, conclusions, and implications of the study

This chapter provides a discussion of the results obtained in Chapter Four. It deliberates on the existing studies that were reviewed, and discusses the results based on the research aims, objectives, and questions. This chapter concludes by providing recommendations for future research related to implementing MCC by SMEs in rural areas. All the variables used in this study are considered, and recommendations are made based on the results obtained in this study.

## 1.9 Summary

This chapter has examined the background of this study, focusing on SMEs and their impact on the economy. The research problem, objectives and questions of this study have been discussed, and the importance of this research has been highlighted. The scope and delimitation of this study have been defined, and the research methodology used in this study has been discussed. The structure of this dissertation and an overview of each chapter has been presented. The next chapter will present the literature review of this study.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

This chapter presents the theoretical framework chosen for this study. It provides a brief description of CC, mobile computing (MC), and MCC, which is a combination of CC and MC. It discusses differences between SMEs in rural areas and those in suburban areas. This chapter also provides an overview of MCC in SMEs and the objectives outlined in Chapter One. It concludes with a discussion of the challenges of MCC and technological devices currently being used by SMEs, as well as factors that influence the use of CC by SMEs.

#### **2.2 Theoretical framework**

According to Varpio, Paradis, Uijtdehaage, and Young (2020), a theoretical framework is crucial to research. Maddux, Lu, Affinito, and Galinsky (2021) describe a theoretical framework as a blueprint for research that an individual wants to pursue. Maddux et al., (2021) further indicated that it is a blueprint that demonstrates how conducted research is aligned with what is already known, or the relationship it has with the existing theory. Similarly, Larsen and Adu (2021) note that a theoretical framework provides a platform for research questions and other components such as a literature review, methodology and any form of analysis.

##### **2.2.1 Diffusion of Innovations Theory (DIT)**

Several theories and models have been constructed to explain the acceptance of technology. These include the Theory of Planned Behaviour (TPB), the Technology Acceptance Model (TAM), and DIT. According to Silva, Braz, Cavalcante, and Alves (2022), DIT examines a variety of innovations by identifying factors that influence the spread of a new idea. Mahakittikun, Suntrayuth and Bhatiasevi (2020) identify five important innovation characteristics that DIT comprises: RA, compatibility, complexity, trialability, and observability. DIT is a suitable theory for this study because it has

several factors that have been found, according to the reviewed literature, to impact SMEs' adoption of MCC. DIT was used in most of the reviewed studies, which shows its significant impact on the identified dependent variable (MCC). According to Spann, Mead, Maleki, Agarwal, and Williams (2022), DIT combines two essential concepts: innovation and diffusion. Innovation is an idea, practice, or object with distinct features that cause it to be perceived as new, while Diffusion is a process in which innovation is conveyed through various methods over a period of time amongst individuals in a social system (Spann et al., 2022).

Mo, Luo, Wang, Zhao, Zhang, Li, Li, Xie, and Lau (2021) define DIT as a theory of how, why, and at what magnitude new ideas and technology are distributed through various cultures. Mori and Mlambiti (2020) conceptualise DIT as the perceptions of an innovation that influence its adoption, rather than its actual attributes. Similarly, Lavoie, Dentzman, and Wardropper (2021) describe DIT as a wide social and psychological theory that assists in predicting the manner in which individuals make decisions to accept an innovation by discovering how it can be adopted and gaining better comprehension of its structure. Cited by Lavoie et al.,(2021), Rogers (2003) identifies five perceptions, or perceived attributes, that are likely to contribute to the adoption of an innovation: RA, complexity, compatibility, observability, and trialability.

### 2.2.2 Unified Theory of Acceptance and Use of Technology

This study incorporates the Unified Theory of Acceptance and Use of Technology (UTAUT) model, developed by Venkatesh et al. (2003), to examine behavioural intentions to use and adopt MCC. Venkatesh et al. (2003) employed the UTAUT model to understand human acceptance behaviour across various fields (Abbad, 2021). UTAUT assists in understanding variances in behavioural intentions to use a particular technology (Al-Saedi et al., 2020). The characteristics of UTAUT are illustrated in Figure 2.1. In this study, UTAUT supports the use of demographic variables such as gender and age.

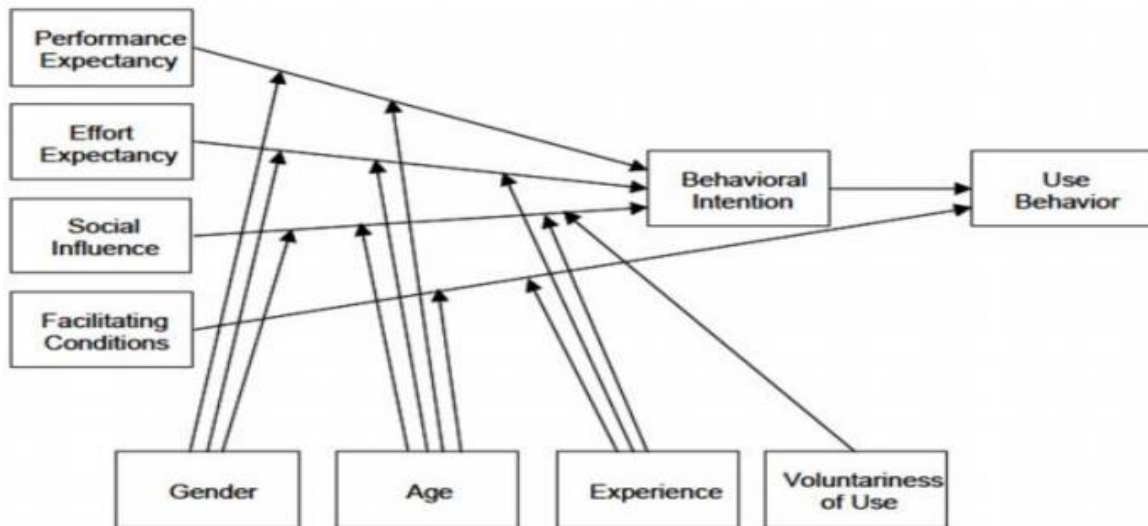


Figure 2.1: UTAUT model (Venkatesh et al., 2003)

### 2.3 Selected theory in the current study

DIT is the main theory applied in this study, together with its five essential innovation characteristics: RA, compatibility, complexity, trialability, and observability. Each of the innovation characteristics is discussed extensively below.

#### 2.3.1 Relative advantage

RA is the level to which an innovation is observed as being superior to the idea it surpasses (Oyelana, Kamanzi & Richter, 2021). It is one of the main constructs in the DIT framework (Okour, Chong & Fattah, 2021). Qader et al. (2022) conceptualise RA as an individual's belief in the superiority of a new idea to an existing system. Okour et al. (2021) describe RA as the level to which an innovation is seen as offering more or better benefits than its predecessor, thus motivating users to understand the main purpose of the technology better. Benhabib, Perla and Tonetti (2021) suggest that RA signifies the benefits and costs of adopting an innovation and is one of the best predictors of an innovation's adoption rate. When a newly developed product works effectively, it can increase efficiency and economic benefits, and enhance status in the new environment (Huong and Duc, 2023).

According to Nofal and Khalaf (2021) previous studies have found that the RA of innovation has had a positive impact on the adoption rate of cloud-based services. Existing studies have suggested that when users start to understand the benefits and importance of a new technology, they tend to accept it (Min et al., 2019). In the context of MCC adoption, benefits such as proximity, convenience, and customer affordability have been reported to be relative advantages.

RA helps to determine an individual's perception of a new idea or innovation (Frei-Landau, Muchnik-Rozanov, and Avidov-Ungar, 2022). It is associated with the results of the end product, which in this study is MCC. These results might include the provision of secure and reliable services and economic benefits to the organisation after utilising MCC. In previous empirical studies, RA has been shown to have a huge impact on the acceptance of cloud-based services (Iqbal and Zahidie, 2022). The RA of a new idea or innovation may have subcategories such as the social prestige of a person, time, cost and discomfort, and economic profitability (Spann, Maleki, Mead, Buchholz, Agarwal, and Williams, 2021). In this study, RA is used as part of the DIT theoretical framework to measure the relative benefits of MCC through surveys, the results of which are presented in Chapter Four of this study.

### 2.3.2 Compatibility

Compatibility is the extent to which a new idea is perceived to be consistent with existing systems (Shirowzhan et al., 2020). If an idea seems fundamentally incompatible with the current values, principles, or infrastructure, it is unlikely that the innovation will be accepted. To be adopted, an innovation must be received by the stakeholders involved (Kagenaar, Hemelrijck, Kunst, and Janssen, 2022). Shirowzhan et al. (2020) assert that compatibility is a significant factor in all innovations, even those with better relative advantages. Ismail (2023) define compatibility as the belief that a new idea will work well with existing or past ideas, products, or practices.

Existing studies have indicated that compatibility is essential in influencing users' attitudes towards adopting cloud-based services in various institutions (Shirowzhan et al., 2020). Innovations that correspond to the existing plan have a high chance of being accepted (Lynch and Giles ,2022).

Benhayoun and Zejjari (2022) suggest that compatibility is a significant feature of innovation, as agreeing with the user's needs can increase the rate of system or product adoption. Khan, Hameed, Iqbal, Shah, Tariq, and Ahmed (2022) note that previous studies have found compatibility to be a significant influence on the adoption of MCC by various organisations. A study conducted by Mo, Luo, Wang, Zhao, Zhang, Li, Li, Xie, and Lau (2021) concluded that compatibility had a significant relationship with cloud-based services' adoption and usage by the organisation. Mo et al., (2021) further contend that users' beliefs regarding innovation are largely associated with adopting the practice. In this study, compatibility is used as a variable to measure how well MCC will work with the existing systems of SMEs in the rural communities of Highflats, KwaMakhutha, Hlokozi, Eluphepheni, and uMbumbulu in KZN.

### 2.3.3 Complexity

Complexity is the extent to which an innovation can be deemed challenging to understand and use (Clark, Andrews, and Hillis, 2022). It refers to the user's perception of the problem in understanding and utilising a newly developed innovation (Dryden-Palmer, Parshuram & Berta, 2020). The apparent complexity of an innovation often negatively affects its acceptance rate (Dryden-Palmer et al., 2020). If the majority of stakeholders find the innovation easy to understand, it becomes easy to adopt; however, the adoption of more complex innovations is likely to take longer. A study by conducted Chawla, Shinde, and Bhati (2023) found that complexity can negatively impact innovation adoption. According to Vargo, Akaka, and Wieland (2020), complexity is the opposite of ease of use. Ease of use means that an innovation is seen as easy to understand and operate (Vargo et al., 2020). Several studies have emphasised the importance of ease of use of new technology as a prerequisite for its adoption. The more user-friendly MCC services and interfaces become, the more users perceive them as easy to use, leading to higher levels of confidence in using them (Chawla et al.,2023) Complexity is a significant factor in the adoption of MCC. Considerable empirical research on cloud-based services has shown that the apparent complexity of the innovation prevents some users from adopting MCC (Vargo et al., 2020).

Much of the literature on MCC indicates that adoption barriers are predominantly associated with technical complexity (Clark et al., 2022). Several studies have reported complexity in usage, technical infrastructure, and technology design as individual barriers (Mo et al., 2021). A study by Deng, Li, and Chen (2023) indicated that users would be discouraged from using MCC services if they find that they require more effort, unless the benefits outweigh the effort. According to Stieninger et al. (2018), complexity is the difficulty level of using an innovation. An innovation combines complexity and simplicity; its degree of complexity relates to whether it is easy or difficult to use. In this study, complexity is used as a variable to measure how challenging MC will be to SMEs in the rural communities of KZN.

#### 2.3.4 Trialability

Trialability is the extent to which a new idea can be tested on a regulated basis (Oyelana et al., 2021). Trialability is more significant to early adopters of new ideas than to late adopters, because early adopters have no references to support the adoption of the new idea, while late adopters are able to draw on the experiences of others who have previously adopted the innovation, and are thus more equipped to manage trials than early adopters (Okour et al., 2021).

According to Benhabib et al., (2021), trialability is the ability to experiment with a newly adopted idea before it is implemented. Users who have accepted the experimental process of an innovation may feel more comfortable implementing the innovation than users who have not. This is further echoed by Huong and Duc (2023), who argues that if users are allowed to attempt an innovation, this will automatically mitigate various negative circumstances associated with it, such as concerns regarding its adoption.

Nofal and Khalaf (2021) indicate that cloud-based services support technologies such as chatbots and demonstrations of MCC usage while in the trial period. Mohammed et al. (2017) assert that doubts regarding adopting cloud-based services can be lessened, and this can also play a vital role in encouraging those who have shown interest in adopting potential cloud-based services. According to Frei-Landau et al., (2022), trialability can be conceptualised as users' experience of innovation or newly

developed products over a short time. Reviewed studies also conveyed that the trialability of innovation by users positively correlates with its adoption (Iqbal and Zahidie, 2022). In this study, trialability is used to as a variable to measure the possibility of testing the system in question (MCC) before it is utilised.

### 2.3.5 Observability

Observability is the extent to which the benefits of the newly developed product are visible to intended users (Spann et al., 2021).

According to Shirowzhan et al., (2020) the observability of an innovation indicates that it can provide noticeable results. Spann et al., (2021) also noted that the more clearly users perceive the positive results of an innovation, the more likely they are to adopt it. According to Kagenaar et al., (2022), the observability of an innovation is the level at which a new idea is evident to the members of a social system and can be easily communicated. Observability can be categorised into two constructs: visibility and results in demonstrability (Shirowzhan et al., 2020). In the context of MCC, observability can be described as the capability of users to access cloud-based services anywhere and at any time (Kagenaar et al., 2022). This exposure enables users to understand MCC and its benefits more clearly, which encourages its adoption (Spann et al., 2021).

In most cases, a communication channel is needed for an innovation to be understood, while some new ideas can be easily understood without the need for a communication mode (Omorodion and Jesuorobo, 2020). The visibility of intangible services is very complicated and sometimes difficult to understand (Moon, 2020). Empirical studies by Essmiller (2021) found a positive and significant correlation between observability and innovation. Tanye, Asampana, Matey, Akanferi, Koi-Akrofi, and Nurudeen (2023) asserted that the notion behind observability is comparable to unspoken peer pressure: if the innovator is influential, there is a significant chance that the innovator's followers will attempt to adopt the innovation. Observability can be characterised by how an innovation is projected to its users (Tanye, et al., 2023). In this study, observability is used as a variable to check whether the system has noticeable results for the intended users.

- ❖ *The innovation characteristics discussed above, such as Relative Advantage, compatibility, complexity, trialability, and observability, have also been used in this study to measure the adoption of Cloud computing (CC) by SMEs in their business in KZN. The following section (2.4) will introduce and discuss Cloud computing and its effectiveness, that has enforced its involvement in this study.*

## **2.4 Cloud computing (CC)**

CC focuses on managing computing, storage, and communication resources shared by multiple users in a virtualised and isolated environment (Sunyaev and Sunyaev, 2020). According to Alam (2020) CC increases the capabilities of hardware resources by means of optimum and shared utilisation. Marinescu (2022) states that CC is an enormous technology to execute large-scale complex computing. It minimises the need to support massive computing hardware, software, and dedicated space. CC was introduced as a tool for providing convenient and always-available network access to various computing resources that provide fast and unlimited capabilities with less management effort (Marinescu, 2022). These computing resources include storage, applications, services, networks, and servers.

For the purposes of this study, CC refers to a service in which hardware, software, operating systems, applications, and storage are shared as needed and can be accessed using the Internet. This definition of CC aligns with the goals of this study, which envisions the on-premises services provided by SMEs in the rural areas of KZN (Highflats, KwaMakhutha, Hlokozi, Eluphepheni, and uMbumbulu) also being offered via the cloud, thereby enabling customers to have access to these services without going to the store or business premises.

### **2.4.1 Mobile computing (MC)**

MC is a field of study that seeks to understand how moveable devices sense and learn the status of devices based on their mobility and networking abilities to provide large-scale support to mobile applications when communication is necessary (Palanisamy and Shi, 2023). Alshahrani (2021) note that mobile computing explains the application

of small, portable, wireless computing and communication devices, which is used when mobile is changing its location. This computing method requires a wireless network to support transfer of ongoing communications from one network to another (Yeboah, 2022). For the purposes of this study, MC refers to CC services that allow convenient, on-demand network access and storage that can be utilised to offer various services and applications to mobile users. This definition of MC aligns with the goals of this study, which envisions customers being able to access the services provided at any time and anywhere they want to, regardless of distance.

#### 2.4.2 Mobile cloud computing (MCC)

MCC, which is the core of this study, is the result of interdisciplinary methods involving MC and CC (Sathye, Goundar, and Bhardwaj, 2022). Fakieh, Busch, and Blount (2022) define MCC as a combination of mobile devices and CC technologies that attempt to make mobile devices fully equipped in terms of computing capabilities such as the provision of storage, memory, computational power, energy, and context awareness. MCC is a modern technology that allows data storage and processing outside the mobile device (Chiu, Chen, and Chen, 2022).

MCC services are provided to various businesses around the world by means of ICT resources such as the Internet and other electronic devices (Fortuin, 2021). According to Rice (2021), the main objective of MCC is to offer robust MC by means of consistent communication between cloud-mobile users (front-users) and cloud providers (end-users), irrespective of diverse wireless environments and underlying platforms in global roaming. MCC was established to integrate CC into the mobile environment (Zhang, Wang & Liang, 2021). The advantages mentioned above have made CC an environment that can expand business irrespective of location. However, it is a significant question whether MCC can be a catalyst for igniting small businesses in rural areas.

While MC is used to process and share applications and resources, wireless communication is used by mobile users to facilitate and support the communication between mobile devices and clouds (Rice, 2021). MCC was developed to provide CC services through mobile phones or embedded system environments (Fakieh et al.,

2022). Hartono and Alianto (2020) describe MCC as an environment in which data storage and processing take place outside the mobile device. For the purposes of this study, MCC is defined as the computing paradigm that leverages CC resources to improve the performance of resource-restricted mobile devices. It also denotes an infrastructure that enables various mobile devices to gain access to computing resources anywhere and at any time. This definition of MCC is suitable for this study for two reasons: firstly, MCC is at the core of this study as it is the solution that the study aims to evaluate, and secondly, it emphasises the idea of flexibility, meaning that an individual can gain access to resources on demand because they are available online, and any device can be used as long as it supports Internet access.

## **2.5 Small and medium-sized enterprises in a broader perspective**

Many definitions of SMEs exist in the literature. Matt, Modrák, and Zsifkovits (2020) define an SME as an entity, which may include branches or subsidiaries and may be a cooperative enterprise, managed by a single owner or primarily operated in certain sectors of the economy. Wang and Wang (2020) note the importance of defining SMEs appropriately, and assert that an organisation could be regarded as a small business if it meets the following criteria: firstly, it has a small market share; secondly, it is controlled by a single owner or individual; thirdly, it operates independently; fourthly, the size of its contribution to the country's GDP is that of a small business. SMEs are significant to local economic development, as they play a crucial role in job creation, poverty alleviation, and economic growth (Matt et al., 2020). For the purposes of this study, an SME is defined as an independent and privately-owned organisation with a single owner and minimal market share, capital, annual turnover and gross assets.

According to Gherghina et al. (2020), 40% of businesses, especially SMEs, are considering migrating their on-premises services to CC to utilise software as a service (SaaS). Globally, small businesses perceive SaaS as the goal of CC implementation and migration (Gherghina et al., 2020). Some services utilised on SaaS include email and other collaborative provisions such as Lync Online, Office Web applications, and SharePoint Online. The definition of SMEs given above is suitable for this study as it outlines the kind of SMEs discussed in this study, which are independent and privately-owned businesses with a single owner and minimal market share.

## **2.6 Differences of small and medium-sized enterprises in rural areas and suburban areas**

Modern technologies such as cloud-based services have increasingly been adopted by many business institutions, especially those in urban areas. However, the same cannot be said about SMEs situated in rural areas. It has been very difficult for rural-based SMEs to integrate ICT innovations such as cloud-based services due to challenges such as poor ICT infrastructure development. According to Gamage, Ekanayake, Abeyrathne, Prasanna, Jayasundara, and Rajapakshe (2020), the main difference between SMEs in rural and urban areas is the level of development. In Colombia, as in most Latin American countries, 75% of SMEs in cities have access to well-developed infrastructure and thus have better opportunities to expand their business, while the other 25%, which are situated in rural areas, are still in need of systems that can enable them to enhance their business conditions to match those of businesses located in urban areas (Gamage et al., 2020). Thus, urban-based small businesses are more advantaged than SMEs in rural areas. According to Zahoor, Al-Tabbaa, Khan, and Wood (2020), a key difference between enterprises in rural and urban areas is that enterprises in rural areas tend to be smaller than their urban counterparts, with a higher proportion of micro and single-person businesses.

### **2.6.1 An overview of mobile cloud computing in small and medium-sized enterprises**

Using MCC can provide significant advantages for SMEs by improving their effectiveness and allowing them to compete with big businesses (Sabando-Vera, Yonfa-Medrandá, Montalván-Burbano, Albors-Garrigos, and Parrales-Guerrero, 2022). The benefits of MCC can be very attractive for SMEs, especially for those that are determined to remain competitive in the business world (Sabando-Vera et al., 2022). Maduku (2021) asserts that small businesses can save on large-scale investments in information technology (IT) infrastructure, such as hardware and software, by obtaining these resources more easily through cost-efficient, integrated CC services. The ability of SMEs to utilise mobile cloud services can enable them to compete in an advanced ICT environment and give them the capabilities required for

business success, such as the effective use of resources which include MCC (Maduku, 2021). MCC can offer SMEs various advantages, including expanding business opportunities, making better use of human resources, improving the business experience, and lowering IT infrastructure costs (Demartini and Beretta, 2020). Eggers (2020) assert that MCC proves to be commercially viable for a variety of SMEs because of its abilities, such as pay-as-you-go cost structure and flexibility.

While it is clear that MCC offers significant advantages to SMEs as outlined above, there are also many challenges that SMEs face in adopting MCC, which will be discussed in the following section.

#### 2.6.2 The perceived need for the adoption of mobile cloud computing by small and medium-sized enterprises in rural areas

Although the economic significance of SMEs was recognised a long time ago, the same cannot be said about their relevance during the surge of the Internet around the 1990s and early 2000s (Eggers, 2020). The development of Internet technology and discoveries in CC and mobile connectivity have allowed SMEs to compete with the global market regardless of location (Masood and Sonntag, 2020). Used together, CC and smartphones have become established as a tool to combat some of the challenges that businesses face in running their operations whenever or wherever they want to (Eggers, 2020). The combination of CC and smartphones has allowed SMEs to use applications and technologies that were previously available only to large organisations due to the great costs involved (Masood and Sonntag, 2020).

In addition to modernising their business processes, these developments have enabled SMEs to compete with large business organisations by using technological platforms such as MCC to grow their customer base, thereby enabling them to have a significant impact on the global market (Mittal, Khan, Purohit, Menon, Romero, and Wuest, 2020). These are some of the factors that encourage SMEs in rural areas to adopt MCC. According to Amaral and Peças (2021) ICT provides SMEs with tools to enhance their business, including services such as processing, storing, securing, and managing information within the enterprise. Cloud services allow SMEs to expand their performances in tactical areas such as business productivity and customer service

(Marinescu, 2022). These ICT platforms facilitate tasks that may be challenging for SMEs, such as communication with various stakeholders and information sharing. (Mittal et al., 2020) states that CC services guarantee vibrant computing environments for individuals who use these platforms.

Although ICT technologies such as cloud-based services have made a significant difference to many institutions, some still struggle to integrate these technologies (Klein and Todesco, 2021). Among the challenges associated with ICT integration are the costs of these services, which include maintenance of the infrastructure being used to enable CC to effectively provide on-demand services anytime and anywhere (Skare, Obesso, and Ribeiro-Navarrete, 2023).

Developing countries, such as those in Africa, have not yet obtained the full benefits of CC due to factors such as privacy concerns, security, power supply, and the digital divide (Marinescu, 2022). According to Pramuka and Pinasti (2020) power supply is one of the challenges inhibiting the sustainable usage of electronic-based systems in ICT such as cloud systems. The high cost of electricity in Africa makes it difficult for some SMEs to survive, especially those in rural areas (Pramuka and Pinasti, 2020). An inadequately established electrical distribution network has a huge impact on digital gaps, resulting in a failure to support ICT infrastructure (Marinescu, 2022). The digital divide is one of the challenges hampering the development of ICT services such as CC in developing countries. Murigi and Mutuku (2022) define the digital divide as the divide between access to ICTs and Internet usage by individuals, families, organisations, countries, and regions at different socio-economic levels. The perceived need for CC is one of the variables used in this study to examine the reasons that propel SMEs in rural KZN to pursue the adoption of MCC.

### 2.6.3 Use of cloud computing by managers and employees of small and medium-sized enterprises

The usage of ICT, especially mobile technology, in small businesses is expanding, and the proliferation of these technologies improves marketing strategies SMEs use to promote their businesses (Scholar, 2022). SMEs can benefit from CC due to the cost savings associated with its use as a business tool (Zulkifli, Hassan, Maarop,

Rahim, and Anuar, 2023). While the efficient usage of cloud services depends on the expertise of the user, there is a significant possibility that SMEs may become familiar with these Internet services and find them easy to use (Scholar, 2022). According to Shabeer, Ramaswamy, Zubar, and Banu (2020), ease of use plays a significant role in SMEs' acceptance of cloud services. A study by Kurup and Guruprasad (2022) also established that PEU influences the adoption of CC services. Shabeer et al., (2020) asserts that ease of use of cloud services can increase employee self-efficacy by means of training, documentation, and help facilities. PEU has a significant influence on users' behavioural intention to accept cloud-based services (Murigi and Mutuku, 2022). Cloud-based services can also benefit customers of institutions such as banks (Buyya, Gill, Srirama, Bahsoon, and Murugesan, 2022).

In addition to enabling customers to expand their interactions with the banks significantly, technologies such as SaaS enable banking customers to realise their daily financial transactions much more easily and without additional costs, as opposed to traditional client-server technologies that involve significant cost, time, and resource constraints (Ngoc and Canh, 2021). The importance of ease of use is highlighted in a study by Bello, Oyedele, Akinade, Bilal, Delgado, Akanbi, Ajayi, and Owolabi (2021) which finds that if [a] manager/owner of [an] SME finds CC easy to use and less complicated, then the chances of CC adoption will increase in that SME. Similarly, Sayginer and Ercan (2020) find that PEU contributes to CC adoption by various institutions. Integration of cloud services is likely to be much easier for SMEs that have already adopted the usage of IT systems, as their employees are familiar with using ICT-based resources (Abusaimeh, Sharabati, and Asha, 2023). Minor changes might need to be made to facilitate the adoption of CC in these SMEs, particularly with regard to how cloud services are accessed. In a study by Choudhary, Gupta, Chawla, Sharma, and Sharma (2020) employees of various SMEs in Germany stated that good functionality and an easy setup process make cloud services easy to use, and no negative user experiences were recorded. In this study, the use of CC by managers and employees of SMEs is examined in order to understand the purposes for which managers and employees might use cloud services.

#### 2.6.4 Technological devices currently used by small and medium-sized enterprises

It has been noted that various SMEs are making significant progress in investing in ICT-related infrastructure (Abdo, 2021). In some cases, this is used for purposes such as accounts and inventory. Some SMEs access cloud-based services via the Internet; this provides mobility to their employees, as they are able to access these services from any device that has an Internet connection, such as a laptop, PC, tablet, or smartphone (Neicu et al., 2020). However, while many businesses have invested in a variety of technological devices, there have been concerns regarding inability to generate required reports (Abdo, 2021). These issues have a significant impact on the operation of the organisation. Many SMEs do not have skilled employees who are able to keep pace with changes in technology and keep their systems virus-free (Ngoc and Canh, 2021). Some cloud-based services require dedicated client machines, which necessitate dedicated IT personnel responsible for managing and configuring them when necessary; this involves correctly installing operating systems, configuring storage space issues, and installing apps (Neicu et al., 2020). In this study, technological devices used by SMEs are examined in order to understand which types of devices these SMEs have.

## **2.7 Factors that influence the use of cloud computing by small and medium-sized enterprises**

CC has proven to be significant for SMEs as it enables individuals to gain almost unlimited access to computing capabilities without investing heavily in infrastructure (Neicu et al., 2020). These capabilities include on-demand self-services, comprehensive network access, and resource sharing (Widyastuti & Irwansyah, 2018). Critical factors for CC adoption by SMEs include top management support, firm size, and technological readiness (Neicu et al., 2020). Further factors are discussed below with reference to each of the innovation characteristics discussed in section 2.3 above.

### **2.7.1 Relative advantage of the use of cloud computing by small and medium-sized enterprises**

RA is associated with perceived benefits or usefulness (Kwabena et al., 2021). According to the existing literature, it is one of the essential elements for technology

adoption. It is defined as the level to which a business perceives benefits of using a particular technology. In this study, it refers to the value that cloud-based services are anticipated to add when introduced. The existence of CC has presented attractive opportunities for businesses, including real possibilities for innovation, business development, and other benefits from its adoption. While CC has been established as a business model for already developed businesses, Awan and Abbas (2023) claims that its advantages can also benefit SMEs.

The benefits of CC include the following:

- on-demand self-service, which means that individuals can easily access computing capabilities with minimal interaction with others;
- mobility, which means that users can access online services anywhere and at any time;
- multi-tenancy, which means that cloud-based services are available to various users simultaneously;
- calculated services, which refers to computing resources that are charged based on usage;
- instant elasticity, which means that computer-based resources can be increased as needed by users; and
- resource pooling, which means that both virtual and physical computing resources can be allocated and reallocated as per individuals' demands.

In this study, RA is used as part of the DIT theoretical framework to measure the relative benefits of MCC in the SMEs that were surveyed.

### 2.7.2 Compatibility of cloud-based services with technologies available to small and medium-sized enterprises

Compatibility refers to the level at which a new idea is seen as consistent with the existing resources within an organisation (Mahakittikun et al., 2020:368). Since there is no universal approach to the adoption of mobile technologies, organisations are sometimes subjected to fragmented systems (Mahakittikun et al., 2020). Issues with

incompatible systems can have a very negative impact on businesses as they inconvenience users who want to access cloud services (Mei, 2023).

In a technological context, factors that have an impact on an organisation's final decision to accept a technology might include relative advantages of that particular technology, as well as its compatibility with the existing systems of the organisation (Maduku, 2021). Further factors include the system's complexity and affordability of the resources required to complete adoption. Since the adoption of cloud services might bring about significant change in an organisation, businesses must ensure that it is compatible with their values and belief systems (Radhakrishnan, Sudhakar, Belfin, Karthikeyan, Kirubakaran, and Sagayam, 2020).

In this study, a compatible cloud-based system is defined as a system that can work with existing systems without any issues. When organisations perceive cloud-based systems as compatible with their existing systems and their business operation, they will likely continue to use them; this may benefit the firm in many ways, including enhancing its performance. In this study, compatibility is used as a variable to measure how well MCC will work with the existing systems in SMEs in the rural communities of Highflats, KwaMakhutha, Hlokozi, Eluphepheni, and uMbumbulu in KZN.

### 2.7.3 Complexity of cloud computing for small and medium-sized enterprises

Complexity is one of the most significant issues when it comes to adopting any technology (Radhakrishnan et al., 2020). It can be defined as the difficulties associated with understanding, deploying and using the developed technology to accomplish the objectives of the business, which may require significant effort (Maduku, 2021). Complexity negatively affects the adoption of a particular product hence, users sometimes reject a particular technology if they perceive it as too complex (Maduku, 2021). Many users expect simplicity in the use of cloud-based services, and time-saving is one of the critical aspects of a developed system (Loizaga, Rua, Amorrortu, Nihoul, and Matskanis, 2023). Complexity in a developed system can affect business performance as it might result in many complications, especially during the setup phase (Radhakrishnan et al., 2020). If a firm is to be successful with the newly adopted cloud-based system, complexity must always be among the top issues that must be

dealt with (Mei, 2023). In this study, complexity is used as a variable to measure how challenging MC will be to SMEs in the rural communities of KZN.

#### 2.7.4 Trialability of cloud computing for small and medium-sized enterprises

Trialability is the level to which a newly adopted system can be experimented with on a limited basis (Al-Dwairi and Jditawi, 2022). Zhang et al. (2021) define trialability as the level to which a new idea may be tested on a regulated basis before it is accepted or rejected. Individuals who have the opportunity to experiment with a newly developed system may be potential users or adopters of the innovation (Gupta, Mazumdar, Mishra, Shinde, Srivastava, and Deepak, 2023). With an understanding of how a system works, there is a greater possibility that they will feel more comfortable with the system and be more likely to accept it. The impact of trialability on the adoption of cloud-based services should never be underestimated (Khan, Khan, Bahadur & Ali, 2021). Trialability is one of the critical determinants in the DIT framework, together with RA, compatibility, complexity, and observability, and has been adopted as one of the constructs of this study. In this study, trialability is used to as a variable to measure the possibility of testing the system in question (MCC) before it is utilised.

#### 2.7.5 Observability of cloud computing in small and medium-sized enterprises

Observability refers to the visibility of the results of a newly developed system or innovation (Villagrán, Pesado, and Estevez, 2020). According to Ali, Hassan, Abdullahi, and Abdulah (2023), it is the extent to which the valuable results of an innovation can be seen. If an organisation is aware of the substantial results of adopting a technology, there is a significant possibility that they will adopt it for themselves. A study by Mamorobela (2023) found that a lack of awareness of the benefits of online-based services was one of the critical reasons for non-adoption of such services.

In most cases, a communication channel is needed for an innovation to be understood, while some new ideas can be easily understood without the need for a communication mode (Gupta et al., 2023). The visibility of intangible services is very complicated and sometimes difficult to understand (Chaudhary, Gupta, Chang, Nedjah, and Chui,

2021). Empirical studies by Mamorobela (2023) found a positive and significant correlation between observability and innovation. Al-Dwairi and Jditawi (2022) assert that the notion behind observability is comparable to unspoken peer pressure: if the innovator is influential, there is a significant chance that the innovator's followers will attempt to adopt the innovation. Observability can be characterised by how an innovation is projected to its users (Chaudhary et al., 2021). In this study, observability is used as a variable to check whether the system has noticeable results for the intended users. In this study, observability is used as a variable to check whether the system has noticeable results for the intended users.

## **2.8 Challenges of mobile cloud computing in various sectors**

The implementation of newly developed technologies faces many challenges. While various benefits of CC have been observed, challenges have also been identified, including risks, security, and other challenges usually identified during deployment (Yeboah, 2022). Despite the many advantages that MCC offers to both service providers and mobile users, there are also many challenges and issues that need to be considered during its implementation, as these issues may result in complications (Yeboah, 2022). Nguyen and Liaw (2022:150) note that “SMEs are confronted with many challenges in having enough investment capital in order to bring or introduce cloud-based services”. In addition to the significant investment costs of large-scale infrastructures and human resources, firms deploying new technology must consider associated risks such as information security hindering progress.

Due to the significant number of cloud-based mobile applications utilised in various domains such as education, banking, and healthcare, data security has come to be a significant issue (Aliyu et al., 2020). MCC security issues have developed for many reasons, including the integration of mobile devices with CC (Qayyum, 2020). Since connections between mobile devices and clouds are supported by technologies such as wireless media, MCC models face security challenges associated with authentication and privacy issues (Fakieh, Busch, and Blount, 2022). MCC security issues include securing and protecting data, resources, communications channels, and authentication (Palanisamy and Shi, 2023). However, as MCC becomes more prevalent in various sectors, attempts are being made to introduce better models to mitigate security issues and improve efficiency (Sathye, Goundar, and Bhardwaj, 2022). Various proposals have been put forward to mitigate MCC security issues; however, these solutions typically have consequences, such as “requir[ing] the sacrifice of usability by preventing certain events, ease of use by adding extra verification and validation steps, or performance when building a defense mechanism that increases computing resource usage” (Al-Ahmad, Kahtan, Alzoubi, Ali, and Jaradat, 2021:2).

This section has examined several challenges with the adoption of MCC that may be faced by SMEs.

## **2.9 Summary**

This chapter began by discussing the theoretical framework chosen for this study, as well as its five innovation characteristics. The concepts of CC, MC, and MCC have been outlined. SMEs have been discussed from a broader perspective by examining the differences between SMEs in rural areas and those in suburban areas. This chapter has also provided an overview of MCC in SMEs, focusing on the need for adopting MCC by SMEs in rural areas, the use of CC by managers and employees of SMEs, and the technological devices that are currently being used by SMEs. The chapter concluded with a discussion of the factors influencing the use of CC by SMEs, with reference to the innovation characteristics: RA, compatibility, complexity, trialability, and observability.

## CHAPTER THREE

### RESEARCH METHODOLOGY

This chapter provides an overview of the research design strategy and methods that are used to address the research questions posed in this study. An explanation of the appropriate study approach to accomplish the objectives of the study is given. The research philosophy, methods, and techniques are discussed, as well as the survey population, sample size, and data collection method. The research variables that are used to structure the questionnaire in this study are defined. Data analysis methods are also discussed in this chapter.

#### 3.1 Research paradigm

This study follows the positivism philosophy, which seeks to investigate, confirm, and predict law-like behaviour patterns and is generally used to examine theories or hypotheses (Alharahsheh & Pius, 2020). The positivist paradigm mostly involves quantitative methodology, using experimental methods that involve experimental and control groups and administration of pre- and post-tests to measure gain scores (Park, Konge & Artino, 2020). According to Maretha (2023) researchers choosing to adopt a positivist philosophy regard social entities as real, in the same way that natural scientists would view physical objects and natural phenomena. In this paradigm, research focuses on finding facts or regularities that are observable and measurable (Mulyani and Sauri, 2022). The researcher's goal is to discover causal correlations in the data collected to support the development of law-like generalisations similar to those developed by scientists. Furthermore, the researcher uses and integrates crucial universal principles and regulations to support and explain the researched behaviour or event within organisations.

The position of positivism includes both realism and objectivism. In this study, a positivist paradigm is applied by means of attempts to prove the established hypotheses using questionnaires and scientific analysis methods. Alharahsheh and Pius (2020) note that in positivist research, the researcher's responsibility is objectively confined to data gathering and interpretation. In this study, data will be collected,

analysed, and reported. After careful consideration of other philosophies, such as interpretivism and critical theories, the conclusion was reached that positivism is the appropriate paradigm for this study.

### **3.2 Research methods and techniques**

This study uses quantitative methods. The quantitative research approach focuses on gathering and evaluating structured data that may be represented numerically (Hodge, 2020). One of the main goals of this approach is to create accurate and reliable measurements that enable statistical analysis (Jamieson, Govaart, and Pownall, 2023). Because quantitative research aims to produce measurable data, it is appropriate for a quantitative study to answer questions such as “what” or “how” with regard to a given situation. This study employs quantitative methods, as numerical data is quantified and analysed through variables to obtain the desired results to achieve the study’s objectives.

### **3.3 Sampling techniques and description of the sample**

This section will discuss the target population, sampling design, data collection methods, variables, and data analysis methods.

#### **3.3.1 Target population**

A population in research can be defined as a group of individuals living in a specific area (Willie, 2022). Members of a population often depend on the same facilities, are subject to similar environmental difficulties, and rely on the availability of other individuals in the community to survive, perhaps over a long period (Willie, 2023). The population of this survey comprises managers, business employees, and customers from five rural areas of the KZN province of the Republic of South Africa: Highflats, uMbumbulu, Hlokozi, Eluphepheni, and KwaMakhutha. These stakeholders were selected because of their impact on the identified SMEs in the area. The total population in the SMEs of the selected rural areas of KZN province was 457. Since the study population is finite or countable, the sample size was calculated using the

sample size formula suggested by Robinson, Oluboyede, Vale, and Olariu (2022). This formula is indicated in Equation 3.1 below.

$$\text{Sample size: } n' = \frac{NZ^2P(1-P)}{d^2(N-1)+Z^2P(1-P)} \dots\dots\dots\text{Equation 3.1}$$

where  $n'$  = Sample size,  $N$  = Population size,  $Z$  = Confidence level,  $P$  = Estimated proportion, and  $d$  = Accuracy

Using equation 3.1, a sample size of 190 was obtained, where the following values were applied:  $N = 457$  (managers, employees, and customers of SMEs in all the above-mentioned rural areas of KZN province in the Republic of South Africa, which gave a sample size of 190 in total),  $P = 0.7$ ,  $D = 0.05$ , and  $Z = 1.96$ .

### 3.3.2 Sampling design

A cluster sampling method was applied because of this study’s population comprised various groups from different towns. Cluster sampling can be defined as population subcategories rather than individuals (Berndt, 2020). In cluster sampling, the population is classified into subgroups which are randomly selected to be included in a certain study (Effati-Daryani, Zarei, Mohammadi, Hemmati, Yngyknd, and Mirghafourvand, 2020). Clusters are usually already defined; for example, towns can be identified as clusters (Mahmud, Huang, Salloum, Emara, and Sadatdiynov, 2020). Effati-Daryani, Zarei, Mohammadi, Hemmati, Yngyknd, and Mirghafourvand (2020) The advantages and disadvantages of cluster sampling are shown in Table 3.1 below.

Table 3.1: Pros and cons of cluster sampling (Berndt, 2020).

Pros	Cons
<ul style="list-style-type: none"> <li>• <b>Cost-effectiveness:</b> Cluster sampling reduces travelling and listing efforts and expenditure.</li> <li>• <b>Variability:</b> Cluster sampling provides increased variability in results.</li> <li>• <b>Feasibility:</b> Cluster sampling is more feasible when working with a large population.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Biased sampling:</b> The group selected as a cluster sample may have a biased opinion that does not accurately reflect the opinion of the entire population.</li> <li>• <b>Sampling errors:</b> Cluster sampling is more prone to sampling error than other probabilistic approaches.</li> </ul>

After cluster sampling, a stratified sampling approach will also be adopted in this study. In this approach, the population is categorised into subgroups that share the same attributes (Rahman, Tabash, Salamzadeh, Abduli, and Rahaman, 2022). A stratified

sampling method is used where the researcher might reasonably anticipate the measurement of interest to differ among different subcategories and where there is assurance of representation from all the subcategories (Simkus, 2022). This study will apply a stratified sampling approach to ensure a more realistic and accurate population estimation.

The advantages and disadvantages of stratified sampling are shown in Table 3.2 below.

Table 3.2: Pros and cons of stratified sampling (Simkus, 2022).

Pros	Cons
<ul style="list-style-type: none"> <li>• Minimises the possibility of individual bias in selecting cases to be included in the sample</li> <li>• Provides a sample that represents the population being studied</li> <li>• Enables the researcher to make generalisations (statistical inferences) from the sample to the population</li> </ul>	<ul style="list-style-type: none"> <li>• Not helpful when the population cannot be divided into disjoint subgroups</li> <li>• Misapplied if subgroups' sample sizes are made proportional to the available data rather than scaling sample sizes to subgroup sizes</li> </ul>

A stratified sampling method will be applied to managers and business employees, as their numbers are known. In contrast, an accidental sampling method will be applied to customers. This method involves taking a population sample close at hand rather than carefully determining and obtaining it. According to Song and Kawai (2023), accidental sampling is convenience in reading the sampling population, mostly used among marketers or newspaper researchers. Accidental sampling is not guided by any obvious characteristics, and has the same advantages and disadvantages as quota sampling (Pettersson and Krumscheid, 2022). After all the above approaches have been applied, a simple random sampling method will be used for this population according to the number of employees of the above-mentioned rural SMEs. In a simple random sampling method, the selection of the participants depends on chance or probability; hence, this technique is also known as the method of chance. This method is used to extract a sample from a larger population, and it is used in this study for that purpose. Equation 3.1 in section 3.1.1 above shows the population and sample size calculations.

Table 3.3: Pros and cons of simple random sampling (Noor, Tajik, and Golzar,2022)

Pros	Cons
<ul style="list-style-type: none"> <li>• It is easy to assemble the sample.</li> <li>• It is fair, as every member has an equal chance of being selected.</li> </ul>	<ul style="list-style-type: none"> <li>• It requires a complete list of all members of the population.</li> <li>• It requires that the comprehensive list of the population must be up to date.</li> </ul>

### 3.4 Data collection methods

A questionnaire-based survey will be employed in this study to collect the data. This questionnaire-based survey will include seven variables. Six of the seven variables are independent variables, and one is a dependent variable. The independent variables are demographics, economic factors, environmental factors, technological factors, organisational factors, and perceptions (PEU and usefulness). The dependent variable is MCC. These variables will be discussed further in the following section. A Likert scale will be applied in the questionnaire to make it easy for the participants to answer the questions. For each question, respondents will select an answer from the following options: strongly disagree, disagree, weakly agree, agree, and strongly agree.

#### 3.4.1 Demographics

The primary purpose of demographics in a study is to understand whether the participants are suitable to respond to the topic of the study (Hilde et al., 2020). Demographic moderators in this study include age, gender, position, citizenship, and type of business. Demographic moderators are an intrinsic feature of the UTAUT model established by Venkatesh et al. (2003), which is one of the theories supporting this study. The UTAUT model has been explained in the literature review in Chapter Two (section 2.2.2).

#### 3.4.2 Economic factors

In the context of this study, economic factors are all the financial elements that impact the failure or success of MCC adoption by SMEs. According to Shi, Xu, Dong, and Nishino (2023), economic factors refer to the level to which economic aspects

influence the adoption of technology by an organisation. Economic feasibility “determines whether a particular technology is cost-effective, which includes whether or not it reduces the cost, and whether or not it provides an acceptable return on investment (ROI)” (Dash, Naik, Nayak, and Vimal, 2022).

Alghofaili, Albattah, Alrajeh, Rassam, and Al-Rimy, (2021) claim that cloud infrastructure resources can impose or minimise end-user financial implications. According to Hiran (2021), economic factors such as cost are sometimes influenced by the size of the organisation. For example, large organisations might be in a better financial position to afford the cost of CC than smaller organisations, which might struggle to support the technological resources needed to make MCC work efficiently. In this study, economic factors are measured by five items in the questionnaire.

### 3.4.3 Environmental factors

In the context of this study, environmental factors are elements in an organisation’s external environment, including competitive pressure and the support provided by the government and other external entities, that significantly influence the adoption of cloud-based services (Skakkebæk, Lindahl-Jacobsen, Levine, Andersson, Jørgensen, Main, Lidegaard, Priskorn, Holmboe, Bräuner, and Almstrup, 2022). The environmental context has both constraints and opportunities for innovation of technological aspects (Li, Kong, Fu, Sussman, and Wu, 2020).

In this study, the use of this variable is supported by theoretical frameworks such as the technology-organisation-environment (TOE) framework and institutional theory, which state that the institutional environment plays a significant role in shaping business structures and actions. This is especially evident regarding the adoption of technology by SMEs. These theories and frameworks have been discussed in the literature review in Chapter Two. According to Alismaili et al. (2020), the environmental context can enable organisations to gain access to various resources associated with competitors and interact with government entities. Environmental factors such as competitive pressure and external business partnerships are important in the adoption of MCC by businesses, as they are likely to increase organisations’ interest in adopting cloud services (Alismaili et al., 2020). In this study, environmental factors are

measured by five items in the questionnaire.

#### 3.4.4 Technological factors

In the context of this study, technological factors are attributes of the technologies that assist in the adoption of cloud-based services by SMEs (Alismailli et al., 2020). According to Sayginer and Ercan (2020), technological factors involve internal and external technologies appropriate to SMEs. These include existing systems and equipment within the business, as well as technologies obtained from external vendors to assist the organisation. Sayginer and Ercan (2020) note the significance of taking care of the IT infrastructure to help IT managers and decision-makers advance business needs through modern technologies. With the establishment of the Internet, MCC is an inevitable technology to help businesses accelerate the provision of goods and services to their customers (Vdovin & Stroganov, 2020). In this study, technological factors involve the technologies that may be used to pursue MCC adoption. This use of this variable is supported by the TOE framework, which has been explained in the literature review in Chapter Two along with the DIT theory. Technological factors are often a significant indicator in MCC adoption studies. In this study, technological factors are measured by five items in the questionnaire.

#### 3.4.5 Perceptions

In the context of this study, perceptions are the views of stakeholders such as customers and managers regarding how important and easy to use MCC will be in their businesses. This variable is classified into two categories: perceived usefulness (PU) and PEU. According to Majumder, Gupta, and Paul (2022), PU describes how a certain technology will improve the user's job performance, while PEU can be defined as the extent to which the new or identified technology will be effortless to users and not present them with difficulties. In this study, perceptions will be measured by five items in the questionnaire.

#### 3.4.6 Organisational factors

In the context of this study, organisational factors are all the aspects of a business that impact or influence the adoption of MCC. Subramaniam, Akbar, Situ, Ji, and Parikh (2023) describes organisational factors as all the characteristics and resources of an organisation that influence the establishment and application of an innovation, which in this case is MCC. These factors include firm size, top management support, organisational structure, organisational culture, and the availability of human resources within the organisation to investigate and use cloud-based services. According to Alam (2020), resources are one of the fundamental factors that need to be considered before the adoption of CC in any organisation, as they directly impact the success or failure of the implementation of CC in the organisation. In this study, the use of this variable is supported by the TOE framework as well as the DIT theory, which, according to Rogers (1995), emphasises individuals' attributes, whether internal or external to the organisation, as the main drivers for any innovation established or proposed by the organisation. The models and theories that support the use of organisational factors as a variable have been discussed in the literature review in Chapter Two. In this study, organisational factors are measured by five items in the questionnaire.

#### 3.4.7 Mobile cloud computing

In the context of this study, MCC is a dependent variable that describes a computing approach involving mobile devices to leverage CC services to improve performance and expand SMEs' provision of goods and services. Palanisamy and Shi (2023) describe MCC as an emerging technology [that fills the] gap between limited resources of mobile devices [and] resource-intensive applications required to run a resource-rich [computing] environment. Similarly, Alshahrani (2021) describe MCC as a computing approach that supports outsourcing mobile device computation and storage to large-scale computing infrastructure to maximise the abilities of mobile devices to facilitate computing. MCC enables mobile users to gain full access to computing services, which are not constrained to any particular mobile user (Alshahrani, 2021). In this study, this variable is used to seek more clarity regarding SMEs' cloud-based services. The TOE theory, which is discussed in the literature review in Chapter Two, supports the idea that various technological, organisational, and environmental factors significantly impact the adoption of cloud-based services.



### 3.5 Questionnaire

The questionnaire utilised in this study is shown in Table 3.4 below, indicating the variables and their items.

Table 3.4: Variables and their items

<b>The following statements are the expressions of SMEs customers about adopting mobile cloud computing in their local SMEs. Please tick (✓) where applicable</b>	
<b>Variable</b>	<b>Items (Statement in the questionnaire)</b>
<b>Demographics</b>	Position
	Age
	Gender
	Citizenship
	Ethnic Group
<b>Use of cloud computing</b>	B.1 I use my smartphone or computer for banking and paying my bills.
	B.2 I download applications from the Internet to my smartphone or computer.
	B.3 I use my smartphone for social networking.
	B.4 I use my smartphone or computer to shop online.
	B.5 I use my smartphone to send and receive emails.
<b>Technological devices</b>	C.1 Computer
	C.2 Smartphone
	C.3 Tablet
	C.4 Laptop
<b>Relative advantage</b>	D.1 Mobile cloud computing will save me time from travelling to shops.
	D.2 I can express my feelings effectively if there is any complaint I want to raise.
	D.3 It will be easy to avoid overcrowding areas during this time of Covid19.
	D.4 I can get various products quickly when I am online shopping.
	D.5 I can easily make price comparisons on products through online shopping.
	D.6 I can shop at my pace without pressure to buy unnecessary products when shopping online.
<b>Perceived security</b>	E.1 The MCC app providers have sufficient security to protect my personal and financial data.
	E.2 The MCC app providers have technical methods to prevent unauthorized third parties from altering the data I send.
	E.3 I won't worry about uninvited third parties intercepting my data when I submit it to MCC app providers.
<b>Perceived ease of use</b>	F.1 I could easily direct MCC apps to perform the tasks I need them to.
	F.2 It would be easy for me to become skillful at using MCC apps.
	F.3 Learning to operate MCC apps would be easy for me.
<b>Attitude</b>	J.1 Making use of mobile cloud computing is a smart move.
	J.2 Mobile cloud computing adds appeal to online shopping
	J.3 I enjoy using mobile cloud computing.

The following statements are the expressions of SMEs owners, managers, and employees about adopting mobile cloud computing in their businesses. Please tick (✓) where applicable.

Variable	Items (Statement in the questionnaire)
<b>Demographics</b>	Position
	Target Market
	Age
	Gender
	Citizenship
	Ethnic Group
	Type of Business
<b>Perceived need for mobile cloud computing</b>	B.1 Increase productivity.
	B.2 Enhance effectiveness.
	B.3 Provide better storage.
	B.4 Expand the provision of goods and services 24/7.
	B.5 Scale up the business.
<b>Use of cloud computing by SMEs</b>	C.1 Disabled people can access their desired products without travelling to get adequate services.
	C.2 People purchase products online.
	C.3 People buy items at a cheaper price.
	C.4 Businesses to expand their data storage.
	C.5 Company to expand their services across the globe.
<b>Technological devices used by SMEs</b>	D.1 Computer
	D.2 Smartphone
	D.3 Tablet
	D.4 Laptop
<b>Compatibility</b>	E.1 Cloud-based systems are consistent with business needs.
	E.2 Cloud-based systems are compatible with the organisation's current values and goals.
	E.3 Cloud-based applications are compatible with our work style.
	E.4 Cloud-based systems are compatible with the current practices of our organisation.
<b>Relative advantage</b>	F.1 Company to expand their services across the globe.
	F.2 Cloud-based services will improve the performance of our organisation.
	F.3 Cloud-based services will provide timely information for decision-making.
	F.4 Cloud-based services will enhance the efficiency of our company.
	F.5 Cloud-based ERP will provide timely information for decision-making.
	F.6 With cloud-based ERP adoption, we expect to see cost savings effect.
<b>Complexity</b>	J.1 We have appropriate tools for cloud-based services.
	J.2 The organisation has great IT personnel to give training to everyone in the business.
	J.3 Integrating cloud-based services into our work practices will not be difficult.
	J.4 Our organisation may not encounter any difficulties maintaining cloud cloud-based services.
<b>Trialability</b>	K.1 Working groups will be set up to examine.
	K.2 Organisation experiments on cloud base applications before deciding whether to use them.
	K.3 Everyone will be allowed to use cloud-based services on an experimental basis long enough to understand how it fits into the organisation.
	K.4 Before adopting mobile cloud-based applications, the business will confirm whether the requirements can be reflected.

<b>Observability</b>	L.1 I would have no difficulty telling others about the results of using cloud services.
	L.2 I believe I could communicate the consequences of cloud services to others.
	L.3 I have seen what others in my organisation do with cloud services.
	L.4 Cloud services are very visible in my organisation.
	L.5 The benefits of using cloud-based services can be easily observed.

### 3.6 Data analysis

This section discusses the statistical methods used in this study to analyse data. SPSS version 25 was used to analyse the quantitative data. SPSS is a well-known specialised computer program designed to analyse numerical data, with various functionalities including discriminant analysis, log-linear regression, logistic regression factor analysis, cluster analysis, chi-square, nonlinear regression, data examination, reliability tests, correlation, t-tests, analysis of variance (ANOVA), MANOVA, data transformations, and descriptive statistics (Okagbue et al., 2021). SPSS will be used to measure the reliability and validity of all the Likert scale variables using Cronbach's Alpha coefficient, as well as to calculate descriptive and inferential statistics. In examining inferential statistics, Pearson's correlation coefficient analysis will be used. The impact of demographics on the data collected will be measured using ANOVA.

### 3.7 Summary

This chapter began with a discussion of the positivist research paradigm used in this study. The target population, sampling design, data collection methods, variables, and data analysis methods have been discussed. The data collection method, which includes a questionnaire-based survey, has been explained. The research variables that are used to structure the questionnaire in this study have been explained. These variables include demographics, economic factors, environmental factors, technological factors, organisational factors, and perceptions. The use of SPSS to analyse the quantitative data gathered has also been discussed.

## CHAPTER FOUR

### PRESENTATION OF RESULTS AND DISCUSSION

This chapter presents the results of the data gathered from the customers and managers of SMEs in Highflats, KwaMakhutha, Hlokozi, Eluphepheni and uMbumbulu regarding the adoption of MCC by SMEs in rural areas. The collected data was analysed using SPSS. During the analysis, the reliability of the variables was measured and descriptive and inferential statistics were calculated.

#### 4.1 Reliability and validity

The Cronbach's alpha reliability statistics for management and customer data are shown in Table 4.1 below. Isik et al. (2020:37) defines reliability as the "accuracy and repeatability of a measurement made with a scale". To determine the reliabilities in this study, Cronbach's alpha was calculated. The Cronbach's alpha values are presented for the Likert scale data for sections B to I of the questionnaire for managers, and sections B to G of the questionnaire for customers. The Cronbach's alpha values presented in Table 4.1 are greater than 0.8, indicating reliability within each Likert section in the data sets. Schrepp (2020:250) provided the following rules of thumb for Cronbach's alpha: " $\alpha > 0.9$  (Excellent),  $> 0.8$  (Good),  $> 0.7$  (Acceptable),  $> 0.6$  (Questionable),  $> 0.5$  (Poor), and  $< 0.5$  (Unacceptable)".

Table 4.1: Cronbach's alpha statistics

<b>Manager</b>		<b>Customer</b>	
<i>Variable</i>	<i>Alpha</i>	<i>Variable</i>	<i>Alpha</i>
B	0.899	B	0.831
C	0.832	C	0.802
D	0.908	D	0.870
E	0.920	E	0.896
F	0.945	F	0.892
G	0.879	G	0.872
H	0.926		
I	0.860		

Full descriptions of the symbols for the Cronbach's alpha variables are indicated in Annexure 8 at the end of this dissertation.

Validity examines the level to which an instrument measures what it is supposed to measure (Mellinger and Hanson 2020). According to Barak, Watted, and Haick (2020), the internal consistency of constructs in the scale should be examined before a test can be done to ensure validity. To validate the data sets, each Likert scale question was correlated with the total contribution of the respondent. The data sets in the additional correlations SPSS files revealed significant correlations with the total contribution in the matrix table, which indicates that the questionnaire results validly measure what the study was designed to measure.

The following section presents the biographical information of the respondents for this study.

#### **4.2 Biographical information**

The biographical information of managers and customers who participated in this study is shown in Table 4.2 below. The biographical information of the manager participants included their position, gender, age group, ethnicity, citizenship, type of business and location, while that of the customer participants included their gender, age, citizenship, and location. The manager data was obtained from SME owners, managers, and employees, and the customer data was obtained from people who were customers of the owners, managers, and employees of the SMEs. In the manager data set, 55.6% of respondents were employees, 26.7% were owners, and 17.8% were managers. In the manager data set, 42.2% of respondents were females and 57.8% were males. In the customer data set, 55.2% of respondents were females and 44.8% were males. In the manager data set, the majority of respondents were in the age group of 18 to 30 years, 15.6% of respondents were 31 to 40 years old, and the rest were 41 years old and above. In the customer data set, 58.3% of respondents were between the ages of 18 and 30, 32.3% were between the ages of 31 and 40, and 9.4% were in the age group of 41 years and above. In both data sets, more than 90% of respondents were in the Black ethnic group, and only one respondent was in the Coloured ethnic group. Two respondents in the manager data set preferred not to disclose their ethnicity. 97.8% of respondents in the manager data set were South African citizens, 94.8% of respondents in the customer data set were South African citizens, and one respondent in each of the data sets did not disclose their citizenship.

In the manager data set, 6.7% of respondents were in the fast food business, 6.7% were in the grocery business, and a further 6.7% were in the hardware business; 2.2% were in the gas station business, and 77.8% were in other types of business. In the manager data set, 17.8% of respondents indicated that their business was based in Eluphepheni, 37.8% in Highflats, 4.4% in Hlokozi, 22.2% in KwaMakhutha, and 15.6% in uMbumbulu. In the customer data set, 28.1% of respondents were located in Eluphepheni, 21.9% in Highflats, 22.9% in Hlokozi, 14.6% in KwaMakhutha and 11.5% in uMbumbulu. In both data sets, one respondent did not disclose their location.

Table 4.2: Biographical information

<b>MANAGER</b>			<b>CUSTOMER</b>		
	<i>Frequency</i>	<i>%</i>		<i>Frequency</i>	<i>%</i>
<b>Position</b>			<b>Gender</b>		
Employee	25	55.6	Female	53	55.2
Manager	8	17.8	Male	43	44.8
Owner	12	26.7	Total	96	100
Total	45	100.0	<b>Age</b>		
<b>Gender</b>			18-30	56	58.3
Female	19	42.2	31 -40	31	32.3
Male	26	57.8	41 and above	9	9.4
Total	45	100.0	Total	96	100
<b>Age</b>			<b>Ethnic Group</b>		
18-30	37	82.2	Black	89	92.7
31-40	7	15.6	Coloured	1	1
41 and above	1	2.2	Other	4	4.2
Total	45	100.0	White	2	2.1
<b>Ethnic Group</b>			Total	96	100
Black	42	93.3	<b>Citizenship</b>		
Coloured	1	2.2	Expatriate	1	1
Prefer not to say	2	4.4	Prefer not to say	4	4.2
Total	45	100.0	South African	91	94.8
<b>Citizenship</b>			Total	96	100
Prefer not to say	1	2.2	<b>Location</b>		
South African	44	97.8		1	1
Total	45	100.0	Eluphepheni	27	28.1
<b>Type of business</b>			Highflats	21	21.9
Fast food restaurant	3	6.7	Hlokozi	22	22.9
Gas station	1	2.2	KwaMakhutha	14	14.6
Grocery store	3	6.7	uMbumbulu	11	11.5
Hardware store	3	6.7	Total	96	100
Other	35	77.8			
Total	45	100.0			
<b>Location</b>					
	1	2.2			
Eluphepheni	8	17.8			
Highflats	17	37.8			
Hlokozi	2	4.4			
KwaMakhutha	10	22.2			
uMbumbulu	7	15.6			
Total	45	100.0			

### 4.3 Likert scale variables – customer data

This section presents the descriptive statistics for the variables established for customers in this study. These variables are as follows: use of CC, technological devices, RA, perceived security, PEU, and attitude towards the use of MCC.

#### 4.3.1 Use of cloud computing

Section B of the customer questionnaire investigated the use of CC by SMEs in rural areas. Several statements regarding the use of CC were listed. The customers of the SMEs were asked to read these statements and then rate them on a scale of 1 = *strongly disagree* to 5 = *strongly agree*. The results are shown in Table 4.3 below.

Table 4.3: Descriptive statistics for customers' opinions on use of cloud computing

Statement	Frequencies, means and standard deviations for customers' opinions on use of CC					Mean	SD	Mode
	1	2	3	4	5			
	SD	FD	WA	FA	SA			
B1	0	1	6	33	56	4.5	0.7	SA
B2	0	2	5	29	60	4.5	0.7	SA
B3	0	0	3	23	70	4.7	0.5	SA
B4	2	6	18	32	38	4.0	1.0	SA
B5	0	0	2	25	69	4.7	0.5	SA

The percentage distribution of the ratings given by customers to the statements regarding the use of CC in Section B of the questionnaire is shown in Figure 4.1 below. Statements B1 to B5 were given *strongly agree* (SA) or *fairly agree* (FA) ratings by a majority of respondents. This indicates that most customers use a smartphone or a computer to bank and pay their bills, that they download applications from the Internet to their smartphone, that they use their smartphone for social networking, that they use their smartphone or computer to shop online, and that they use their smartphone to send and receive emails.

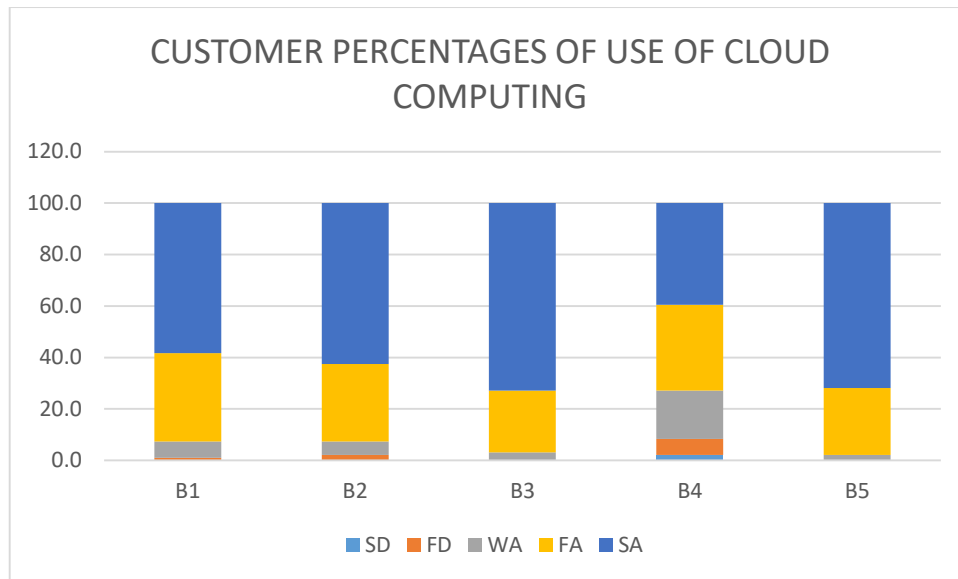


Figure 4.1: Percentage distribution of customers' opinions on use of cloud computing

#### 4.3.2 Technological devices

Section C of the customer questionnaire investigated the use of technological devices. This section of the questionnaire addressed the third research question (RQ3) in this study: *What kind of devices are SMEs using in rural areas?* Several statements concerning technological devices were listed. The customers of the SMEs were asked to read these statements and then rate them on a scale of 1 = *strongly disagree* to 5 = *strongly agree*. The results are shown in Table 4.4 below.

Table 4.4: Descriptive statistics for customers' opinions on technological devices

	Frequencies, means and standard deviations for customers' opinions on technological devices					Mean	SD	Mode
	1	2	3	4	5			
Statement	SD	FD	WA	FA	SA			
C1	0	3	26	41	26	3.9	0.8	FA
C2	0	1	3	20	72	4.7	0.6	SA
C3	0	4	10	48	34	4.2	0.8	FA
C4	0	3	8	58	27	4.1	0.7	FA

The percentage distribution of the ratings given by customers to the statements regarding technological devices in Section C of the questionnaire is shown in Figure 4.2 below. The mode for statements C1, C3 and C4 is *fairly agree* (FA), which indicates that most customers are fairly certain that they have suitable computers, tablets and

laptops to access CC services. Most customers were very certain that they have suitable smartphones to access CC services (statement C2).

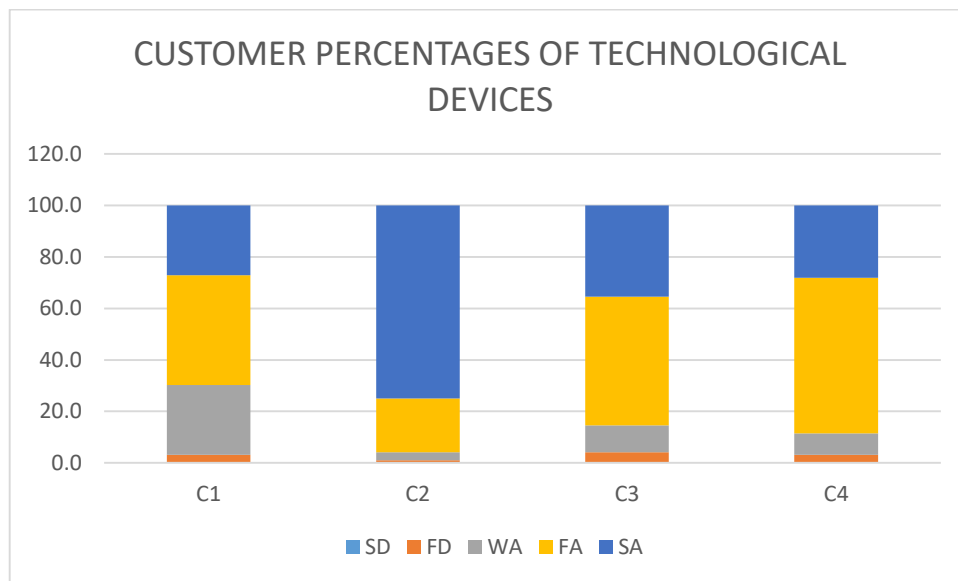


Figure 4.2: Percentage distribution of customers' opinions on technological devices

#### 4.3.3 Relative advantage

Section D of the customer questionnaire investigated relative advantages of CC in SMEs in rural areas. Several statements regarding the use of CC were listed. The customers of the SMEs were asked to read these statements and then rate them on a scale of 1 = *strongly disagree* to 5 = *strongly agree*. The results are shown in Table 4.5 below.

Table 4.5: Descriptive statistics for customers' opinions on relative advantage

Statement	Frequencies, means and standard deviations for customers' opinions on relative advantage					Mean	SD	Mode
	1	2	3	4	5			
	SD	FD	WA	FA	SA			
D1	0	2	4	33	57	4.5	0.7	SA
D2	0	3	1	25	67	4.6	0.7	SA
D3	1	2	2	37	54	4.5	0.7	SA
D4	0	2	2	40	52	4.5	0.6	SA

The percentage distribution of the ratings given by customers to the statements regarding RA in Section D of the questionnaire is shown in Figure 4.3 below. The mode for all statements is *strongly agree* (SA), and all statements were given SA or FA ratings by a large majority of respondents. This indicates that most respondents

believed that MCC saves them time travelling to shops, that MCC allows them to express their feelings effectively if they wish to raise complaints, that MCC helped them to easily avoid crowded areas during the time of COVID-19, and that they are able to purchase a variety of products within a short period of time by means of online shopping.

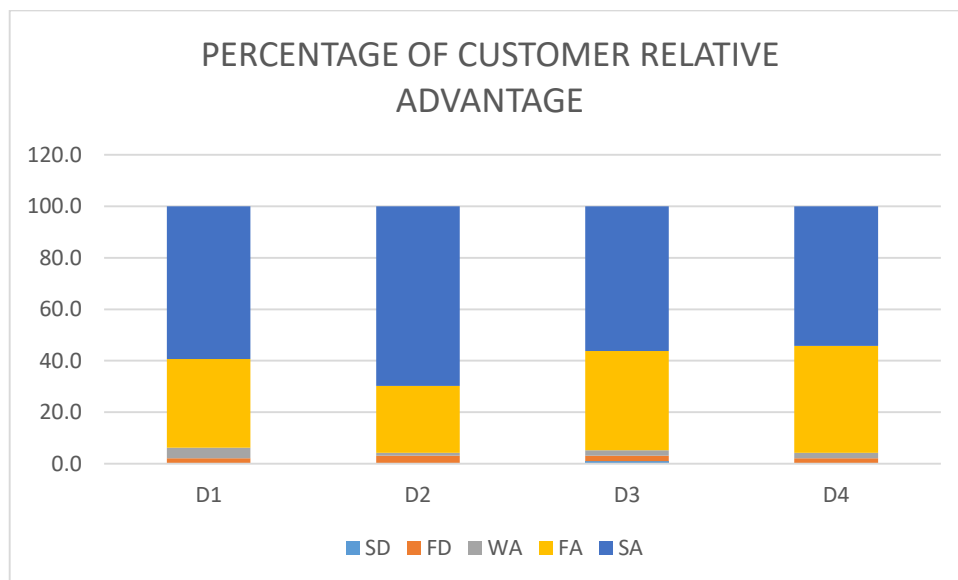


Figure 4.3: Percentage distribution of customers' opinions on relative advantage

#### 4.3.4 Perceived security

Section E of the customer questionnaire investigated the perceived security of CC when utilised by SMEs in rural areas. Several statements regarding perceived security were listed. The customers of the SMEs were asked to read these statements and then rate them on a scale of 1 = *strongly disagree* to 5 = *strongly agree*. The results are shown in Table 4.6 below.

Table 4.6: Descriptive statistics for customers' opinions on perceived security

Statement	Frequencies					Mean	SD	Mode
	1	2	3	4	5			
E1	1	3	19	44	29	4.0	0.9	FA
E2	0	4	20	43	29	4.0	0.8	FA
E3	0	5	23	43	25	3.9	0.8	FA

The percentage distribution of the ratings given by customers to the statements regarding perceived security in Section E of the questionnaire is shown in Figure 4.4 below. The mode for all statements is *fairly agree* (FA), and all statements were given SA or FA ratings by a large majority of respondents. This indicates that most customers believed that MCC app providers have sufficient security measures in place to protect their personal and financial data, that the app providers have technical methods to prevent unauthorised third parties from altering the data being sent, and that they would not worry about uninvited third parties intercepting their data when they submit it to MCC app providers.

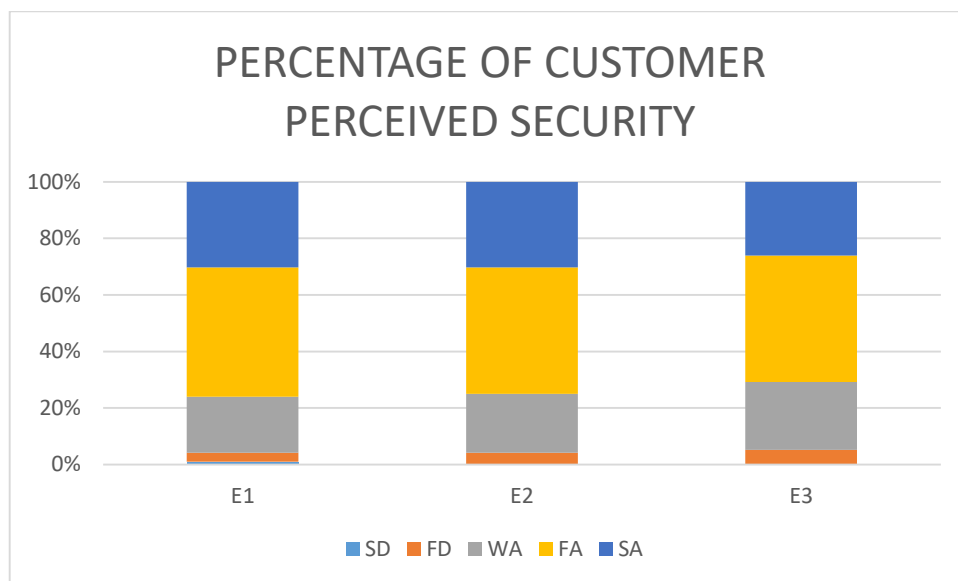


Figure 4.4: Percentage distribution of customers' opinions on perceived security

#### 4.3.5 Perceived ease of use

Section F of the customer questionnaire investigated the PEU of CC by SMEs in rural areas. Several statements concerning the PEU of CC were listed. The customers of the SMEs were asked to read these statements and then rate them on a scale of 1 = *strongly disagree* to 5 = *strongly agree*. The results are shown in Table 4.7 below.

Table 4.7: Descriptive statistics for customers' opinions on perceived ease of use

	Frequencies, means and standard deviations for customers' opinions on perceived ease of use of cloud computing							
	1	2	3	4	5			
Statement	SD	FD	WA	FA	SA	Mean	SD	Mode
F1	0	3	11	43	39	4.2	0.8	FA
F2	0	2	6	38	50	4.4	0.7	SA
F3	0	1	5	35	55	4.5	0.6	SA

The percentage distribution of the ratings given by customers to the statements regarding PEU in Section F of the questionnaire is shown in Figure 4.5 below. The mode for statement F1 is FA, and the mode for statements F2 and F3 is SA. All statements were given SA or FA ratings by a large majority of respondents. This indicates that most customers felt that they could easily direct the MCC apps to perform tasks, that it would be easy to become skillful at using MCC apps, and that learning to operate MCC apps would be easy for them.

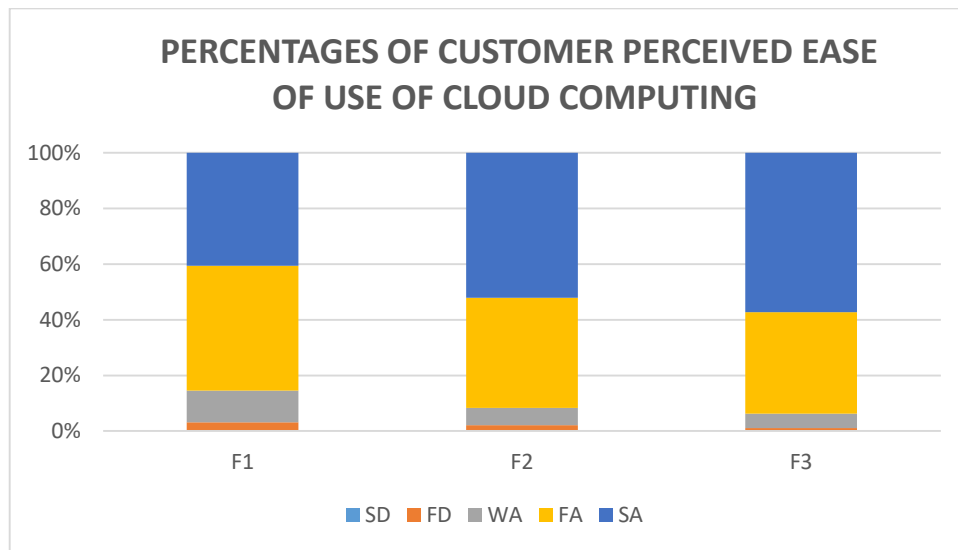


Figure 4.5: Percentage distribution of customers' opinions on perceived ease of use

#### 4.3.6 Attitude

Section G of the customer questionnaire investigated the perceived attitude towards the use of cloud-based resources by SMEs in rural areas. Several statements regarding attitude towards CC were listed. The customers of the SMEs were asked to read these statements and then rate them on a scale of 1 = *strongly disagree* to 5 = *strongly agree*. The results are shown in Table 4.8 below.

Table 4.8: Descriptive statistics for customers' opinions on attitude

Statement	Frequencies, means and standard deviations for customers' opinions on attitude					Mean	SD	Mode
	1	2	3	4	5			
	SD	FD	WA	FA	SA			
G1	1	2	4	33	56	4.5	0.8	SA
G2	1	1	2	36	56	4.5	0.7	SA
G3	0	1	2	35	58	4.6	0.6	SA

The percentage distribution of the ratings given by customers to the statements regarding attitude in Section G of the questionnaire is shown in Figure 4.6 below. All statements were given SA or FA ratings by a large majority of respondents. This indicates that most customers believed that using MCC is a smart move, that MCC adds appeal to online shopping, and that they enjoy MCC.

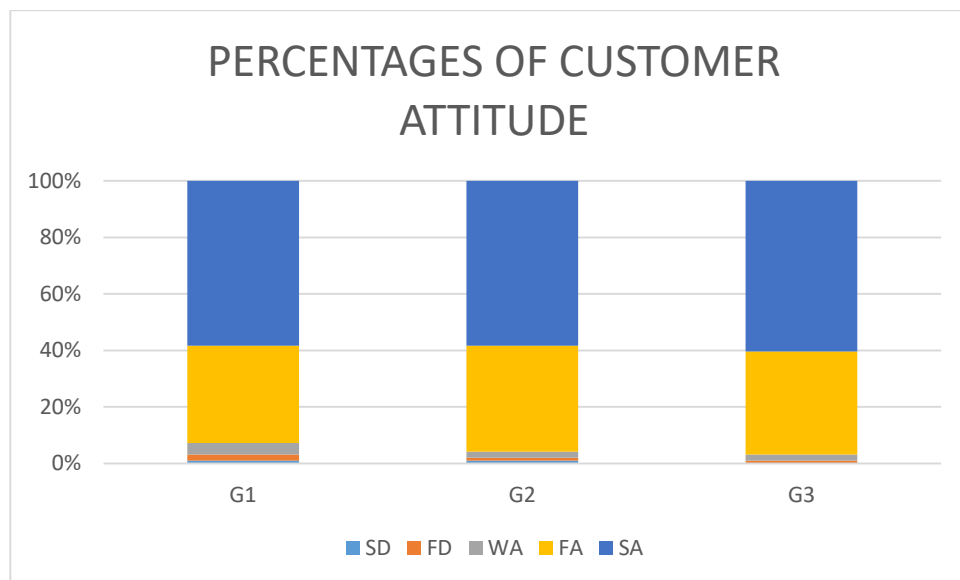


Figure 4.6: Percentage distribution of customers' opinions on attitude

#### 4.4 Likert scale variables – manager data

##### 4.4.1 Perceived need for mobile cloud computing

Section B of the manager questionnaire investigated the perceived need for the adoption of MCC by SMEs in rural areas. This section of the questionnaire addressed the first research question (RQ1) in this study: *What is the need to adopt MCC by SMEs in rural areas?* A number of statements concerning the perceived need for MCC were listed. The managers of the SMEs were asked to read these statements and then

rate them on a scale of 1 = *strongly disagree* to 5 = *strongly agree*. The results are shown in Table 4.9 below.

Table 4.9: Descriptive statistics for managers' opinions on perceived need for mobile cloud computing

	Frequencies, means and standard deviations for managers' opinions on perceived need for mobile cloud computing							
	1	2	3	4	5			
Statement	SD	FD	WA	FA	SA	Mean	SD	Mode
B1	2	0	1	9	33	4.58	0.92	SA
B2	1	1	0	9	34	4.64	0.80	SA
B3	1	0	3	11	30	4.53	0.81	SA
B4	1	0	1	14	29	4.56	0.76	SA
B5	1	0	0	15	29	4.58	0.72	SA

The percentage distribution of the ratings given by managers to the statements regarding perceived need for MCC in Section B of the questionnaire is shown in Figure 4.7 below. All statements were given SA or FA ratings by a large majority of respondents. This indicates that most managers, owners and employees believed that there is a need for their businesses to use MCC in order to increase productivity, enhance effectiveness, provide better storage, increase the provision of goods and services by making them available to customers at any time, and expand the business.

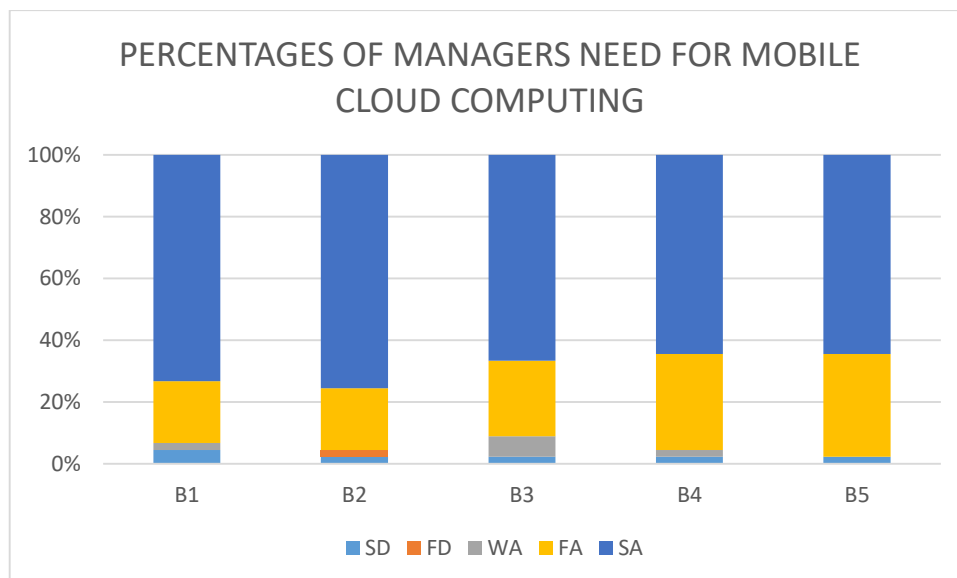


Figure 4.7: Percentage distribution of managers' opinions on perceived need for mobile cloud computing

#### 4.4.2 Use of cloud computing

Section C of the manager questionnaire investigated the use of CC by SMEs in rural areas. A number of statements concerning the use of CC were listed. The managers of the SMEs were asked to read these statements and then rate them on a scale of 1 = *strongly disagree* to 5 = *strongly agree*. The results are shown in Table 4.10 below.

Table 4.10: Descriptive statistics for managers' opinions on use of cloud computing

	Frequencies, means and standard deviations for managers' opinions on use of cloud computing							
	1	2	3	4	5			
<b>Statement</b>	<b>SD</b>	<b>FD</b>	<b>WA</b>	<b>FA</b>	<b>SA</b>	<b>Mean</b>	<b>SD</b>	<b>Mode</b>
C1	2	0	0	12	31	4.56	0.89	SA
C2	2	1	3	12	27	4.36	1.03	SA
C3	2	2	6	12	23	4.16	1.11	SA
C4	1	0	3	16	25	4.42	0.81	SA
C5	0	2	3	13	27	4.44	0.81	SA

The percentage distribution of the ratings given by managers to the statements regarding their use of CC are shown in Figure 4.8 below. All statements were given SA or FA ratings by a large majority of respondents. This indicates that most managers, owners and employees believed that cloud-based services would make it easy for disabled customers to obtain their desired products without having to travel, for customers to purchase products online, for customers to buy items at a lower price, for businesses to expand their data storage, and for businesses to expand their services across the globe.

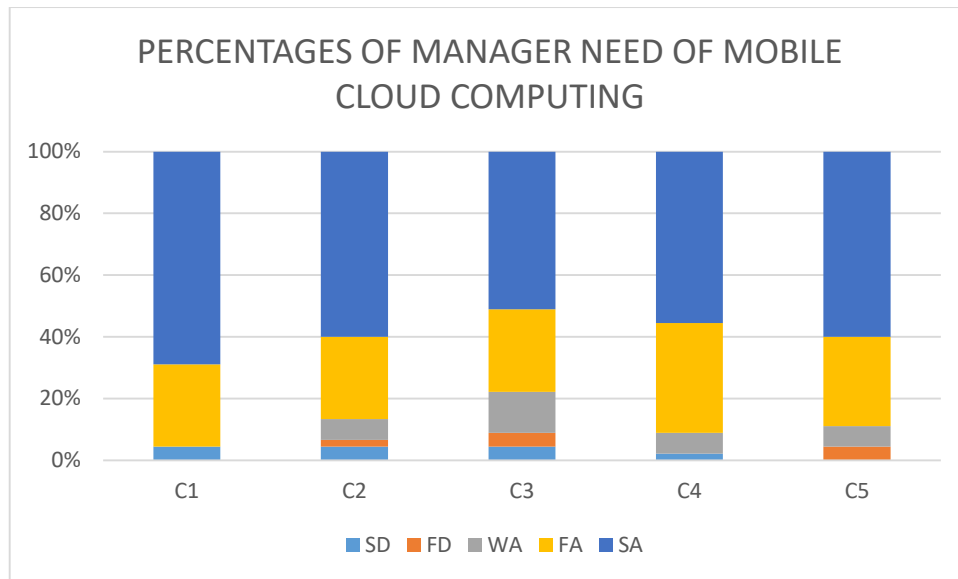


Figure 4.8: Percentage distribution of managers' opinions on use of cloud computing

#### 4.4.3 Technological devices

Section D of the manager questionnaire investigated the use of technological devices by SMEs in rural areas. A number of statements concerning technological devices were listed. The managers of the SMEs were asked to read these statements and then rate them on a scale of 1 = *strongly disagree* to 5 = *strongly agree*. The results are shown in Table 4.11 below.

Table 4.11: Descriptive statistics for managers' opinions on technological devices

Statements	Frequencies, means and standard deviations for managers' opinions on use of technological devices					Mean	SD	Mode
	1	2	3	4	5			
D1	5	2	5	12	21	3.93	1.34	5
D2	1	2	2	15	25	4.36	0.93	5
D3	4	1	5	11	24	4.11	1.25	5
D4	2	3	4	13	23	4.16	1.13	5

The percentage distribution of the ratings given by managers to the statements concerning technological devices are shown in Figure 4.9 below. All statements were given SA or FA ratings by a large majority of respondents. This indicates that most managers, owners and employees believed that they have suitable devices to access CC, such as computers, smartphones, tablets and laptops.

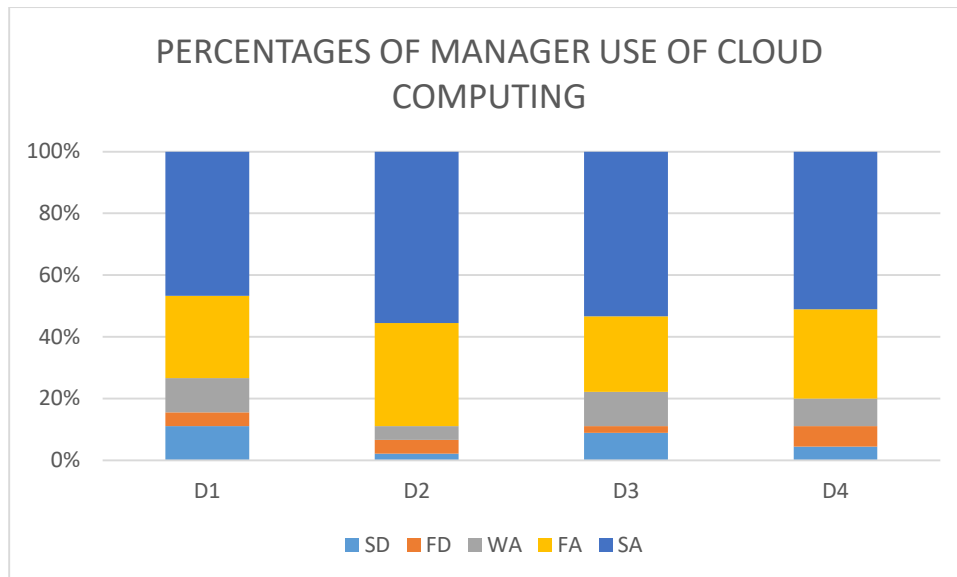


Figure 4.9: Percentage distribution of managers' opinions on technological devices

#### 4.4.4 Compatibility

Section E of the manager questionnaire investigated the compatibility of MCC with SMEs in rural areas. This section addressed the fourth research question in this study (RQ4): *Is CC compatible with SMEs in rural areas?* A number of statements concerning compatibility were listed. The management of the SMEs were asked to read these statements and then rate them on a scale of 1 = *strongly disagree* to 5 = *strongly agree*. The results are shown in Table 4.12 below.

Table 4.12: Descriptive statistics for managers' opinions on compatibility

	Frequencies, means and standard deviations for managers' opinions on compatibility of cloud computing					Mean	SD	Mode
	1	2	3	4	5			
Statements	SD	FD	WA	FA	SA			
E1	2	1	5	10	27	4.31	1.06	5
E2	1	1	4	11	28	4.42	0.92	5
E3	1	3	3	13	25	4.29	1.01	5
E4	3	1	3	12	26	4.27	1.14	5

The percentage distribution of the ratings given by managers to the statements concerning compatibility is shown in Figure 4.10. All statements were given SA or FA ratings by a large majority of respondents. This indicates that the majority of managers, owners and employees believed that cloud-based systems are consistent with the needs of their businesses, that they are compatible with their organisations'

current values and goals, that cloud-based applications are compatible with their work style, and that cloud-based systems are compatible with the current practices of their organisations.

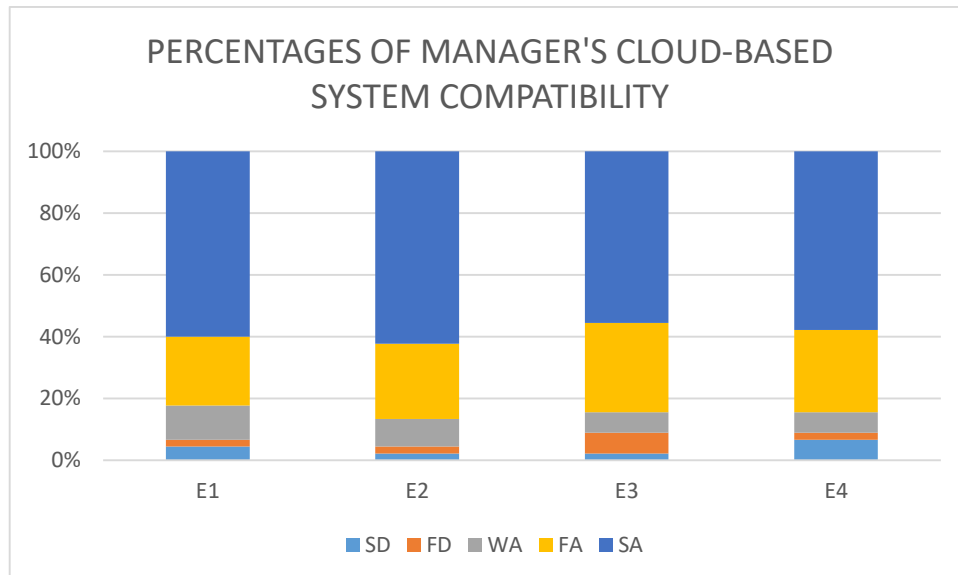


Figure 4.10: Percentage distribution of managers' opinions on compatibility

#### 4.4.5 Relative advantage

Section F of the manager questionnaire investigated the RA of MCC in SMEs in rural areas. A number of statements concerning the RA of cloud-based systems were listed. The management of the SMEs were asked to read these statements and then rate them on a scale of 1 = *strongly disagree* to 5 = *strongly agree*. The results are shown in Table 4.13 below.

Table 4.13: Descriptive statistics for managers' opinions on relative advantage

	Frequencies, means and standard deviations for managers' opinions on relative advantage of cloud computing							
	1	2	3	4	5	Mean	SD	Mode
<b>Statements</b>	<b>SD</b>	<b>FD</b>	<b>WA</b>	<b>FA</b>	<b>SA</b>			
F1	2	2	3	9	29	4.36	1.09	5
F2	1	1	4	10	29	4.44	0.92	5
F3	2	2	2	11	28	4.36	1.07	5

The percentage distribution of the ratings given by managers to the statements concerning the RA of cloud-based systems is shown in Figure 4.11. All statements were given SA or FA ratings by a large majority of respondents. This indicates that the

majority of managers, owners and employees believed that cloud-based services would enable their businesses to expand their services across the globe, that cloud-based services would improve the performance of their businesses, and that cloud-based services would provide timely information for decision-making in their organisations.

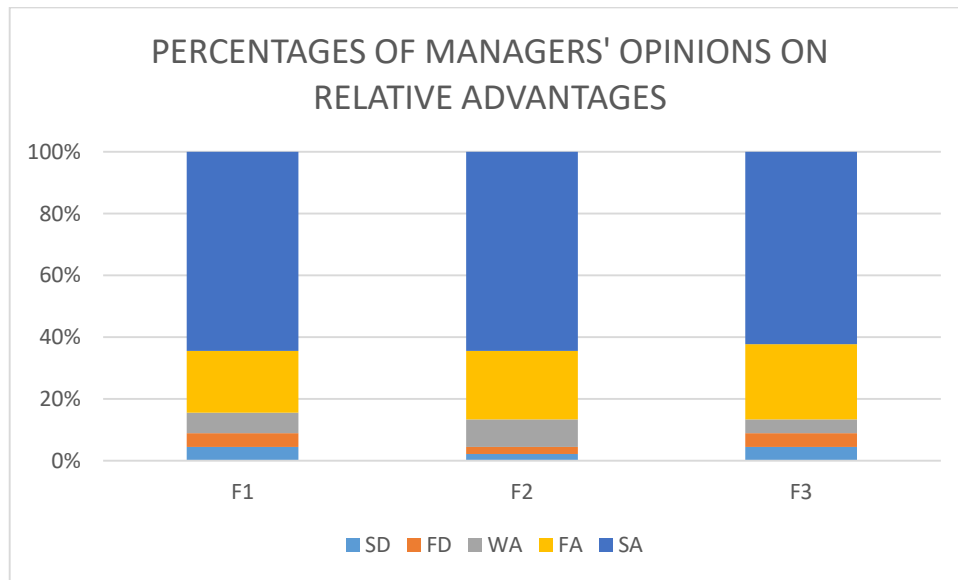


Figure 4.11: Percentage distribution of managers' opinions on relative advantage

#### 4.4.6 Complexity

Section G of the manager questionnaire investigated the complexity of cloud-based services used by SMEs in rural areas. A number of statements concerning the complexity of cloud-based systems were listed. The management of the SMEs were asked to read these statements and then rate them on a scale of 1 = *strongly disagree* to 5 = *strongly agree*. The results are shown in Table 4.14 below.

Table 4.14: Descriptive statistics for managers' opinions on complexity

Statements	Frequencies, means and standard deviations for managers' opinions on complexity of cloud computing					Mean	SD	Mode
	1	2	3	4	5			
	SD	FD	WA	FA	SA			
G1	7	0	3	13	22	3.96	1.41	5
G2	2	1	7	14	21	4.13	1.06	5
G3	4	0	3	14	24	4.20	1.18	5
G4	4	1	6	12	22	4.04	1.24	5

The percentage distribution of the ratings given by managers to the statements concerning the complexity of cloud-based services used by SMEs is shown in Figure 4.12. All statements were given SA or FA ratings by a large majority of respondents. This indicates that the majority of managers, owners and employees believed that they have appropriate tools for cloud-based services, that their organisations have qualified IT personnel to train users, that integrating cloud-based services would not be difficult, and that their organisations are not likely to encounter any difficulties maintaining the cloud-based services.

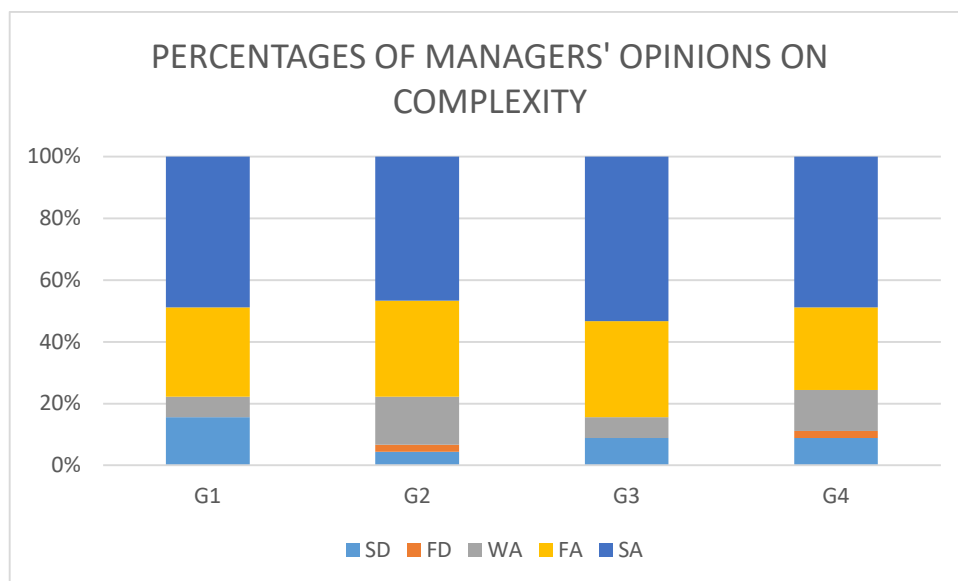


Figure 4.12: Percentage distribution of managers' opinions on complexity

#### 4.4.7 Trialability

Section H of the manager questionnaire investigated the trialability of cloud-based services used by SMEs in rural areas. A number of statements concerning the trialability of cloud-based systems were listed. The management of the SMEs were asked to read these statements and then rate them on a scale of *1 = strongly disagree* to *5 = strongly agree*. The results are shown in Table 4.15 below.

Table 4.15: Descriptive statistics for managers' opinions on trialability

	Frequencies, means and standard deviations for managers' opinions on trialability							
	1	2	3	4	5			
Statements	SD	FD	WA	FA	SA	Mean	SD	Mode
H1	3	1	4	16	21	4.13	1.12	5
H2	4	0	3	21	17	4.04	1.13	4
H3	1	2	2	21	19	4.22	0.90	4
H4	2	2	2	18	21	4.20	1.04	5

The percentage distribution of the ratings given by managers to the statements concerning the trialability of cloud-based services used by SMEs is shown in Figure 4.13. All statements were given SA or FA ratings by a large majority of respondents. This indicates that the majority of managers, owners and employees intended to set up working groups to examine cloud-based services, to conduct experiments on cloud-based applications before deciding whether to use them, to give employees the opportunity to use cloud-based services on an experimental basis for long enough to understand how they fit into the organisations, and to confirm before adopting mobile cloud-based applications whether the applications would meet the businesses' requirements.

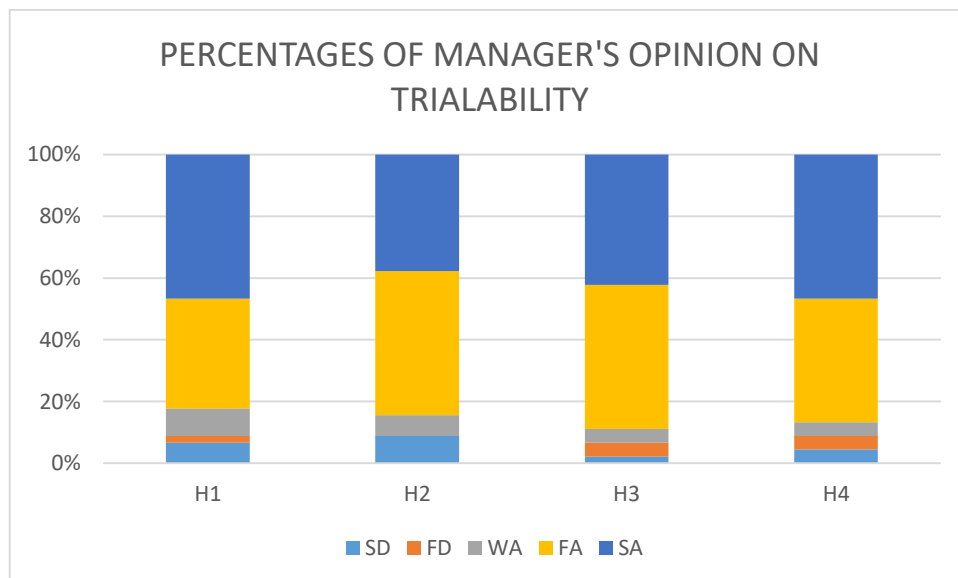


Figure 4.13: Percentage distribution of managers' opinions on trialability

#### 4.4.8 Observability

Section I of the manager questionnaire investigated the observability of cloud-based services used by SMEs in rural areas. A number of statements concerning the observability of cloud-based systems were listed. The management of the SMEs were asked to read these statements and then rate them on a scale of 1 = *strongly disagree* to 5 = *strongly agree*. The results are shown in Table 4.16 below.

Table 4.16: Descriptive statistics for managers' opinions on observability

	Frequencies, means and standard deviations for managers' opinions on observability							
	1	2	3	4	5			
<b>Statements</b>	<b>SD</b>	<b>FD</b>	<b>WA</b>	<b>FA</b>	<b>SA</b>	<b>Mean</b>	<b>SD</b>	<b>Mode</b>
I1	3	3	2	15	22	4.11	1.19	5
I2	3	1	0	17	24	4.29	1.08	5
I3	4	1	4	15	21	4.07	1.21	5
I4	3	3	4	14	21	4.04	1.21	5

The percentage distribution of the ratings given by managers to the statements concerning the observability of cloud-based services used by SMEs is shown in Figure 4.14. All statements were given SA or FA ratings by a large majority of respondents. This indicates that the majority of managers, employees and owners believed that they would have no difficulty telling others about the results of using cloud services, that they could communicate to others about the consequences of using cloud services, that they have seen what others in their organisations do with cloud services, that cloud services are very visible in their organisations, and that the benefits of using cloud services can be easily observed.

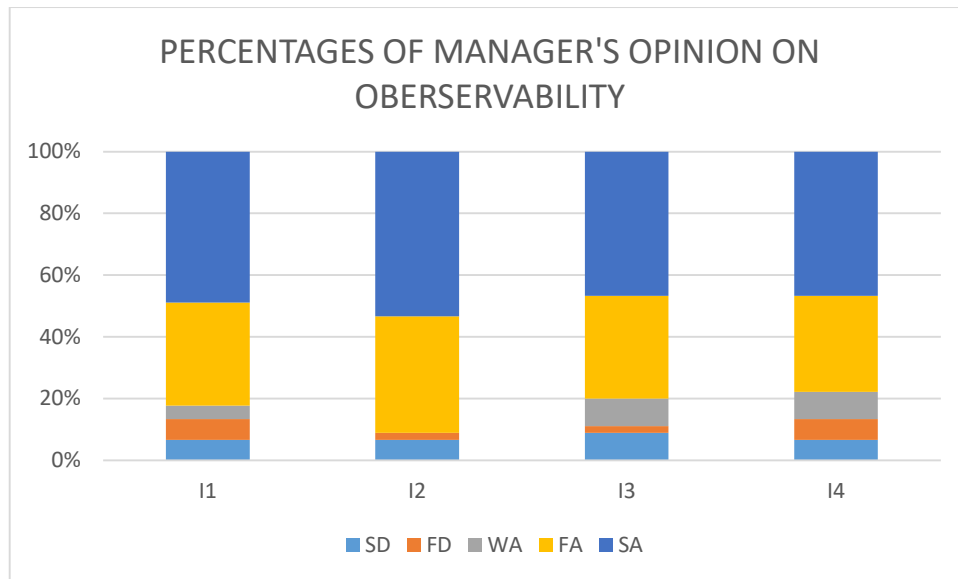


Figure 4.14: Percentage distribution of managers' opinions on observability

#### 4.5 Inferential statistics (correlations)

Inferential statistics are calculated when the intention is to draw conclusions about the statistical significance of the relationships or differences among variables (Reuben et al., 2021). In this study, the Pearson correlation ( $r$ ) was used for this purpose. This section provides the results of the Pearson correlation tests that were performed on the data collected from both managers and customers. While the Pearson correlation measures the relationship between two continuous variables (Zhang, Li, Zhang, Jin, Mu, and Wang, 2023). ANOVA measures differences of means among more than two groups (Deng, Deng, and Cheong, 2021).

In this study, an ANOVA test is used to determine whether there is a statistically significant difference between the measured items or variables. Since this study measures a variety of independent variables against a dependent variable, an ANOVA test is appropriate. A probability value below 0.05 indicates a significant result (Bertinetto, Engel, and Jansen, 2020). Significant correlations, at a 5% (0.05) level of significance, are denoted by an asterisk (\*) next to the correlation coefficient. Double asterisks (\*\*) denote correlations that are significant at a 1% (0.01) level of significance.

The Pearson correlation measures the strength and direction of the linear relationship between two variables. The correlation coefficient ranges from -1 to +1, with -1 indicating a perfect negative correlation, +1 indicating a perfect positive correlation, and 0 indicating no correlation (Chatterjee, 2021). In this study, a Pearson's correlation analysis was conducted to investigate the relationship between variables in the manager and customer questionnaires.

A correlation of **0 to ± 0.20** will be considered negligible. **±0.21 to ± 0.40** indicates a weak correlation, **±0.41 to ± 0.60** a moderate correlation, **±0.61 to ± 0.80** a strong correlation, and **±0.82 to ± 1.00** a solid or very strong correlation.

The results of a Pearson's correlation analysis for the variables in the manager questionnaire are presented in Table 4.17. The variables are as follows: *Perceived need of mobile cloud computing (sec\_b)*, *Use of cloud computing by SMEs (sec\_c)*, *Technological devices used by SMEs (sec\_d)*, *Compatibility (sec\_e)*, *Relative advantage (sec\_f)*, *Complexity (sec\_g)*, *Trialability (sec\_h)*, and *Observability(sec\_i)*.

Table 4.17: Correlations between means for manager questionnaire responses

Correlations between means for statements in sections <b>B - I</b> of the manager questionnaire								
		<b>sec_b</b>	<b>sec_c</b>	<b>sec_d</b>	<b>sec_e</b>	<b>sec_f</b>	<b>sec_g</b>	<b>sec_h</b>
<b>sec_c</b>	Pearson Correlation	.855**						
	Sig. (2-tailed)	0.000						
<b>sec_d</b>	Pearson Correlation	.525**	.555**					
	Sig. (2-tailed)	0.000	0.000					
<b>sec_e</b>	Pearson Correlation	.633**	.680**	.777**				
	Sig. (2-tailed)	0.000	0.000	0.000				
<b>sec_f</b>	Pearson Correlation	.723**	.657**	.617**	.809**			
	Sig. (2-tailed)	0.000	0.000	0.000	0.000			
<b>sec_g</b>	Pearson Correlation	.607**	.661**	.564**	.851**	.695**		
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000		
<b>sec_h</b>	Pearson Correlation	.621**	.594**	.704**	.816**	.853**	.688**	
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000	0.000	
<b>sec_i</b>	Pearson Correlation	.566**	.686**	.633**	.771**	.697**	.723**	.794**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000	0.000	0.000

The results of the correlation analysis shown in Table 4.17 may be interpreted as follows:

- A significant positive correlation is observed between *Perceived need of mobile cloud computing (sec\_b)* and *Use of cloud computing by SMEs (sec\_c)*. A double asterisk (\*\*) indicates significance at 0.01 level of significance (Sig. < 0.01). This means that the correlation between the perceived need of CC and use of CC by SMEs is very strong ( $\rho = 0.855$ ).
- A positive correlation is observed between *Technological devices used by SMEs (sec\_d)* and *Use of cloud computing by SMEs (sec\_c)*, with a Pearson's r correlation of 0.555 and a p-value of 0.000. These results indicate that the managers in this study believe that if they have adequate technological devices, SMEs will be able to adopt MCC.
- A positive correlation is observed between *Compatibility (sec\_e)* and *Use of cloud computing by SMEs (sec\_c)*, with a Pearson's r correlation of 0.680 and a p-value of 0.000. These results indicate that the managers in this study believe that if CC is compatible with their resources, they will be able to adopt it.
- A positive correlation is observed between *Relative advantage (sec\_f)* and *Use of cloud computing by SMEs (sec\_c)*, with a Pearson's r correlation of 0.657 and a p-value of 0.000. This indicates that the perceived advantages for the owners, managers and employees are an important factor in the adoption of MCC.
- A positive correlation is observed between *Complexity (sec\_g)* and *Use of cloud computing by SMEs (sec\_c)*, with a Pearson's r correlation of 0.661 and a p-value of 0.000. This indicates that complexity strongly impacts SMEs' adoption of MCC.
- Similarly, a positive correlation is observed between *Trialability (sec\_h)* and *Use of cloud computing by SMEs (sec\_c)*, with a Pearson's r correlation of 0.594 and a p-value of 0.000.

- A significant positive correlation is observed between *Observability (sec\_i)* and *Use of cloud computing by SMEs (sec\_c)*, with a Pearson's r correlation of 0.686 and a p-value of 0.000. This indicates that the managers in this study believe that feedback about the usage of cloud-based services plays a significant role in SMEs' implementation of MCC.

The results of a Pearson's correlation analysis for the variables in the customer questionnaire are presented in Table 4.18. The variables are as follows: *Use of cloud computing (sec\_b)*, *Technological devices (sec\_c)*, *Relative advantage (sec\_d)*, *Perceived security (sec\_e)*, *Perceived ease of use (sec\_f)*, and *Attitude (sec\_g)*.

Table 4.18: Correlations between means for customer questionnaire responses

Correlations between means for statements in sections B - G of the customer questionnaire						
		sec_b	sec_c	sec_d	sec_e	sec_f
sec_c	Pearson Correlation	.695**				
	Sig. (2-tailed)	0.000				
sec_d	Pearson Correlation	.577**	.539**			
	Sig. (2-tailed)	0.000	0.000			
sec_e	Pearson Correlation	.476**	.573**	.536**		
	Sig. (2-tailed)	0.000	0.000	0.000		
sec_f	Pearson Correlation	.610**	.613**	.725**	.697**	
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	
sec_g	Pearson Correlation	.573**	.499**	.730**	.595**	.823**
	Sig. (2-tailed)	0.000	0.000	0.000	0.000	0.000

The results of the correlation analysis shown in Table 4.18 show that significant positive correlations are observed between all of the variables.

#### 4.6 Summary

This chapter has presented the results of the analysis conducted in this study, which was performed on the data collected from both categories of respondents: customers and managers. The reliability and validity of the data were tested, and internal consistency in the measured variables was confirmed. Descriptive statistics were calculated to describe the characteristics of the datasets, and inferential statistics were

calculated to generalise a larger population based on a representative sample of that population gathered in this study. The inferential statistics showed a strong correlation between the independent research variables and the measured dependent variable. The next chapter will discuss the results and conclusion of this study.

## CHAPTER FIVE

### SUMMARY, CONCLUSIONS, AND IMPLICATIONS OF THE STUDY

The previous chapter presented and deliberated on the findings discovered during the analysis of the data collected in this study. During the analysis, the reliability of the variables was measured and descriptive and inferential statistics were calculated. The data regarding the adoption of MCC by SMEs in rural areas was gathered from customers and other stakeholders (owners, managers, and employees) of SMEs in Highflats, KwaMakhutha, Hlokozi, Eluphepheni and uMbumbulu.

This chapter examines these findings in comparison to existing empirical studies on the adoption of MCC by SMEs in rural areas, which were discussed in Chapter Two. Research gaps are identified, and recommendations regarding the adoption of MCC by SMEs in rural areas are provided.

#### 5.1 Discussion of results in comparison to existing reviewed studies

This study reviewed the existing literature regarding the adoption of CC by SMEs. Various factors influencing the adoption of CC by SMEs were identified and categorised for use as variables in this study. Appropriate variables were used for both groups of participants in this study (customers and managers) in order to obtain relevant data that can be used to understand the phenomenon of the adoption of MCC by SMEs in rural areas. For customers, the following variables were used: *Use of cloud computing, Technological devices, Relative advantage, Perceived security, and Perceived ease of use*. For managers, the following variables were used: *Perceived need for mobile cloud computing, Use of cloud computing by SMEs, Technological devices, Compatibility, Relative advantage, Complexity, Trialability, and Observability*.

In the existing literature, the majority of the variables in both categories were found to have an impact, positive or otherwise, on the adoption of MCC by SMEs in rural areas, while some of the variables did not affect the adoption of MCC by SMEs in rural areas. This study found that both customers and managers are of the opinion that MCC can be adopted by SMEs in rural areas.

The findings of this study are in agreement with existing reviewed studies, which found that MCC can be used to conduct business. However, this study found an overwhelming correlation between variables when compared to the existing reviewed studies. In this study, correlations between all of the variables were found (see Table 4.17 and 4.18), while some of these variables did not show any form of relationship in the existing reviewed literature.

## **5.2 Achievement of the research aim and objectives**

This study aimed to examine the factors that impact the adoption of MCC by SMEs in rural areas. This aim was accomplished by identifying various factors in existing studies using DIT, as discussed in Chapter Two, and testing these factors as variables in this study, as discussed in Chapter Four.

The first objective of this study was to establish the perceived need for the adoption of MCC by SMEs in rural areas. This objective was addressed in section 2.6.2, which discussed the benefits to SMEs of adopting MCC. These benefits include enabling SMEs to compete with the global market regardless of their location, and providing better platforms and services to process, store, secure, and manage the information available in the enterprise (Mudzamba, van der Schyff & Renaud, 2022). The results of measuring the perceived need for the adoption of MCCs in rural areas in this study were reflected in Table 4.9 and Figure 4.7, which showed that most managers, owners and employees believed that there is a need for their businesses to use MCC in order to increase productivity, enhance effectiveness, provide better storage, increase the provision of goods and services by making them available to customers at any time, and expand the business.

The second objective of this study was to ascertain whether SME owners, managers, and employees can easily use MCC services. This objective was addressed in sections 2.6.3 and 2.7.3. The results of measuring the complexity of cloud-based services used by SMEs in rural areas in this study were reflected in Table 4.14 and Figure 4.12, which showed that the majority of managers, owners and employees believed that they have appropriate tools for cloud-based services, that their organisations have qualified IT personnel to train users, that integrating cloud-based

services would not be difficult, and that their organisations are not likely to encounter any difficulties maintaining the cloud-based services.

The third objective of this study was to identify technological devices that SMEs are currently using. This objective was addressed in section 2.6.4, which noted that the reviewed literature identified laptops, PCs, tablets and smartphones as devices that are currently popular. The results of measuring the use of technological devices by SMEs in rural areas in this study were reflected in Table 4.11 and Figure 4.9, which showed that most managers, owners and employees believed that they have suitable devices to access CC, such as computers, smartphones, tablets and laptops. CC provides these users with easy and convenient access to data and applications at any time, anywhere, using any device with an Internet connection, and is always available (Sithole & Ruhode, 2021).

The fourth objective of this study was to determine whether the devices used by owners, managers and employees of SMEs are compatible with CC. This objective was addressed in section 2.6.2. The results of measuring the compatibility of MCC with SMEs in rural areas in this study were reflected in Table 4.12 and Figure 4.10, which showed that most managers, owners and employees believed that cloud-based systems are compatible with their organisations' current values and goals (a mean of 4.42), and that cloud-based systems are consistent with the needs of their businesses; (a mean of 4.31). A similar study conducted by Jayeola et al. (2022) found that the compatibility of CC with existing systems was found to be a significant adoption factor in 79.3 percent of the studies reviewed.

The fifth objective of this study was to identify and measure factors that affect the adoption of MCC by SMEs in rural areas. These factors were identified and discussed in section 2.7, and were tested in section 4.4. The factors that were measured in this study include *Perceived need for mobile cloud computing*, *Use of cloud computing by SMEs*, *Technological devices used by SMEs*, *Compatibility*, *Relative advantage*, *Complexity*, *Triability*, and *Observability*.

The final objective of this study was to test the identified factors. The identified factors were grouped and converted into variables, which were tested. The analyses and interpretations are presented in Chapter Four.

### **5.3 Conclusions**

This section discusses the conclusions that have been drawn with regard to each of the variables established in this study. These conclusions are based on the results obtained from analysis of the collected data and comparisons with the existing literature.

#### **5.3.1 Perceived need for the adoption of mobile cloud computing by small and medium-sized enterprises in rural areas**

This study has highlighted the perceived need for MCC as one of the crucial factors that propel SMEs to adopt cloud-based services. This is supported by the descriptive statistics for the opinions of the managers in this study, as shown in Table 4.9. While many respondents agreed on the importance of perceived need regarding implementing cloud-based services, a few did not share this view. The results of this study indicate that stakeholders need to communicate the reasons for the necessity of incorporating this kind of technology, as some people may reject the technology if no explanation is given. MCC provides massive computing capabilities which are delivered as services, using virtualisation and service-oriented techniques to reduce cost, improve performance, or allow remote access (Noor et al., 2018). This might be one of the major reasons for its adoption by SMEs.

#### **5.3.2 Use of cloud computing by small and medium-sized enterprises**

The majority of managers, owners and employees in this study believed that cloud-based services would make it easy for disabled customers to obtain their desired products without having to travel, for customers to purchase products online, for customers to buy items at a lower price, for businesses to expand their data storage, and for businesses to expand their services across the globe.

### 5.3.3 Technological devices used by small and medium-sized enterprises

The findings of this study indicated that smartphones (D2) are the most common technological device used by SMEs to conduct business. Few participants indicated that they use computers, tablets, or laptops. This highlights the power of smartphones and their prevalence over other devices frequently used by individuals. A smartphone is a portable device that can fit in an individual's pocket and facilitates accessible communication. The results of this study indicate that SMEs must consider incorporating the smartphone to accelerate cloud-based services when adopting MCC.

### 5.3.4 Compatibility of cloud computing with existing systems within small and medium-sized enterprises

The importance of ensuring compatibility in the adoption of newly introduced technology cannot be overstated. Based on the reviewed literature and the findings of this study, the following conclusions regarding the importance of compatibility of the new technology with existing systems are drawn:

- Issues with system incompatibility can have a very negative impact on a business, as this will inconvenience users wishing to access cloud services.
- The compatibility of MCC with existing systems influences an organisation's final decision to adopt the technology. Therefore, businesses must ensure that existing systems are compatible with the new technology before making a final decision regarding its adoption to avoid complications and unnecessary issues.
- The compatibility of the new technology is dependent not only on existing systems, but also on the values and beliefs of the organisation. Therefore, it is essential to ensure that the new technology meets the requirements of the business.

## **5.4 Recommendations for future research**

This section provides recommendations for future research related to the adoption of MCC by SMEs in rural areas. These recommendations are based on the findings of this study with regard to both customers and managers.

### **5.4.1 Technological devices**

This study found a positive correlation between technological devices and the use of CC by SMEs in rural areas. This correlation was not found in the reviewed literature. Therefore, this study recommends that more research be conducted in order to affirm this finding, and possibly to provide greater insight into preferred devices that can be used to implement MCC in rural areas.

There is a necessity to conduct more research on technological devices that can be used for MCC because some SMEs are located in geographical areas where there are often network or power issues, which can negatively impact their productivity. Since some cloud-based services require their own dedicated client machines (Neicu et al., 2020), this emphasises the importance of more effective technological devices for the successful implementation of MCC.

### **5.4.2 Relative advantage**

This study found a significantly positive correlation between RA and the use of CC by SMEs in rural areas. While some reviewed studies echoed these results, this study suggests that further research still needs to be conducted to articulate the advantages of CC to stakeholders in SMEs in order to encourage them to take advantage of the benefits of CC. This study seems to suggest that when SMEs in rural areas are aware of these relative advantages, they will be in a better position to accelerate the implementation of mobile cloud services in their businesses. As noted by Sánchez (2017), RA is crucial as it can provide opportunities such as the real possibility for innovation, business development, and various other benefits.

#### 5.4.3 Perceived security

This study found a positive correlation between perceived security and the use of CC by SMEs in rural areas. This correlation was not found in the reviewed literature. Therefore, this study recommends that more research be pursued on the relationship between security and MCC implementation. The results of this study indicate that the majority of customers regard perceived security as an important factor in the use of MCC. This study advocates that businesses be vigilant about the type of security they adopt in order to ensure that their data cannot be compromised. As noted by Shabbir et al. (2021), it is crucial to implement the necessary security measures to prevent security breaches and vulnerabilities. Therefore, this study suggests that SMEs should exercise caution with regard to security.

#### 5.4.4 Perceived ease of use

This study found a strong positive correlation between PEU and the use of CC by SMEs in rural areas. This correlation was not found in the reviewed literature. Therefore, this study recommends that more research be conducted on the relationship between PEU and the use of CC by SMEs in rural areas. While the results of this study indicate that PEU by customers impacts MCC adoption, the results also seem to indicate that participants who do not believe that it will be easy to use MCC might not adopt MCC. According to Almaiah and Al-Khasawneh (2020:3095), “complexity of mobile cloud applications largely depends on how easy it is to perform critical functionalities such as sharing the files, accessing stored files, and storing files”. The easier it is to perform these tasks, the lower the level of complexity and the easier and quicker the perception of the advantages provided by this technology (Almaiah & Al-Khasawneh, 2020).

#### 5.4.5 Attitude

This study found a positive correlation between attitude and the use of CC by SMEs in rural areas. This correlation was not found in the reviewed literature. Although the results of this study indicate that a positive attitude has a significant influence on the implementation of MCC by SMEs in rural areas, the results also seem to suggest that

a negative attitude towards MCC might influence SMEs not to adopt it. Research into methods of developing a positive attitude towards MCC among stakeholders in SMEs needs to be conducted to increase SMEs' opportunities for MCC implementation.

#### 5.4.6 Perceived need for mobile cloud computing

This study found a strong correlation between perceived need and the use of CC by SMEs in rural areas. This correlation was not found in the reviewed literature. Therefore, it is proposed that more research be pursued on the relationship between perceived need and the implementation of MCC in SMEs. However, while the results of this study indicate that owners, managers, and employees of SMEs believe that a need for MCC will propel SMEs to adopt MCC in their businesses, the results also seem to suggest that those who cannot see a need for MCC or any of its benefits might not embrace MCC. Therefore, research needs to be conducted to establish more reasons for SMEs to adopt MCC.

#### 5.4.7 Compatibility

This study found a positive correlation between compatibility and the use of CC by SMEs in rural areas. This correlation was not found in the reviewed literature. Therefore, it is recommended that more research be conducted on the relationship between compatibility with current systems and SMEs' use of MCC. Factors that influence an organisation's final decision on the adoption of mobile technologies might include the relative advantages of the technology and compatibility of the technology with the existing systems in the organisation (Maduku, 2021). The results of this study show that compatibility with current systems used by SMEs should be established before advocating the incorporation of cloud-based services.

#### 5.4.8 Complexity

This study found a strong correlation between complexity and the adoption of MCC by SMEs. This correlation was not found in the reviewed literature. Therefore, this study suggests that more research be conducted to affirm the relationship between complexity and SMEs' implementation of MCC. A study by Maduku (2021) found that

complexity negatively affects the adoption of a particular product. This indicates that users sometimes reject a technology if they perceive it as too complex. According to Tractenberg (2023), complexity in any developed system can affect business performance as it might result in many complications, especially during the setup phase. Therefore, this study recommends that stakeholders should ensure the simplicity of a cloud-based system before it is adopted so that users do not reject it.

#### 5.4.9 Trialability

This study found a positive correlation between trialability and the adoption of MCC by SMEs. This correlation was not found in the reviewed literature. Therefore, this study recommends that more research be conducted on the relationship between trialability and SMEs' implementation of MCC. Individuals who have the opportunity to experiment with a newly developed system may be potential users or adopters of the innovation (Tanye, Asampana, Matey, Akanferi, Koi-Akrofi, and Nurudeen, 2023). With an understanding of how a system works, there is a greater possibility that they will feel more comfortable with the system and be more likely to accept it. This study recognises trialability as one of the significant aspects that need to be considered before a cloud-based system is adopted, in order to identify any possible issues associated with the system.

#### 5.4.10 Observability

This study found a positive correlation between observability and the adoption of MCC by SMEs. The results of this study indicate that the majority of managers of SMEs regard feedback about the usage of cloud-based services as an important factor in the adoption of MCC. This correlation was not found in the reviewed literature. Therefore, this study suggests that more research be conducted on the relationship between observability and SMEs' adoption of MCC. According to Tanye et al., (2023), observability is the extent to which the valuable results of an innovation can be seen. If an organisation is aware of the substantial results of adopting a technology, there is a significant possibility that they will adopt it for themselves (Tanye et al., 2023). This study recommends that observation is conducted to obtain feedback regarding MCC

usage before it is implemented by SMEs. This process can also assist in redefining the system, if necessary, before it is implemented.

## **5.5 Summary**

This study involved the gathering and analysis of data from two categories of participants: customers and managers.

The results of the study showed that for the first category of participants (customers), variables such as technological devices, RA, perceived security, PEU, attitude and demographics (such as age and location) all have a significant impact on the implementation of MCC by SMEs.

For the second category of participants, which included managers, owners and employees of SMEs, the study found that perceived need, technological devices, compatibility, RA, complexity, trialability and observability all have a significant impact on the adoption of MCC by SMEs. These results are illustrated in in section 4.4.

In conclusion, this study has shown that if the variables mentioned above are not considered, SMEs in rural areas might face difficulties in implementing MCC.

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## ANNEXURE 1: Questionnaires



### **Adoption of Mobile Cloud Computing by Small and Medium-Sized Enterprises (SMEs) in Rural KwaZulu Natal**

#### **Greetings**

I am Noxolo Pretty Cele master's student in Information Technology from Durban University of Technology. The University program requires me to conduct this survey as one of the requirements. Would you kindly take a moment to complete this survey so that I can use your responses in my research? In my research, I'm trying to figure out the expressions of SMEs owners, managers, employees, and customers about the adoption of mobile cloud computing in rural SMEs.

I'm distributing this survey to all SMEs owners, managers, employees, and customers in Highflats, uMbumbulu, and KwaMakhutha areas who are willing to take part. According to DUT's policy on research ethics, taking this survey is completely optional. If you decide to participate, be assured that your answers will be kept private, and the study's conclusions won't include any information that would identify the participants.

I appreciate your help in advance and look forward to working with you.

#### **Glossary**

**Cloud Computing (CC):** Cloud computing involves delivering different types of services over the Internet. From software and analytics to secure and safe data storage and networking resources, everything can be delivered via the cloud.

**Mobile Computing (MC):** The mobile cloud is Internet-based data, applications and related services accessed through smartphones, laptop computers, tablets, and other portable devices.

**Mobile Cloud Computing (MCC):** Mobile cloud computing technology consists of cloud computing and mobile computing combined on a wireless network. This innovative technology makes it possible to deliver and execute high-quality applications on mobile devices, regardless of the latter's operating system, storage capability, and computing tasks

**Questionnaire**

The following statements are the expressions of SMEs customers about the adoption of mobile cloud computing in their local SMEs. Please tick (✓) where applicable.

A.1. Position	Customer	<input type="checkbox"/>
A.2. Age	Under 30 years	<input type="checkbox"/>
	30-40 years	<input type="checkbox"/>
	41-50 years	<input type="checkbox"/>
A.3. Gender	Male	<input type="checkbox"/>
	Female	<input type="checkbox"/>
	Prefer not to say	<input type="checkbox"/>
A.4. Ethnic group	Black	<input type="checkbox"/>
	Coloured	<input type="checkbox"/>
	White	<input type="checkbox"/>
A.5. Citizenship	South African	<input type="checkbox"/>
	Expatriate	<input type="checkbox"/>
	Prefer not to say	<input type="checkbox"/>

**B. Use of cloud computing**

	Strongly Disagree	Fairly Disagree	Weakly Agree	Fairly Agree	Strongly Agree
B.1 I use my smartphone or computer to bank and pay my bills.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B.2 I download applications from internet to my smartphone or computer.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B.3 I use my smartphone for social networking.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B.4 I use my smartphone or computer to shop online.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
B.5 I use my smartphone to send and receives emails.	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**C. Technological devices.**

I believe that we have good devices to access cloud computing such as:

	Strongly Disagree	Fairly Disagree	Weakly Agree	Fairly Agree	Strongly Agree
C.1 Computers					
C.2 Smartphone					
C.3 Tablets					
C.4 Laptop					

**D. Relative advantage**

I believe that:

	Strongly Disagree	Fairly Disagree	Weakly Agree	Fairly Agree	Strongly Agree
D.1 Mobile cloud computing will saves me time from travelling to shops.					
D.2 I will be able to express my feelings effectively if there is any complain I want to raise.					
D.3 It will be easy to avoid overcrowding areas during this time of Covid19.					
D.4 I can be able to get variety of products within a short period of time when I am using online shopping.					
D.5 I will be able to do price comparison easily on products when I am using online shopping.					
D.6 I can do shopping at my pace without pressure to buy unnecessary products when I am shopping online.					

**E. Perceived security**

I believe that :

	Strongly Disagree	Fairly Disagree	Weakly Agree	Fairly Agree	Strongly Agree
E.1 The MCC app providers have sufficient security measures in place to protect my personal and financial data.					
E.2 The MCC app providers have technical methods to prevent unauthorized third parties from altering the data I send.					
E.3 I won't have to worry about uninvited third parties intercepting my data when I submit it to MCC apps providers.					

**F. Perceived ease of use**

I believe that :

	Strongly Disagree	Fairly Disagree	Weakly Agree	Fairly Agree	Strongly Agree
F.1 I could easily direct MCC apps to perform the tasks I need them to.					
F.2 I would be easy for me to become skillful at using MCC apps					
F.3 Learning to operate MCC apps would be easy for me.					

**J. Attitude**

I believe that :

	Strongly Disagree	Fairly Disagree	Weakly Agree	Fairly Agree	Strongly Agree
J.1 Making use of mobile cloud computing is a smart move.					
J.2 Mobile cloud computing adds appeal to online shopping					
J.3 I enjoy using mobile cloud computing.					



**Adoption of Mobile Cloud Computing by Small and Medium-Sized Enterprises (SMEs) in Rural KwaZulu Natal**

Greetings

I am Noxolo Pretty Cele master's student in Information Technology from Durban University of Technology. The University program requires me to conduct this survey as one of the requirements. Would you kindly take a moment to complete this survey so that I can use your responses in my research? In my research, I'm trying to figure out the expressions of SMEs owners, managers, employees, and customers about the adoption of mobile cloud computing in rural SMEs.

I'm distributing this survey to all SMEs owners, managers, employees, and customers in Highflats, uMbumbulu, and KwaMakhutha areas who are willing to take part. According to DUT's policy on research ethics, taking this survey is completely optional. If you decide to participate, be assured that your answers will be kept private, and the study's conclusions won't include any information that would identify the participants.

I appreciate your help in advance and look forward to working with you.

**Glossary**

**Cloud Computing (CC):** Cloud computing involves delivering different types of services over the Internet. From software and analytics to secure and safe data storage and networking resources, everything can be delivered via the cloud.

**Mobile Computing (MC):** The mobile cloud is Internet-based data, applications and related services accessed through smartphones, laptop computers, tablets, and other portable devices.

**Mobile Cloud Computing (MCC):** Mobile cloud computing technology consists of cloud computing and mobile computing combined on a wireless network. This innovative technology makes it possible to deliver and execute high-quality applications on mobile devices, regardless of the latter's operating system, storage capability, and computing tasks

**Questionnaire**

The following statements are the expressions of SMEs owners, managers, and employees about the adoption of mobile cloud computing in their businesses. Please tick (✓) where applicable.

**A. Demographics**

A.1. Position	Owner <input type="checkbox"/>	Manager <input type="checkbox"/>	Employee <input type="checkbox"/>
A.2. Age	Under 30 years <input type="checkbox"/>	30-40 years <input type="checkbox"/>	41-50 years <input type="checkbox"/>
A.3. Gender	Male <input type="checkbox"/>	Female <input type="checkbox"/>	Prefer not to say <input type="checkbox"/>
A.4. Ethnic group	Black <input type="checkbox"/>	Coloured <input type="checkbox"/>	White <input type="checkbox"/>
A.5. Citizenship	South African <input type="checkbox"/>	Expatriate <input type="checkbox"/>	Prefer not to say <input type="checkbox"/>
A.6. Target Market	Retail shops <input type="checkbox"/>	Communities <input type="checkbox"/>	Other (specify) <input type="checkbox"/>

**B. Perceived need of mobile cloud computing**

I believe that mobile cloud computing is needed to:

	Strongly Disagree	Fairly Disagree	Weakly Agree	Fairly Agree	Strongly Agree
B.1 Increase productivity.					
B.2 Enhance effectiveness.					
B.3 Provide better storage.					
B.4 Expand provision of good and service 24/7.					
B.5 Scale up the business.					

**C. Use of cloud computing by SMEs**

I believe that cloud-based services will make it easy for:

	Strongly Disagree	Fairly Disagree	Weakly Agree	Fairly Agree	Strongly Agree
C.1 The disabled people to access their desired products without having to travel to get adequate services.					
C.2 People purchase products online.					
C.3 People to buy items at a cheaper price.					
C.4 Business to expand their data storage.					
C.5 Company to expand their services across the globe.					

**D. Technological devices used by SMEs**

I believe that we have good devices to access cloud computing such as:

	Strongly Disagree	Fairly Disagree	Weakly Agree	Fairly Agree	Strongly Agree
D.1 Computers.					
D.2 Smartphone					
D.3 Tablets.					
D.4 Laptop.					

**E. Compatibility**

I believe that:

	Strongly Disagree	Fairly Disagree	Weakly Agree	Fairly Agree	Strongly Agree
E.1 Cloud based systems are consistent with business need.					
E.2 Cloud based systems are compatible with the organization's current values and goals.					
E.3 Cloud based applications are compatible with our work style.					
E.4 Cloud based systems are compatible with the current practices of our organization.					

**F. Relative advantage**

I believe that:

	Strongly Disagree	Fairly Disagree	Weakly Agree	Fairly Agree	Strongly Agree
F.1 Company to expand their services across the globe.					
F.2 Cloud-based services will improve the performance of our organization.					
F.3 Cloud-based services will provide timely information for decision making.					
F.4 Cloud-based services will enhance the efficiency of our company.					
F.5 Cloud-based ERP will provide timely information for decision making.					
F.6 With cloud-based ERP adoption, we expect to see cost savings effect.					

**J. Complexity**

I believe that:

	Strongly Disagree	Fairly Disagree	Weakly Agree	Fairly Agree	Strongly Agree
J.1 We have appropriate tools to cloud-based services.					
J.2 The organization has great IT personnel to give training everyone in the business.					
J.3 Integrating cloud-based services in our work practices will not be difficult.					
J.4 Our organization may not encounter any difficulties in maintaining the cloud cloud-based services.					

**K. Triability**

I believe that

	Strongly Disagree	Fairly Disagree	Weakly Agree	Fairly Agree	Strongly Agree
K.1 Working groups will be set up to examine.					
K.2 Organization conducts experiment on cloud base applications before deciding whether to use it.					
K.3 Everyone will be allowed to use cloud-based services on an experimental basis long enough to understand how it fits into the organization.					
K.4 Before mobile cloud-based application get adopted, the business will confirm whether the requirements can be reflected.					

**L. Observability**

IN terms of observation:

	Strongly Disagree	Fairly Disagree	Weakly Agree	Fairly Agree	Strongly Agree
L.1 I would have no difficulty telling others about the results of using cloud services.					
L.2 I believe I could communicate to others the consequences of using cloud services.					
L.3 I have seen what others in my organization do with cloud services.					
L.4 Cloud services are very visible in my organization.					
L.5 The benefits of using cloud-based services can be easily observed.					

## ANNEXURE 2: Introduction to Research Ethics



**TRREE**

# Zertifikat Certificat

# Certificado Certificate

Promouvoir les plus hauts standards éthiques dans la protection des participants à la recherche biomédicale  
Promoting the highest ethical standards in the protection of biomedical research participants



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### Introduction to Research Ethics

du programme de formation TRREE en évaluation éthique de la recherche  
of the TRREE training programme in research ethics evaluation

Release Date: 2021/02/08  
CID: B4jpsW1v30



Professeur Dominique Sprumont  
Coordinateur TRREE Coordinator



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[REV : 20170510]

## ANNEXURE 3: Research Ethics Evaluation



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[REV : 20170310]

## ANNEXURE 4: Informed Consent



**TRREE**

# Zertifikat Certificat

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[REV : 20170310]

## ANNEXURE 5: Public Health Research Ethics



**TRREE**

# Zertifikat Certificat

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Promoting the highest ethical standards in the protection of biomedical research participants



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## Public Health Research Ethics

du programme de formation TRREE en évaluation éthique de la recherche  
of the TRREE training programme in research ethics evaluation

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Swiss Academy of Medical Science (SAMS/ASSM/AMW) ([www.sams.ch](http://www.sams.ch)) - Commission for Research Partnerships with Developing Countries ([www.lipr.ch](http://www.lipr.ch))

[REV : 20170310]

**ANNEXURE 6: Tables of percentages used to draw stacked bar-graphs for customer data**

<b>TABLE A1. PERCENTAGES OF CUSTOMER USE OF CLOUD COMPUTING</b>					
	1	2	3	4	5
	SD	FD	WA	FA	SA
B1	0.0	1.0	6.3	34.4	58.3
B2	0.0	2.1	5.2	30.2	62.5
B3	0.0	0.0	3.1	24.0	72.9
B4	2.1	6.3	18.8	33.3	39.6
B5	0.0	0.0	2.1	26.0	71.9

<b>TABLE A2. PERCENTAGES OF CUSTOMER TECHNOLOGICAL DEVICES</b>					
	1	2	3	4	5
	SD	FD	WA	FA	SA
C1	0.0	3.1	27.1	42.7	27.1
C2	0.0	1.0	3.1	20.8	75.0
C3	0.0	4.2	10.4	50.0	35.4
C4	0.0	3.1	8.3	60.4	28.1

<b>TABLE A3. PERCENTAGES OF CUSTOMER RELATIVE ADVANTAGE</b>					
	1	2	3	4	5
	SD	FD	WA	FA	SA
D1	0.0	2.1	4.2	34.4	59.4
D2	0.0	3.1	1.0	26.0	69.8
D3	1.0	2.1	2.1	38.5	56.3
D4	0.0	2.1	2.1	41.7	54.2

<b>TABLE A4. PERCENTAGES OF CUSTOMER PERCEIVED SECURITY</b>					
	1	2	3	4	5
	SD	FD	WA	FA	SA
E1	1.0	3.1	19.8	45.8	30.2
E2	0.0	4.2	20.8	44.8	30.2
E3	0.0	5.2	24.0	44.8	26.0

<b>TABLE A5. PERCENTAGES OF CUSTOMER PERCEIVED EASE OF USE</b>					
	1	2	3	4	5
	SD	FD	WA	FA	SA
F1	0.0	3.1	11.5	44.8	40.6
F2	0.0	2.1	6.3	39.6	52.1
F3	0.0	1.0	5.2	36.5	57.3

<b>TABLE A6. PERCENTAGES OF CUSTOMER ATTITUDE</b>					
	1	2	3	4	5
	SD	FD	WA	FA	SA
G1	1.0	2.1	4.2	34.4	58.3
G2	1.0	1.0	2.1	37.5	58.3
G3	0.0	1.0	2.1	36.5	60.4

**ANNEXURE 7: Tables of percentages used to draw stacked bar-graphs for management data**

<b>TABLE B1. PERCENTAGES OF CUSTOMER NEED OF MOBILE CLOUD COMPUTING</b>					
	1	2	3	4	5
STATEMENTS	SD	FD	WA	FA	SA
B1	4.4	0.0	2.2	20.0	73.3
B2	2.2	2.2	0.0	20.0	75.6
B3	2.2	0.0	6.7	24.4	66.7
B4	2.2	0.0	2.2	31.1	64.4
B5	2.2	0.0	0.0	33.3	64.4

<b>TABLE B2. PERCENTAGES OF USE OF CLOUD COMPUTING BY SMEs</b>					
	1	2	3	4	5
STATEMENTS	SD	FD	WA	FA	SA
C1	4.4	0.0	0.0	26.7	68.9
C2	4.4	2.2	6.7	26.7	60.0
C3	4.4	4.4	13.3	26.7	51.1
C4	2.2	0.0	6.7	35.6	55.6
C5	0.0	4.4	6.7	28.9	60.0

<b>TABLE B3. PERCENTAGES OF MANAGER USE OF CLOUD COMPUTING</b>					
	1	2	3	4	5
STATEMENTS	SD	FD	WA	FA	SA
D1	11.1	4.4	11.1	26.7	46.7
D2	2.2	4.4	4.4	33.3	55.6
D3	8.9	2.2	11.1	24.4	53.3
D4	4.4	6.7	8.9	28.9	51.1

<b>TABLE B4. PERCENTAGES OF CUSTOMER USE OF CLOUD COMPUTING</b>					
	1	2	3	4	5
STATEMENTS	SD	FD	WA	FA	SA
E1	4.4	2.2	11.1	22.2	60.0
E2	2.2	2.2	8.9	24.4	62.2
E3	2.2	6.7	6.7	28.9	55.6
E4	6.7	2.2	6.7	26.7	57.8

<b>TABLE B5. PERCENTAGES OF CUSTOMER USE OF CLOUD COMPUTING</b>					
	1	2	3	4	5
STATEMENTS	SD	FD	WA	FA	SA
F1	4.4	4.4	6.7	20.0	64.4
F2	2.2	2.2	8.9	22.2	64.4
F3	4.4	4.4	4.4	24.4	62.2

<b>TABLE B6. PERCENTAGES OF CUSTOMER USE OF CLOUD COMPUTING</b>					
	1	2	3	4	5
STATEMENTS	SD	FD	WA	FA	SA
G1	15.6	0.0	6.7	28.9	48.9
G2	4.4	2.2	15.6	31.1	46.7
G3	8.9	0.0	6.7	31.1	53.3
G4	8.9	2.2	13.3	26.7	48.9

<b>TABLE B7. PERCENTAGES OF CUSTOMER USE OF CLOUD COMPUTING</b>					
	1	2	3	4	5
STATEMENTS	SD	FD	WA	FA	SA
H1	6.7	2.2	8.9	35.6	46.7
H2	8.9	0.0	6.7	46.7	37.8
H3	2.2	4.4	4.4	46.7	42.2
H4	4.4	4.4	4.4	40.0	46.7

<b>TABLE B8. PERCENTAGES OF CUSTOMER USE OF CLOUD COMPUTING</b>					
	1	2	3	4	5
STATEMENTS	SD	FD	WA	FA	SA
I1	6.7	6.7	4.4	33.3	48.9
I2	6.7	2.2	0.0	37.8	53.3
I3	8.9	2.2	8.9	33.3	46.7
I4	6.7	6.7	8.9	31.1	46.7

**ANNEXURE 8: Full descriptions of the symbols under Cronbach's alpha variables**

<b>MANAGERS</b>	
<b>Symbol</b>	<b>Full Description</b>
B	<i>Perceived need of mobile cloud computing (sec_b)</i>
C	<i>Use of cloud computing by SMEs (sec_c)</i>
D	<i>Technological devices used by SMEs (sec_d)</i>
E	<i>Compatibility (sec_e)</i>
F	<i>Relative advantage(sec_f)</i>
G	<i>Complexity(sec_g),</i>
H	<i>Trialability(sec_h)</i>
I	<i>Observability(sec_i)</i>
<b>CUSTOMERS</b>	
<b>Symbol</b>	<b>Full Description</b>
B	<i>Use of cloud computing(sec_b)</i>
C	<i>Technological devices(sec_c)</i>
D	<i>Relative advantage(sec_d)</i>
E	<i>Perceived security(sec_e)</i>
F	<i>Perceived ease of use(sec_f)</i>
G	<i>Attitude (sec_g)</i>