AN EVALUATION OF M-GOVERNMENT SERVICES PROLIFERATION IN SOUTH AFRICA

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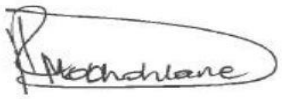
DECLARATION

I, Diteboho Refiloe Mokhohlane, declare that the contents of this dissertation, entitled *An Evaluation of M-Government Services Proliferation in South Africa* submitted for the degree of Master Technologiae: Information Technology signify my own work and that the dissertation has not previously been submitted for academic assessment towards any qualification of higher education. Furthermore, this report complies with the Code of Academic integrity, the rules and regulations of the Central University of Technology.



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ABSTRACT

E-government contributes to the improvement of government service delivery to citizens. Access to information and services permit citizens through the facilitation of interactions. E-Government commonly provides online services through wired networks and computers; which poses a challenge of fair access for entire citizens, predominantly for those living in rural areas and/or in disadvantaged financial state. In view of this, mobile phone penetration is growing faster than that of landline connection and is deemed having the chance to give wider access to citizens. Statistics show that more people access the internet via their cell-phones, suggesting that the computer has lost its dominance as a tool for information access. Due to the high-level use of mobile devices, many countries have been moving towards m-Government as the next step in improving their contact with citizens.

m-Government is a subsection of e-Government and the former is a supplement or extension of the latter. The key advantages of m-Government services include: personalization, ubiquity, reduced cost, providing information and services anywhere and at any time, ease of use, and placed-based services. m-Government has four major domains which includes: m-Services, m-Communication, m-Administration and m-Democracy. The main research question for this study was: "*To which extent has m-Government services in the Free State been implemented and accepted by the citizens*". The primary objective was to evaluate and measure m-Government implementation in the Free State Province and provide the roadmaps and guidance for future directions.

As this is an Information Systems research project, a problem-centered approach was adopted. In order to accomplish the main objective of the study, the researcher made use of four data collection tools: literature review, observations, in-depth interviews and surveys. The study commenced with an intensive literature review, by investigating e-Government and m-Government initiatives in SA and also investigated and assessed m-Government maturity models. This allowed the researcher to design and develop a mGMM that was utilised in measuring and assessing m-Government implementation in the Free State. In order to validate the mGMM, case studies in two different government departments (DoE and DoH) in the Free State were conducted. Each case study was thoroughly observed to gather information on m-Services that were currently available to the community. The observations were followed by in-depth interviews, and the in-depth interviews assisted the researcher to assess and measure the level of maturity of m-Government services in these departments.

The data was analysed using descriptive statistics as well as thematic approach. The findings from this exercise were used to develop questions for the survey for the community. The survey was carried out among community members of the Free State province (in rural, urban and township areas). The survey enabled the researcher to collect data on m-Services that the citizens currently know of and are using; factors that are influencing the use or non-use of m-Services and also m-Services they would like to use in the future. UTAUT framework was utilised to develop the questions to measure m-Government (Technology) adoption from the citizen's point of view.

From the observation done at DoE, three m-Government services were discovered (School Finder, Social media pages and Student Portal). The in-depth interviews were conducted to find at which level / stage were these m-Government services when rated using the mGMM. The results indicate that two of these m-Government services are at the augmentation stage and the last m-Government service is at the involvement stage. Furthermore, the results indicate that some of the participants find the m-Government services easy to use and other participants would like to see more m-Government services provided in the future. From the observations done at DoH, only two mobile applications were offered to citizens (Mom-Connect and AitaHealth). Participants who used AitaHealth found the application easier to use and much more significant. The m-Services currently offered by DoH when rated using mGMM, the results indicate that AitaHealth is at Augmentation stage, while Mom-Connect at Elementary stage. The factors that affect m-Government services include: user adoption, lack of investment, staff not computer literate, lack of trust and financial constraints.

Considering the data analysed and presented in this dissertation, Free State government, particularly the DoE and DoH, are not yet ready to transition to m-Government. The systems provided by these departments are still at the Augmentation stage of the mobile Government Maturity Model and the Departments are still yet to prepare to transition to the Elementary stage. The researcher also identified factors for successful implementation of m-Government services in the Free State in SA. The proposed m-Government factors include the following: Technology Infrastructure, Security, Trust and Privacy, Application Services, Agile Policies and Strategies, Knowledge Management, Human factors, Adequate Investment, Training, Education and Support and lastly Marketing. All the identified factors play a crucial role in the successful implementation of m-Government.

Keywords: m-Government, mobile Government maturity model, e-Services

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ABBREVIATIONS

C2G	Citizen to Government
CCTV	Closed Circuit Television
CMM	Capability Maturity Model
DoE	Department of Education
DoH	Department of Health
DOI	Diffusion of Innovation
EE	Effort Expectancy
E-Government	Electronic Government
E-Service	Electronic Service
FC	Facilitating Conditions
FRIC	Faculty of Research and Innovation Committee
G2B	Government to Business
G2C	Government to Citizen
G2E	Government to Employee
G2G	Government to Government
ICT	Information and Communication Technology
IT	Information Technology
M	Mobile
m-Administration	Mobile- Administration
m-Communication	Mobile-Communication
m-Democracy	Mobile- Democracy
mG2B	Mobile Government to Business
mG2C	Mobile Government to Citizen
mG2E	Mobile Government to Employee
mG2G	Mobile Government to Government
mGMM	Mobile Government Maturity Model
m-Government	Mobile-Government
MM	Maturity Model
MMS	Multimedia Message Service
M-Payment	Mobile-Payment
MPCU	Model of PC Utilization
m-Readiness	Mobile-Readiness
m-Services	Mobile-Services
PBC	Perceived Behavioural Control
PDA	Personal Digital Assistant
PE	Performance Expectancy
PEOUU	Perceived Ease of Use
PU	Perceived Usefulness
RFID	Radio Frequency Identification
RO	Research Objectives
SCT	Social Cognitive Theory
SI	Social Influence
SMS	Short Message Service
TAM	Technology Acceptance Model

TPB	Theory of Planned Behavior
TRA	Theory of Reasoned Action
UTAUT	Unified Theory of Acceptance and Use of Technology

CHAPTER 1: INTRODUCTION

1.1 INTRODUCTION

Section 1.2 concisely outlines the background to the research study. Section 1.3 elucidates the research problem. Section 1.4 discusses research questions and objectives. Section 1.5 provides research methodology and design. Section 1.6 focuses on the scope of the study. Section 1.7 describes the ethical consideration. Section 1.8 presents an outline of all the chapters. Section 1.9 is the summary of this chapter.

1.2 BACKGROUND

Electronic government (e-Government) refers to the use of Information and Communication Technologies (ICTs) in translating the collaboration among governments and citizens, governments, governments and their employees, as well as governments and businesses (Heeks, 2013). E-government contributes to the enhancement of government service delivery to citizens, the facilitation of interactions with businesses and the empowerment of citizens through access to information and services (Al-Hujran, 2012; Linder, 2012). E-Government can help build improved relations between government and the public by making interaction with society more effective. E-Government has benefits which includes: a decrease of cost, improved transparency, reduced corruption, revenue growth, and better convenience (Paoli & Leone, 2015; Alomari et al., 2013). Nevertheless, besides these benefits, e-Government has its own challenges comprising of the digital divide, which happens to be the core crippling factor in most e-Government initiatives (Shackel, 2009; Al Thunibat et al., 2010).

E-Government commonly offers online services using wired networks and computers; which then poses a challenge of fair access for all citizens, predominantly for those living in rural areas and/or in disadvantaged financial state (Muguti, 2013). In view of this, landline assembly is deemed having the chance to give wider access to citizens as mobile phone penetration is growing quicker (Mukonza, 2013). Statistics show that more people access the internet via their cell-phones, suggesting that the computer has lost its dominance as a tool for information access (Goldstuck, 2011). The affordability of mobile devices gives opportunities for members of the public, such as the poor to participate in public affairs (Abdelghaffar & Magdy, 2012). According to Du Preez (2013), m-Government is the use of mobile technology (e.g. portable computers, personal digital assistants and mobile phones) to deliver any government service, both internal and external. Due to the increased level use of mobile devices, many countries have been moving towards m-Government as the next step in improving their interaction with citizens (Ogunleye & Van Belle, 2014). Fath-Allah et al. (2014) states that m-Government has become the midpoint for a wide variety of activities, for example: transaction, services and information exchange. m-Government is a subset of e-Government (Paoli & Leone, 2015; Du Preez, 2013) and the former is a supplement or extension of the latter (as depicted in Figure 1.1).

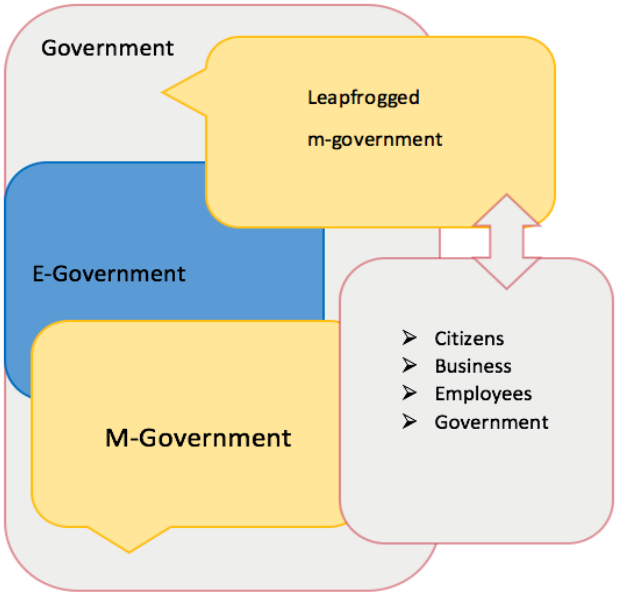


Figure 1.1: Synergies Between m-Government Stakeholders (Mukonza, 2013)

m-Government has greatly gained significant attention internationally (Maranny, 2011). m-Government has four major domains which includes: m-Services, m-Communication, m-Administration and m-Democracy (Mtingwi & Van Belle, 2013; Jahanshahi et al., 2011), as shown in Figure 1.2. m-Government is further classified into four types of cooperation between entities which are: (a) m-Government to Citizen (mG2C), denotes to the interaction between government and citizens; (b) m-Government to Business (mG2B), refers to the interaction of government with businesses; (c) m-Government to Employee (mG2E), regarding the government and its employees; and lastly (d) m-Government to Government (mG2G), indicate relations and the interaction between governmental agencies (Mtingwi, 2012; Hussain & Imran, 2014).

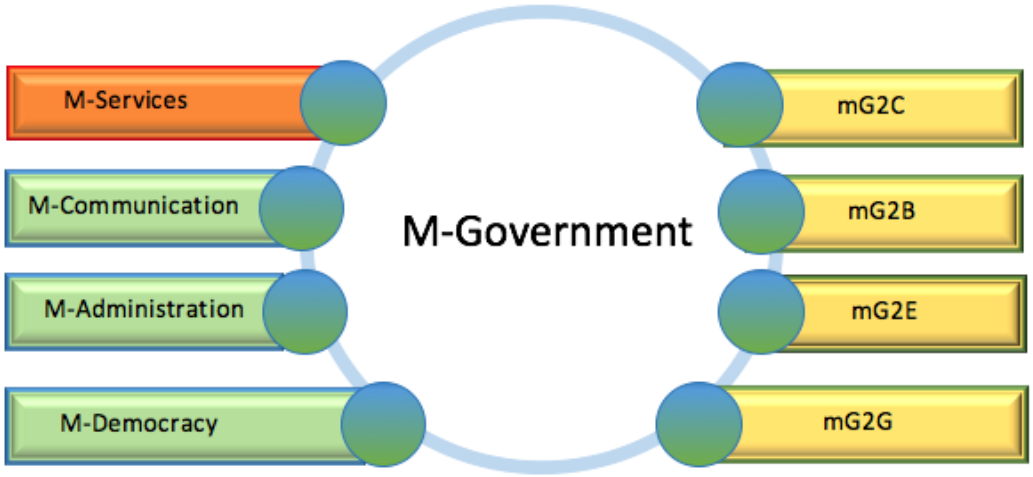


Figure 1.2: mGovernment Domains and Levels (Muguti, 2013)

The main advantages of m-Government services include: ubiquity, offering data and services anywhere and at any time, personalisation, ease of use, time and reduced cost and location-based services (Wilson, 2012; Amos, 2011). It is due to these benefits that the South African

government has also embarked on m-Government (Mehlomakhulu, 2014; Mukonza, 2013). Table 1.1 lists some of the m-Government initiatives currently underway in SA.

Table 1.1: Current m-Government Initiatives in South Africa

Government Department	Project	Description
Health	Dokoza (SA Year Book, 2015)	Uses mobile technologies for data and transaction exchange for medical services, offers real time interactive confidential communication, authorisation and administration via the cell phone and SMS.
	Access Health by Mohwiti Technologies	Mobile technology solution to improve patient referrals between local clinics and district hospitals, resulting in the overall improvement of the quality of health-care provided.
	Masiluleke (Zefferer , 2011)	Uses mobile technologies to fight HIV and AIDS. Text messages are sent out to encourage people in SA to be tested and treated for HIV and AIDS.
	Cell-Life (Zefferer , 2011)	Home care workers monitor patients in their homes and transmit patient data like medication/symptoms to a central server using mobile technologies.
Education	Satellite broadcasting programme (SA Year Book, 2015)	The satellite broadcasting service which broadcasts Mathematics for grades 8/9 directly to priority high schools during lesson time so that teachers can integrate the broadcasts with their teaching time.
	Matric Results (DoE, 2016)	Students accessing their final school year results by SMS
	Educational portal (SA Year Book, 2015)	The educational portal offers a range of curriculum and learner-support material, professional development programmes for educators, and administration and management resources for schools.

Lee and Kwak (2012) posit that Maturity Models (MMs) refers to the evaluation of the maturity of people, procedures, and substances, constructed on a set of criteria. m-Government employment is a course that is ongoing and its growth is conceptualised into stages (maturity levels) (Kim & Grant, 2010; Chen et al., 2011). This study assessed and evaluated the maturity of m-Services offered by the Free State Government by considering two government departments: The Department of Health (DoH) and the Department of Education (DoE). The researcher specifically selected DoE and DoH upon discovering that education and health primarity play a significant role to each individual and yet limited research has been conducted in the Free State province regarding the two. The study developed an m-Government Maturity Model (mGMM) and used this model to develop an assessment instrument to evaluate m-Services offered by the selected departments. The study also assessed the extent to which the m-Services has been accepted and adopted by the citizens.

There is a plethora of studies on e-Government maturity models (Fath-Allah et al., 2014; Solar et al., 2013), but there is a lack of research in mGMM with its specific features (Maranny,

2011). This research investigated studies on mGMM and compared the studies. The researcher then proposed an mGMM suitable to measure current m-Government applications, developed at the Department of Education and Department of Health in the Free State. The proposed mGMM assisted both government departments to understand the current level of maturity and how to move to the next level of maturity. In essence, the mGMM measured the performance of m-Government execution and provided the roadmaps and guidance for future directions.

1.3 RESEARCH PROBLEM

Research delivered, focusing on evaluating the extent to which m-Services has been accepted and adopted by the citizens, is limited. Moreover, the researcher could not find a study that assessed the citizen's awareness of the existing m-Services through which public information and services can be accessed. Similarly, literature also showed only limited research that has been conducted to assess and evaluate the success of m-initiatives in SA, particularly in the Free State province. Diminutive research has been done to evaluate and assess if local government organisations in SA are taking advantage of the benefits brought by m-Government. There was a need to investigate the maturity level of m-Government implementation in the Free State and explore the major issues faced by government towards a fully realised m-Government service.

From around 2009, a plethora of studies were conducted to assess m-Readiness (m-Government readiness) of SA and the study concluded that SA is ready to offer m-Services (Ogunleye & Van Belle, 2014; Du Preez, 2009). Since then, SA has initiated a number of m-government initiatives to offer government services to citizens (as shown in Table 1.1). Heeks (2013) describes an effective ICT venture in a developing country as one "in which most stakeholder groups attain their major goals and do not experience significant undesirable outcomes". This can only be concluded through an evaluation. Spector et al., (2007) state that assessment is not easy nor cheap, but when it is an essential component of the continuing ICT preparation and infusion method, it is worth the effort.

1.4 RESEARCH QUESTIONS AND OBJECTIVES

1.4.1 Research Questions

The main research question is: **To which extent has m-Government services in the Free State been implemented and accepted by the citizens?**

The sub-research questions include:

1. Which m-Services have been designed and developed for the citizens?
2. What is the maturity level of these m-Services?
3. What are the factors affecting the successful implementation of these m-Services?

1.4.2 Research Objectives

The main objective of the study is: **To evaluate and measure m-Government implementation in the Free State Province and provide the roadmaps and recommendations for future directions.**

To achieve the main objective mentioned above, the following sub-objectives had to be accomplished:

1. Investigate m-Services currently available in the Free State province.
2. Measure and assess the m-Services using mGMM.
3. Establish the aspects that affect the attainment of m-Services implementation.

1.5 RESEARCH METHODOLOGY AND DESIGN

According to Khothari (2009), a research methodology assists the researcher to systematically solve the research problem. The techniques that were implemented in this study were based on the research problem and are described using Figure 1.3.

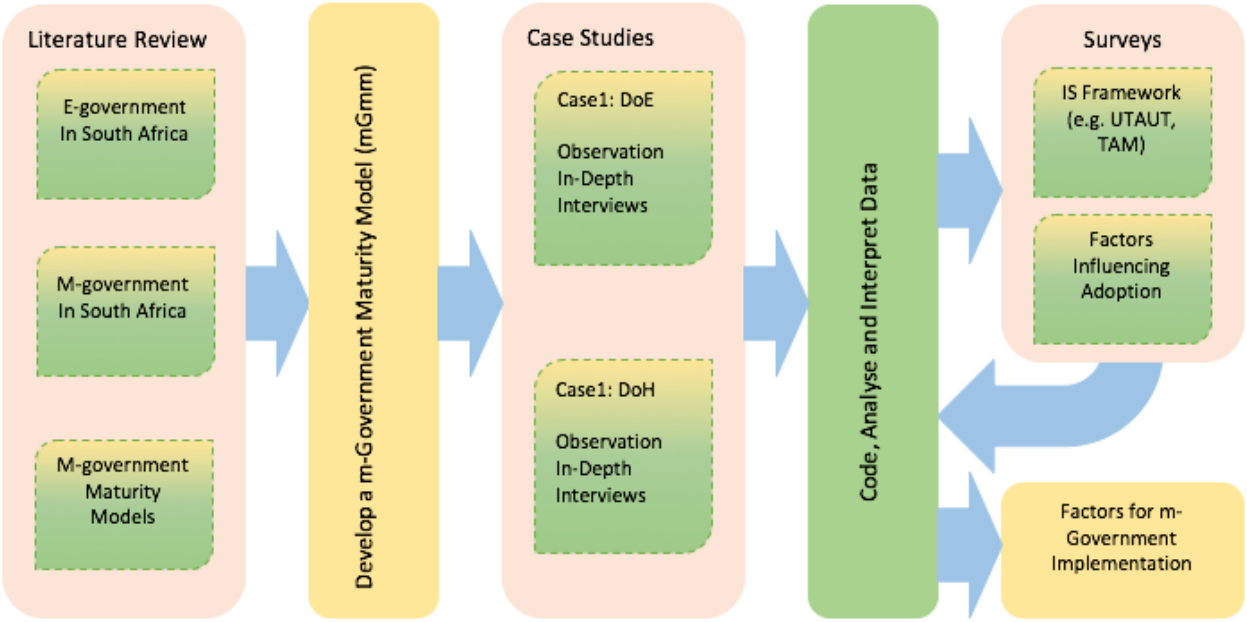


Figure 1.3: Research Design

The proposed research design for this study in Figure 1.3 provides a clear indication of the phases that were followed to complete the study. A literature review is defined as an important summary and assessment of the existing body of recorded work dealing with information produced by other researchers, scholars, and practitioners in a given field (Gomm, 2008; Mackey & Gass, 2013). The study commenced with an intensive literature review, by investigating e-Government and m-Government initiatives in SA and also investigated and assessed m-Government maturity models. This allowed the researcher to design and develop a mGMM that was utilised in measuring and assessing m-Government implementation in the Free State. In order to validate the mGMM, case studies in two

different government departments (DoE and DoH) in the Free State were conducted. Each case study was thoroughly observed to gather information on m-Services that were currently available to the community. The observations were followed by in-depth interviews, and the in-depth interviews assisted the researcher to assess and measure the level of maturity of m-Government services in these departments.

The data was analysed using qualitative content analysis technique. The findings from this exercise were used to develop questions for the survey for the community. The survey was carried out among community members of the Free State province (in rural, urban and township areas). The survey enabled the researcher to collect data on m-Services that the citizens currently know of and are using; factors that are influencing the use or non-use of m-Services and also m-Services they would like to use in the future. The UTAUT framework was used to develop the questions to measure m-Government (Technology) adoption from the citizen's point of view. The researcher then proposed factors for m-Government implementation in the Free State in SA. The data collected from the case studies and the survey were then triangulated and the results were presented.

1.6 SCOPE OF THE STUDY

The key objective of this study was to evaluate and measure m-Government implementation in the Free State Province, as well as offer the roadmap and commendations for the future. The case studies focused on two departments namely: Department of Education and Department of Health in the Free State. The case studies served as an illustration of m-Government within the South African environment. The study also proposed factors for m-Government implementation in the Free State Province.

1.7 ETHICAL CONSIDERATION

Ethics are defined as behaviors, norms and standards that direct good choices with regard to our relationships with others (Mulki et al., 2009). In this study the researcher interacted with human participants and this meant that all necessary ethical guidelines and principles were applied to such that no indignity, mental or physical harm may come to participants in the research process. Ethical issues were considered throughout the entire research procedure to ensure that the outcomes and the final report of this study accurately represented all of the information and applicable conditions.

The rights of participants as human beings were respected at all times. This meant that the decision to take part in the study remained the choice of the participants. Participants were given the option to withdraw from the study at any time and participants were not coerced into providing information. The participants were considered as partners and were assured that the information they offer is private. This also meant that their identification or personal details were not revealed to other people, unless for research purposes, and any information utilised in the report was not associated with any respondents.

1.8 RESEARCH OUTLINE

In this study the following research outline were followed as presented in the Figure 1.4.

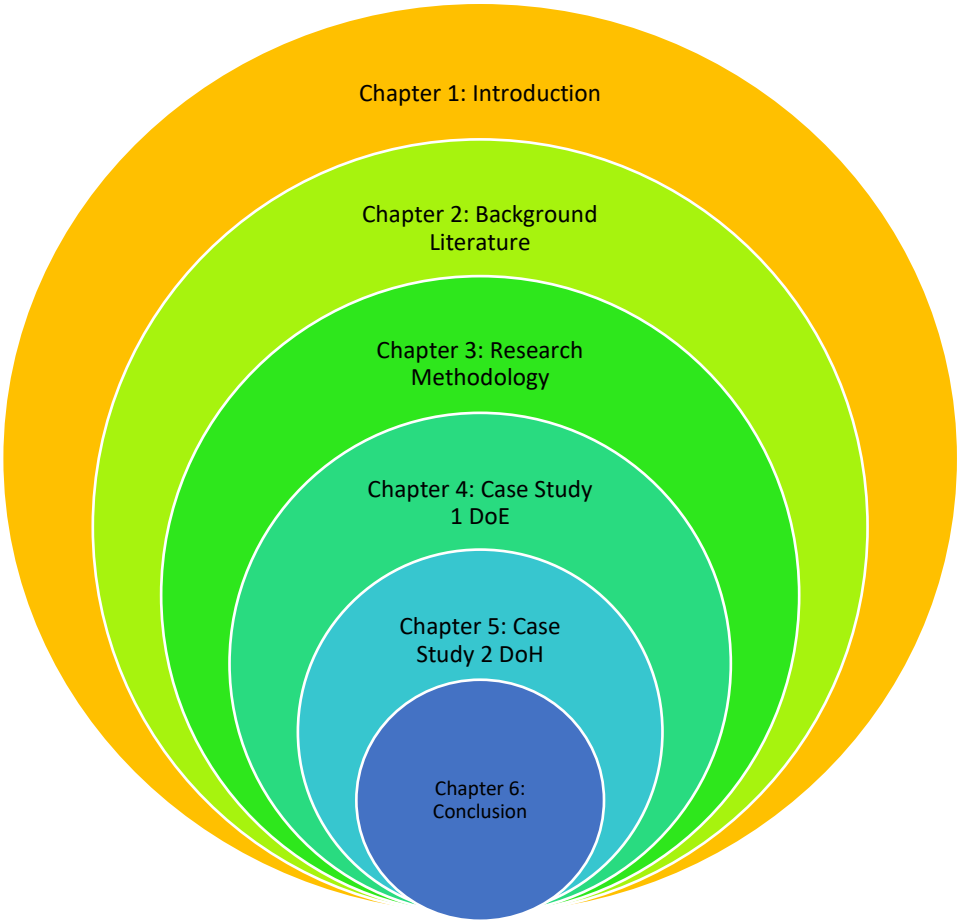


Figure 1.4: Research Study Outline

Chapter 1: This chapter briefly outlines the background of the study, problem statement, research questions and objectives. It presents research methodology and design, as well as the scope of the study.

Chapter 2: This chapter presents the background literature for m-government, examines maturity models and proposes a suitable m-Government maturity model for the Free State Province.

Chapter 3: The research methodology and design were explained in detail in this chapter. The research process, research strategies and data triangulation are also included in this chapter.

Chapter 4: This chapter presents information of the case study from Department of Education in the Free State. Findings are from observations and in-depth interviews and a survey.

Chapter 5: This chapter presents the Department of Health's case study. This chapter presents data collected during observations, in-depth interviews and surveys.

Chapter 6: This chapter concludes the dissertation by evaluating / assessing the success of the study. It assesses if the main objective was achieved.

1.9 SUMMARY

This chapter introduces the main aim of the study. It unfolds the research problem, research questions and objectives that assisted the researcher to resolve the problem of the study. A clear overview of the research methodology and design is presented, as well as the scope of the study. Ethical consideration is reflected on and lastly an outline of all the chapters is presented. The next chapter (Chapter 2) contextualises and provides background literature.

CHAPTER 2: BACKGROUND LITERATURE

2.1 INTRODUCTION

Chapter 2 describes in detail the background literature. Section 2.2 introduces and defines Electronic Government. Section 2.3 discusses the transition from Electronic Government to Mobile-Government. Section 2.4 focuses and explains Mobile Government. Section 2.5 lists and describes Mobile Government services in South Africa. Section 2.6 provide m-Government services worldwide. Section 2.7 presents the maturity models developed and used by other authors whilst, Section 2.8 presents this study's proposed m-Government maturity model. Section 2.9 focuses on information systems theories. Section 2.10 summarises the chapter. The next Section discusses e-Government.

2.2 ELECTRONIC GOVERNMENT

To fully recognise the idea of e-Government, one must first understand government in overall. The delivery of services to the society is one of the most significant issues in the world. Citizens rely on government to deliver the services to them efficiently and effectively. To ensure equality among the population, government needs to come up with ways to address inequality of service delivery. Traditional government have physical offices, they have limited operating hours and most business processes are done manually on paper (Almarabeh & AbuAli, 2010).

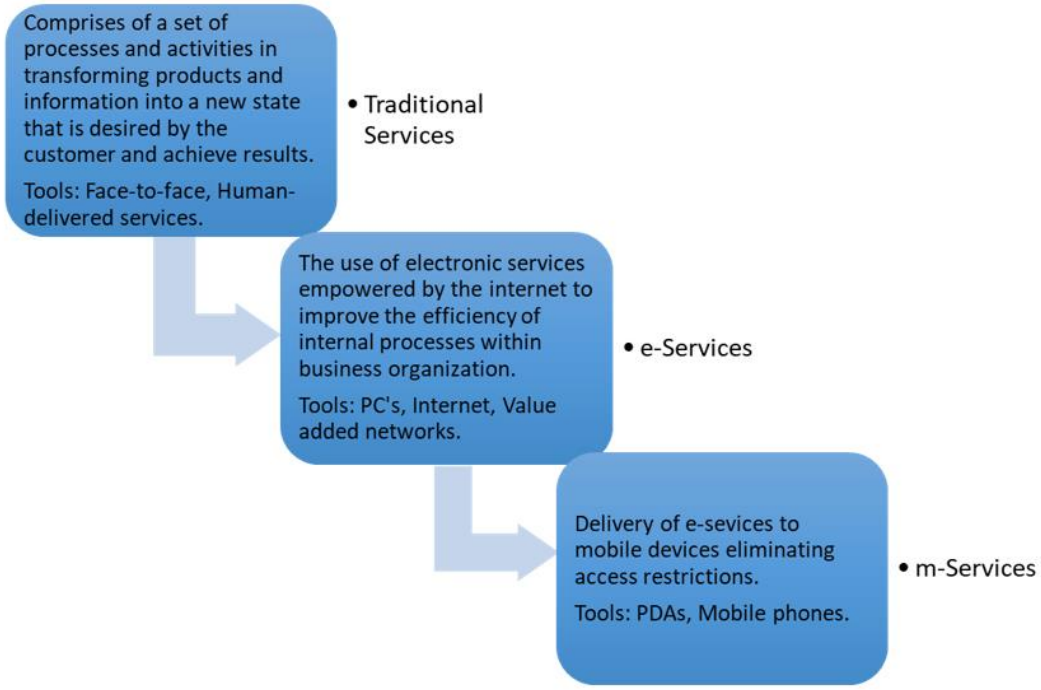


Figure 2.1: The Evolution of Government Services (Mengistu et al., 2009)

E-Service is the key aspect of e-Government. Figure 2.1 illustrates the evolutionary model of public sector services. It defines traditional services as those that are delivered face-to-face and through direct human contact. According to Mengistu et al. (2009), the proliferation of e-services indicates the development in public sector services delivery.

Numerous developed countries (Australia and United Kingdom) and a fewer developing countries (Philippines, Uganda and India) have taken a step that is crucial to achieve the recommended plan of action of the World Summit on Information Society (WSIS) with utilizing the internet to ensure that government services are available (Goggin, 2015). Information and Communication Technologies (ICTs) is an important aspect to individuals and governments to ensure that they are being utilised for political revolution, as well as creating a socially encompassed information society.

There are various definitions on E-Government by different researchers and specialists. Chan and Pan, (2008) defines e-Government as digital government, internet government, connected government and online government. The following is a collection of some of the definitions. E-Government is identified as the use of information and communication technologies in the public sector to deliver services and advance the efficiency, usefulness, transparency, and accountability of government concerning citizens (Sing & Sahu, 2008; Sheng & Trimi, 2008; Grima-Izquiedo, Ahasan, 2010).

E-government enables municipal segments to improve the success and proficiency of services delivery by using Information Technology (IT), ICTs and other web technologies. These comprise several opportunities to supply government services, allowing the delivery of services to be done indirectly without the need of direct contact or face to face with the public (Heeks, 2013; Pan et al., 2007; Danial 2014; Al-Hujran et al., 2015). Furthermore, Jeong (2007) asserted that e-Government entails of digital collaborations between Citizen and the Government (C2G), between Governments and other Government agencies (G2G), (Al Thunibat, Zin, & Sahari, 2010) between Government and Citizens (G2C), between Government and Employees (G2E), and between Government and Businesses/commerce's (G2B).

E-Government is a fundamental part in social-economic expansion and decent managing. E-Government was implemented in the mid 1990's to help deliver public services to the society electronically through the use of ICTs (Tassabehji, 2005). E-Government enhances contact to government data, fulfilment with government service delivery, and improves citizens participation to be proficient (Hanandah & Obitat, 2013). E-Government can assist to progress the basic division in both developing and developed countries. Increasing the ease of access to information utilizing ICTs can result in better accountability as well as transparency of government. The first government inspired portal (UKOnline) was designed and developed in the United Kingdom (UK) to offer data, links with critical information (Budd & Harris, 2004).

All the definitions of e-Government are different but have interconnected aspects that are common. Therefore, in this study e-Government involves the use of electronic communication devices, as well as ICTs – precisely the internet to better the Service delivery to government sections, citizens and businesses. The implementation of e-Government allows a country to be positioned at a modest advantage in the evolving age of information, technology and knowledge. This in turn has brought a move from a traditional paper-based system to paperless system where all interactions between government, businesses and citizens can be performed online. The execution of e-Government comes with a number of benefits.

2.2.1 Benefits of E-Government

E-Government, when successfully implemented, must generate some of the following benefits: an outstanding service to citizens and stakeholders, increase the excellence of decision making, offer low operations costs and increased effectiveness for the government, transparent and accountable transactions, and innovative ICT usage in all aspects of the country. More benefits and references are listed in Table 2.1.

Table 2.1: Benefits of e-Government

Benefits	References
Increased productivity of government organisations and transparency. Supports decision-making process and enables effective workflow systems and business processes. Promotes a simplified organisational structure and hierarchical line of authorities and responsibilities.	Shang and Seddon, 2000; OECD, 2001; Bonham et al, 2001; Heeks, 2013; UN/DESA, 2002; Carbo & Williams, 2004; Ma *et al,* 2005; Beynon-Davies, 2005.
Changes are stimulated with innovation and creativity in the aspect of the systems, labour law, and workforce, which offers the benefit of improving the precision of orders and reducing the personnel dedicated department	National Research Council, 2002; Beynon-Davies, 2005; Ifinedo, 2006; Buccoliero *et al,* 2008; Almarabeh & AbuAli, 2010.
Enhancing external relationship with agencies and partners. Good governance by interconnecting various ministries and government departments electronically to share information. Possibility of one integrated e-Government portal, to enable citizens and businesses to benefit from various government services	Shang & Seddon, 2000; Heeks, 2013; Moon, 2002; Wimmer & Tambouris, 2002; Carbo & Williams, 2004; Beynon-Davies, 2005; Ifinedo, 2006.
E-Government makes organisational policy to be effective and it reduces the time required to complete transactions. It enables restructuring of administrative functions and processes, and monitoring of government performance. Ease of pressure that could occur in the organisation as a result of queuing or aligning in waiting rows.	OECD, 2001; Chandler & Emanuels, 2002; Shang & Sheddon, 2002; James, 2002; Moon, 2002.
Converting the existing services and expanding the new service delivery. Changing the way of working within the public sector and encouraging stakeholders to become accustomed to e-Government.	Shang & Seddon, 2000; Atkinson and Ulevich, 2000; Chandler and Emanuels, 2002; Ndou, 2004; Borras, 2004; Kaliontzoglou *et al,* 2005; Hamed *et al,* 2008a; Martin & Reddington, 2009
Accessing information and interacting with various government departments or agencies rather than having to wait in long queues; digitising procurement services from and to the business sector by better management and control of government procurement systems; and ability to attract more foreign direct investments and business.	Cabinet Office, 2000; Ma *et al,* 2005; Zhang, *et al,* 2005; Muoka, 2010.

E-Government is attesting to be more of a problem to implement in developing countries (Letch & Carroll, 2008). The main problem is increased cost of infrastructure development, followed by most people having average ICT skills, and and a lack of trained human resources. Regardless of the benefits stated above, e-Government still faces some challenges and the next section considers them.

2.2.2 E-Government Challenges

E-Government is proving to be tricky regarding the implementation in the least developed countries. The main problems leading to less implementation of e-Government is due to a number of significant challenges such as: deficiency towards ICT infrastructure or high cost of infrastructure, problems of managing changes, no proper policies and laws in place, literacy and access issues among most of the citizens. Other challenges include: scarcity of proper human skills developments, limited policies, no there is no well-established interaction between private-division and government, lack of assurance in solutions established and no clear leadership roles (Mtingwi & Belle 2013).

An effort to improve the challenges mentioned above, government should address by: eliminating corruption, offer staff trainings, centralise e-Government policy implementation, encourage government officials to be dedicated to their work and consider restructuring the organisation (Jaeger & Thompson, 2003). Government must consider the needs of the society and initiate an approach that is innovative according to what is stated.

Technology is being adopted in many forms by governments globally to improve the delivery of public services and information. To describe the modern state, new terms are being created properly to accommodate the technology that keeps evolving. The next segment focuses mainly on transition from the e-Government and m-Government.

2.3 TRANSITION FROM E-GOVERNMENT TO M-GOVERNMENT

According to Mutula and Mostert (2010), several governments in developing countries have made an enormous improvement regarding the implementation of e-Government, but at the national level the position of e-Government in developing countries is still at the fundamental stages. Challenges such as no access or limited access to fixed line internet by majority of the citizens, faced by government in executing e-Government, have led governments to move their attention to m-Government as the ultimate target of e-Government (Kaisara & Pather, 2009).

The progression of mobile technologies has revolutionised the area of mobile device technology and provided another solution to be used when delivering public services. The aptitude to offer access through mobile devices in the 21st century civilization, comes with economic political and social benefits to the citizen. Rawlinson (2011), revealed that more than 95% of people living in Africa have access to mobile phones, while 90% of these are the actual owners of the mobile devices. A level of increase concerning the use of mobile technologies has provided citizens in the developing countries with an opportunity that is remarkable.

2.4 MOBILE GOVERNMENT

As the world is surfacing with advancement in ICT, it is evident that there is a huge need to adapt to the new changes. M-Government is not a replacement of e-Government, but rather an additional channel to help deliver public services to the community efficiently and effectively. According to Alrazooqi and De Silva (2010), m-Government represents compartment to e-Government, that makes use of services, wireless technologies, various

applications and mobiles. Better opportunities for the citizen to communicate and engage with the government is initiated by utilising devices to provide information and services to all government units, citizens and businesses (Lallana, 2008; Abdelghaffar & Magdy, 2012).

M-Government refers to the approach and its employment to offer information and services to state employees, citizens, businesses and other organisations using mobile equipment (Wang, 2014). M-Government is one of the fastest growing service domains in the modern-day information society (Carroll, 2005; Lallana, 2008). Additionally, developing countries have an advantage to implement m-Government due to the rapid evolution of mobile phone penetration also low cost of rates towards internet access (OECD/ITU, 2011). Mobile is not fixed, it is categorised by movement. This offers owners the ability to use / work from anywhere and at any time.

The growth of cellular and mobile technologies worldwide is significantly increasing. Tavakoli et al. (2016) reported that there are more than 2.2 billion mobile phone users worldwide and the number of wireless Internet users in the world is increasing. It is also expected that by the year 2019, the world will exceed the number of mobile users by five billion (Statistics, 2018). Driving force for embracing m-Government services is an effect caused by high mobile penetration, infrastructure and an increase in mobile wireless technologies (Zukang et al., 2011). Using m-Government has the potential to assist the public "anytime and anywhere" with government services and information available.

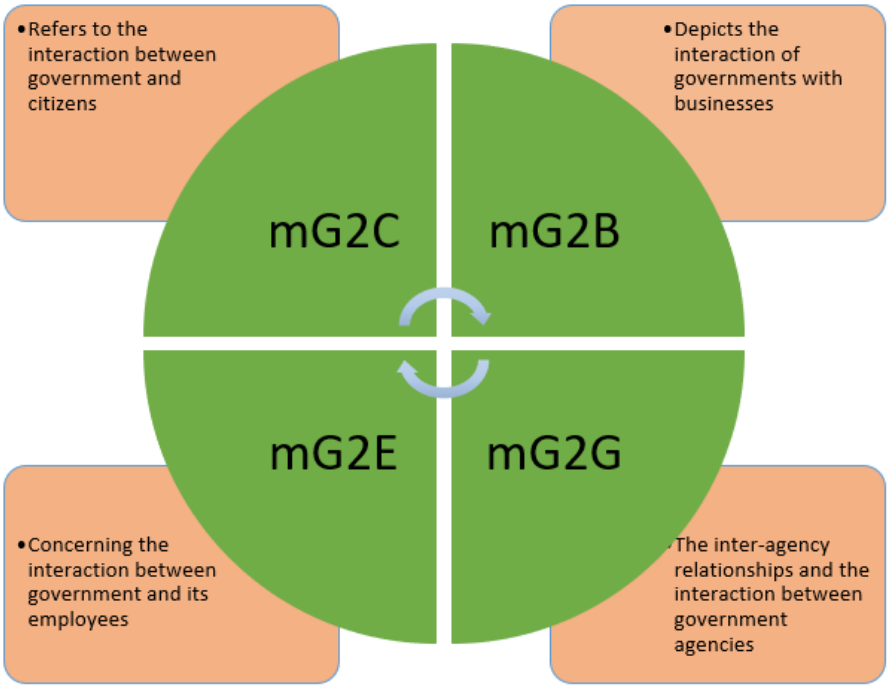


Figure 2.2: Key Delivery Models of m-Government (Oui-Suk, 2010)

Figure 2.2 shows the key delivery model of m-Government, which is an extension of e-Government. M-Government offers opportunities to enhance communication between Government and Citizens (mG2C), Government and Government (mG2G) as well as improving operations between Government and Business (mG2B) as well as Government and Employees (mG2E) (Sheng & Trimi, 2008).

Mobile government is an approach aiming at providing public services that has enormous potential for change and transformation in government by increasing the access of citizens and observing their needs (Tair & Abu-Shanab 2014; Oghuma et al., 2012; Sowaileh, 2011). This is extending the reach of government data and services to the public and is emerging as a new focus in the ongoing challenge to offering efficient, effective and accessible public services (Zukang et al., 2011).

2.4.1 Benefits of Mobile Government

M-Government increases access and eliminates the obstacle of time and location. The need for cables is not required when using wireless technologies to interact between the government and citizens, businesses and other parts of the government (Wei et al., 2010). The aspiration of m-Government is to extend access of public services to relegated sectors of the population who do not have access to services through traditional and e-Government channels, such as government front desks, information centers, departments and telephones (Maumbe & Owei 2006; Mitrovic & Klaas 2012).

The leading advantage that m-Government brings is the boundary-breaking probable: permitting people to work anywhere, at any time and assisting to establish a true unified digital system for government (Sheng & Trimi, 2008; Du Preez, 2009). Due to its proximity and convenience, this helps to reduce the barricades to public service processes, inspiring residents or service providers to make use of the technology where formerly barriers were depressingly huge (Sheng & Trimi, 2008; Mitrovic & Klaas 2012). Figure 2.3 displays some of the benefits that government may achieve when m-Government is implemented.

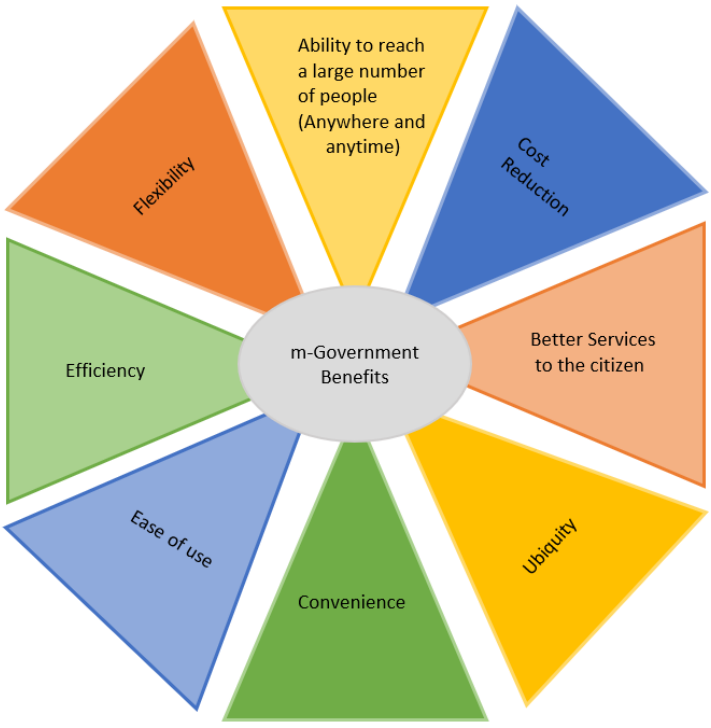


Figure 2.3: m-Government Benefits (Du Preez, 2009; Mitrovic & Klaas, 2012)

Furthermore, other researchers in this field such as Trimi and Sheng (2008), Mengistu et al. (2009), as well as Amos (2011) identified the benefits of implementing m-Government as follows:

- To quantitatively increase services and provide information to the public.
- To exchange data and information between government, citizens, commercial organisations and other government sectors without time and place restrictions.
- To provide a unified digital nervous system, as well as increase the competence and efficiency of various government sectors.
- To grow democratic involvement of community in decision-making and setting rules.
- To have a complementary role to e-Government by m-Government, which leads to improved efficiency and effectiveness of the activities of e-Government and easy implementation of m-Government infrastructure.

M-Government provides vast benefits, but however, it still has its own challenges. The challenges are listed in Table 2.2.

Table 2.2: m-Government Challenges

Challenges	Elucidation
Cost	M-Government would create serious problems for systems linking to citizens given the number of people who are likely to remain without mobile ICT devices for the foreseeable future. Hence, systems like this are likely to be cost-addition rather than cost-substitution initiatives. At least some governments have been able to adopt innovative costing strategies, for example, using fee-sharing arrangements that avoid the public sector having to provide many up-front costs (Al Thunibat et al., 2011; Abu-Shanab & Haider, 2015).
Digital Divide	Not everyone has a mobile phone, predominantly older people and poor groups in the society tend to be excluded from this technology. Based on the benefits provided by m-Government, it means these groups will have access to public services via the traditional route. M-Government is supposed to ensure access to each person, it becomes a challenge when it can only be beneficial to the haves at the expense of those who do not have (Misuraca, 2013).
Mobile mindsets	Mobile devices - cell phones particularly - are seen by many as tools more for fun and entertainment than for serious activities. Yet politics is a serious business involving difficult choices. Aligning these two mismatched worlds may be difficult. One sign already emerging of this underlying tension is the use of m-Government systems for playing pranks, such as hoax messaging, encouraged by the anonymity that many mobile devices (which are often unregistered) offer (Alomali & Elrehail, 2013; Sekyere et al., 2016).
Trust/ Security	If m-Government is to encompass m-payment systems or other transactional public services, then it must have good security and must be trusted. As yet, there is still a credibility gap to be crossed for many mobile device users (Chang & Kannan, 2008).
Data overload	Mobile devices increase the pressures of a world in which users are permanently connected: "always on". These permanent connections increase the number of messages circulating and can create a blizzard of communications - some valuable, some not - in which public service communications can come to be devalued or lost (Bakar et al., 2016; Saxena, 2017).

2.5 M-GOVERNMENT SERVICES IN SOUTH AFRICA

South Africa has a population of more than 54 million (World Population Review, 2018). With a population this high, it is easy to envision the challenges that the government goes through when planning for service delivery nationwide (Goodall et al., 2017). It is essential for the citizens to network with the government for various reasons, such as attaining permission from government officials in order to acquire: a driving license, starting a business, paying for outstanding taxes, building, travelling abroad and other duties required by the law (Amos, 2011). Payment for services such as water, removal of garbage and electricity must be made to the local authorities (Atkinson, 2007).

Information on variety of matters ranging from applying for services to the position of their applications may be needed by the society. Currently in our country most of these services take place face to face (Mpinganjira, 2013). It is for this reason that various m-Government

studies have been conducted to assist the government. These are some of the m-Government applications that have been instigated in South Africa thus far (Blessing et al., 2007).

The South African Revenue Services (SARS) initiated an SMS notification that sends alerts to clients for their tax return status (SARS, 2008). Matric examination scores are made available to students by means of an SMS from the Department of Education. Moreover, in North West province the Department of Education established a partnership with Mindset and Nokia for female learners by developing and providing educational mathematics content via mobile phones. Goldstuck (2005) in the Eastern Cape province's pathology labs send blood-test results to clinics in rural areas instantly, using a global system for mobile communication; this reduces disease impact and enables patients to be to be given treatment on time when needed. The Department of Home Affairs sends an SMS notification when the application is made and also when the documents are ready for collection. Following are some of m-Government services in SA found in the literature in Table 2.3:

Table 2.3: m-Government Services in South Africa

Government Agencies	Applications	Description
Department of Home Affairs	SMS (Short Message Service) Notification	SMS notification when the ID or passport is ready for collection (Ogunleye et al., 2011).
Department of Police	SMS Alert	To report crime, citizens can send a message to 32211 (Turck, 2016).
South African Revenue Services	SMS	An SMS is sent to clients to notify them of tax related transactions through their mobile phones (Akinboade et al., 2015).
Department of Education	SMS	Public schools interact with learners and parents by means of a message to notify them of any relevant school meetings or events coming (Patel & White, 2005).
Department of Health	GSM (Global System for Mobile Communication)	GSM is used to send blood test results immediately to rural clinics as soon as they have been processed (Al-juaifari, 2016).
	Cell-phone with menu driven software	Mobile phone sends information to central database after a counsellor has visited their HIV/AIDS patient. Authorised nurses or doctors can view information provided and offer their professional and effective treatment (Comulada et al., 2019).
	SMS	Patients are notified about their appointments and medicine through SMS text (Kallander et al., 2013).

The next Section focuses on the m-government services word wide.

2.6 M-Government Services World Wide

The number of people that use and own wireless devices were much higher for those living in developed countries when compared to people living in developing countries (Mengistu, et al., 2009). It is for the reason why most developing countries are advancing m-Government. Table 2.4 displays m-Government applications in developed countries from various researchers (Lallana, 2004; Hassan, 2014; Zo, 2009).

Table 2.4: m-Government Applications in Developing Countries

Places	Application and Description
Singapore	SMS - people are notified by SMS to renew their passports, provide parking tickets and national service obligations (Bakar et al., 2016).
Malta	SMS notification - message alerts individuals for court hearings, renewal of licenses, direct credit payments and examination results (Bakar et al., 2016; Johnson et al., 2017).
Norway	Tax notification - SMS is sent to people when they have to do tax return (Mengistu et al., 2009).
Hong Kong	SMS alert service - text messages to mobile phone users during SARS (Rajabion, 2015).
Saudi Arabia	Crime Report - People can send SMS or MMS showing suspicious criminal activity (Alzaylaee et al., 2016).
China and Philippines	SMS - society can send text messages to complain about government officials or services (Chete et al., 2012).
Korea	M-Police - Police can print tickets on the spot and get necessary information using mobile devices (Mengistu et al., 2009).
Busan and Korea	M-local tax management system - able to transfer data to the local tax database. Permits officers of the law to access tax information on the spot (Danyluk, 2019).
Anyang, Korea	Parking enforcement - allows tickets to be printed on the spot. PDAs enables parking inspectors to collect parking lot information (Cho & Shin, 2017).

2.7 MATURITY MODEL

A Maturity Model (MM) is a tool for considering the maturity of the procedures of an organisation and for finding the exercise that are needed to enhance the maturity of these procedures (Windley, 2002). A number of maturity models happen for a variety of progressions (De Bruin et al., 2005). The utmost well-known maturity model is that of the software engineering industry, which refers to it as a Capability Maturity Model (CMM), established by the Software Engineering Institute at Carnegie Mellon University (Beecham & Rainer, 2005; Paulk, 2009).

A MM is developed to assist organisations as the basis for evaluating and comparing degrees for improvement (Berke & Conroy, 2000). Tapia (2009) explained that the use of maturity

models allow the governments to recognise actions that must be taken in every section and potential ways to successfully reach the results. Implementing maturity models in government provides some of the following benefits (Haris, 2010; Lee et al., 2012):

- Crucial as a guiding mechanism to assist leading governments with long-term plans.
- Allows employees to have an understanding towards the activities of the government by describing requirements and guidelines in each maturity stage.
- To demonstrate governments potential capabilities communication can be used as a tool.

This aids government to understand at which position or level they are currently at and also actions to be taken in order to enhance the services delivered to the citizens. The next Section discusses e-Government maturity models.

2.7.1 E-Government Maturity Model

According to Almarabeh and AbuAli (2010), the implementation of e-government is normally a procedure that is ongoing and requires theory to be developed in stages. E-Government maturity models help to determine the level of maturity notion and current standing (Wiinbladh et al., 2006). An e-Government maturity model brings leadership on ways to advance management of e-Government services and how to gain control of procedures for implementing and continuously sustaining e-Government services (Lofstedt, 2012; Kim & Robinson, 2012). Karokola and Yngström (2009) state that direction is provided by e-Government maturity model to regulate establishment and recommendations for exceptional management of e-Government services. Many maturity models exist (Singh & Joseph, 2007). These maturity models have been established by researchers individually as well as institutes.

This study focused on m-Services in the Free State hence, the investigation also focused on m-Government maturity models, which is discussed in the next Section.

2.7.2 M-Government Maturity Model

M-Government maturity models are mainly established and applied in order to check if the governments are on the position and assist governments in evaluating the degree for government improvement (Andersen and Henriksen, 2006). The development of m-Government is generally categorised into two central phases to assist with the supply of services (Bataineh et al., 2009). The **first phase** through mobile devices a computer-based application is utilised to offer the services already available. The **second phase** provide applications and services that can be feasible through the use of mobile and wireless tools (Almaraber & AbuAli 2010).

Majority of the researchers have implemented their m-Government maturity models grounded on an evaluation from e-Government maturity model (Al-Hadid & Rezgui 2010; Al-Debei et al., 2015). M-government maturity models support government from practicing disorderly or ineffective and advice to assess the development of the people, processes and technology based on a set of principles. The reviewed models were formed based on the development of e-Government, while mobile technologies were used for m-Government as it assists with the growth caused by the rapid change it brings (Mitrovic & Klass 2014).

There is limited literature regarding m-Government maturity model. The researcher was able to identify and present the four m-Government maturity models, this was contributed by confines regarding maturity model, presented in Figure 2.4.

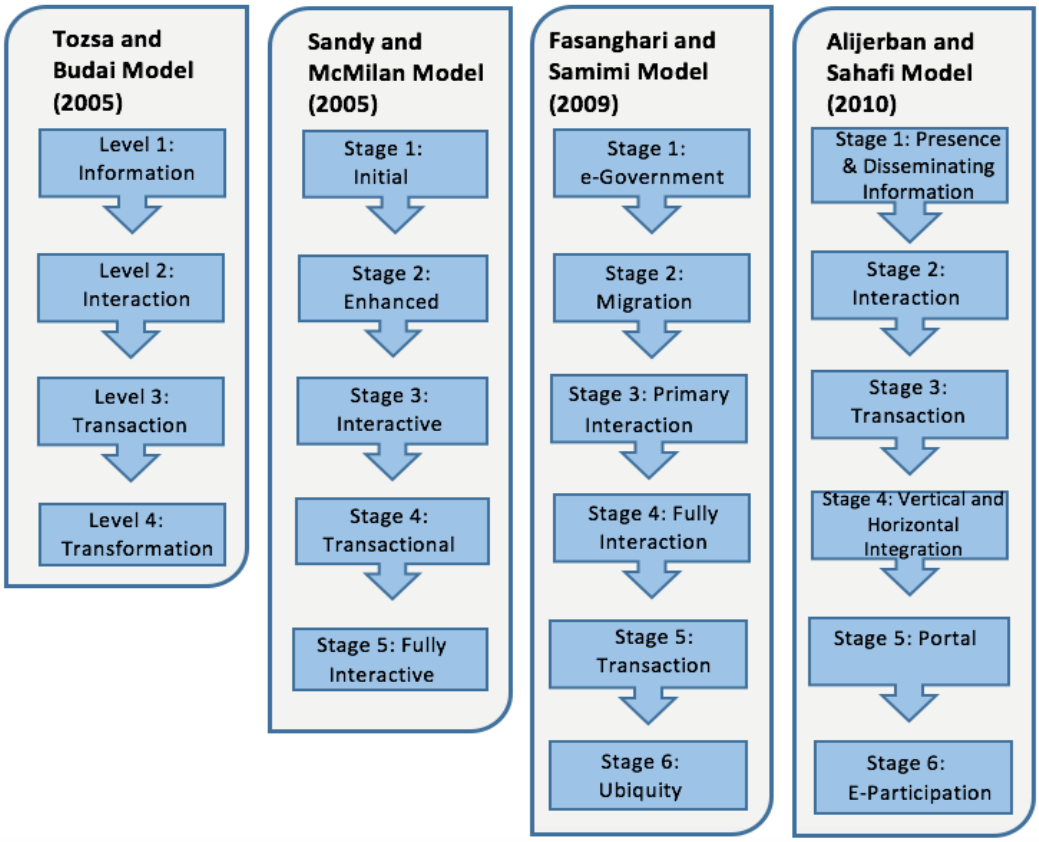


Figure 2.4: m-Government Maturity Model Comparison

Figure 2.4 the four m-Government maturity models that have been reviewed and made available in scientific fields and real-world. The Tozsa and Budai (2005) established their m-Government maturity model that comprises of four-stage model by using Gartner Group as the base, four phases created are aimed at assisting in the progress of m-Government. Sandy and McMilan's (2005) offer a success feature for the model which demonstrate the crucial factors required for the achievement of any m-Government venture. The model entails five stages of functions in electronic service delivery through mobile and the use of a web. Fasanghari and Samimi (2009) developed a six stages m-Government maturity model formed on the ground of security, infrastructure and technology for overall perspective.

While, Alijerban and Sahafi (2010) on the other hand proposed m-Government maturity model constructed on central view with technology feasibility and consist of six stages. Our proposed m-Government maturity model suggests social media to be added as it has the ability of reaching most citizens and people living in rural settlements especially when implemented in developing countries. The following Section focuses on the proposed m-Government maturity model components.

2.8 PROPOSED MOBILE-GOVERNMENT MATURITY MODEL

This segment introduces the proposed m-Government Maturity Model (mGMM), suitable for the Department of Education (DoE) and Department of Health (DoH) in the Free State province. In this study the m-Government Maturity Model is mainly formed to assist and measure the current status of public service delivery in the Free State province and assist in formulating mechanisms that can help move government to the next phase of the maturity level. The domains and metaphors are crucial and essential to be discovered as they are fundamental when developing a suitable mGMM.

mGMM consists of the following two components: firstly, the domain features which represents a functional area in the maturity model developed, followed by phases that comprises of steps starting from the basis that allows constant process of improvement.

2.8.1 Domain Features

The factors that could influence the implementation of m-Government were established from the literature and they are presented in Table 2.5**.**

Table 2.5: Factors Affecting m-Government Derived from the Literature

Factors	Kannan & Chang (2002)	Fasanghari & Samimi (2009)	Goldstuck (2003)	Sandy & McMillan (2005)	Wilson (2012)	Lanvin (2002)	Ogunleye (2017)
Technology Infrastructure		X		X			X
Security	X	X		X		X	
Application Services				X			
Policy				X			
Knowledge Management				X			
Human factors				X	X		
Privacy	X			X		X	
User Needs			X				

According to Kannan and Chang (2002), security and privacy are the biggest issues that concern m-Government and affect the behavior for accepting or refusing the adoption. M-Government maturity model that consisted of six stages was formed on the ground of security, infrastructure and technology for overall perspective (Fasanghari & Samimi, 2009). Goldstuck (2003), stated that applications should be driven by the needs of the user essentially needs of the potential m-Government constituents who will access the services. Sandy and McMillan model (2005), possess seven factors that affect m-Government implementation and they are as follows: technology infrastructure, security, application services, policy, knowledge management, human / organizational factors and privacy. Human factor play a role of defining which public sector services are selected for m-Government implementation (Wilson, 2012). According to Lanvin (2002), privacy and security are seen as

the most vital concern that citizens have about m-Government. Furthermore, in order for m-Government to succeed technology infrastructure must be at hand (Ogunleye, 2017).

Upon looking at literature review in this study six maturity domain features were considered as follows in Figure 2.5.

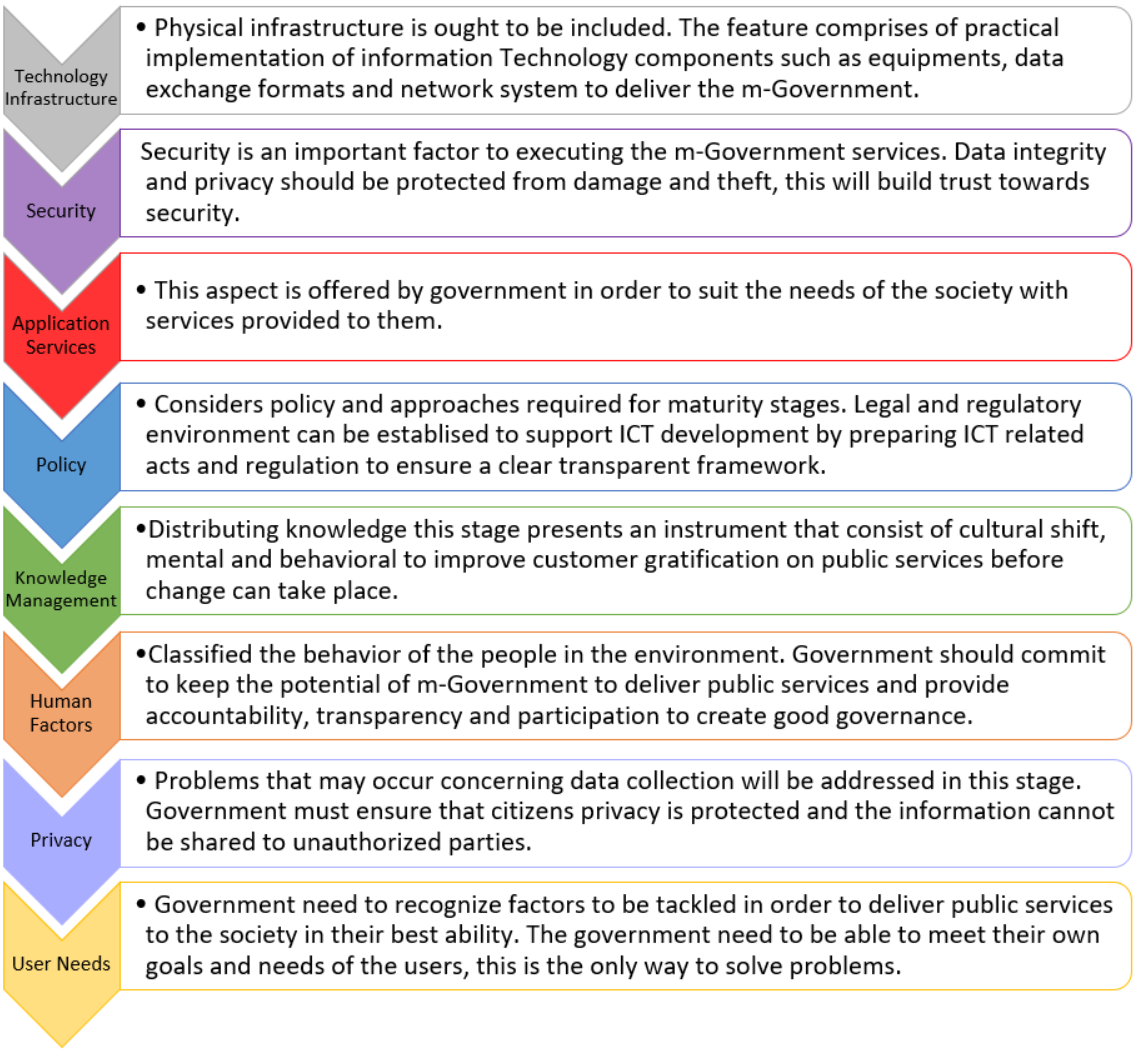


Figure 2.5: Domain Features

2.8.2 Mobile Government Maturity Model Phases

This segment presents the proposed phases that were considered in preparing the recommended mGMM to be utilised in the Free State Province. The proposed mGMM was established or developed based on the mGMM comparison in Figure 2.4. Creation of each phase came from different existing models except the last phase. Stage 1 of (Sandy & McMilan, 2005; Fasanghari & Samimi, 2009) models formed the first phase called **augmentation**. **Elementary** phase originated from stage 2 of (Sandy & McMilan, 2005; Fasanghari & Samimi, 2009; Alijerban & Sahafi, 2010) models. **Interaction** was derived from stage 2 of (Tozsa & Budai, 2005; Alijerban & Sahafi, 2010) and stage 3 of (Sandy & McMilan, 2005; Fasanghari & Samimi, 2009) models. **Transactional** phase was designed from stage 3 of

(Tozsa & Budai, 2005; Alijerban & Sahafi, 2010), stage 4 of (Sandy & McMillan, 2005) and stage 5 of (Fasanghari & Samimi, 2009) models. **Involvement** is a new phase as all models did not incorporate social media in them which made it impossible for the users to have immediate communication.

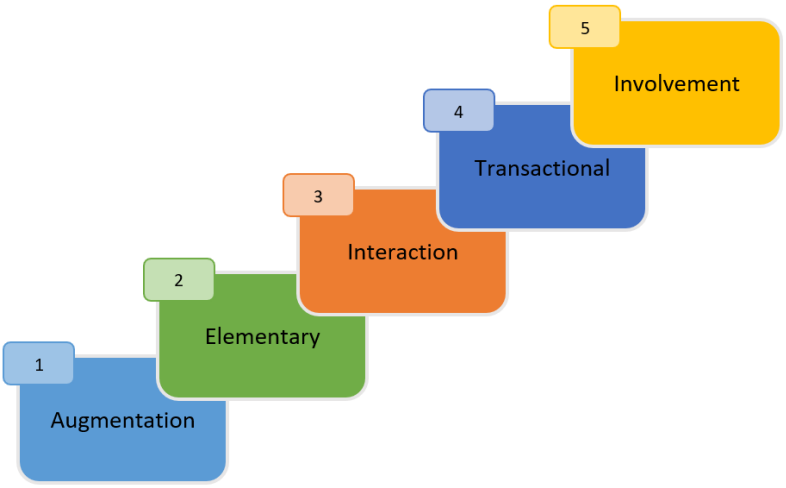


Figure 2.6: Proposed Mobile Government Maturity Model (mGMM)

The proposed mGMM, as seen in Figure 2.6 has five phases. ***The first phase*** is called Augmentation: given the fact that the level of use towards mobile devices continues to increase, it is vital to deliver government services via m-Government. In this phase the use of mobile devices enables people to get access to government information, the phase also aims to extend e-Government to m-Government. All government services provided / offered via e-Government, should be made available on mobile devices (m-Government). An analogy was used throughout the phases to explain each phase (A user can only make an appointment on the website using a computer, but the Department is in the process of transitioning to m-Government).

The second Phase **-** Elementary: permitting web sites to be accessed through mobile phones. It is fundamental to design all sites in a low sized software, enabling the community to access public services using their mobile phones. M-Government services in this phase can be offered by Short Message Service (SMS), email and web sites can be accessed on using a mobile phone. Interactive response is not available in this phase (The website can be accessed by the user to make an appointment using a mobile device).

Third Phase - Interaction: offering government services delivery in a better and appropriate way when equated to the preceding phase. Interactions are made available for the community to interact with government services providers, thus a two-way communication is permitted. Users can download or fill in the forms online and submit them using a wireless connection or mobile device. (A user gets response back on the appointment made and can cancel if necessary).

Fourth Phase **-** transactional: provides interaction for financial aspect using online interaction between the government official and citizens for execution of the public services.

Fundamentally, security at this stage must be considered. To ensure that security considered, user privacy should be conserved, also information given must be confidential. Now users can make payments using their mobile devices. (This phase enables a user to make a payment on the appointment made).

Fifth Phase **-** Involvement: offers mobile integration with more expediency.
Social media is included in this phase and offers 24/7 communication, increased participation, at any location to accommodate all the citizens, even those in rural areas (Allows a user to ask questions and get instant responses).

2.9 INFORMATION SYSTEMS THEORIES

Information Systems models have been established in different disciplines by numerous researchers to help elucidate, understand and predict individuals' acceptance and adoption of new technologies. Over the years, as the theories evolve, researchers extended the existing models to ensure validity. Table 2.6 presents a summary of Information Systems Theories / Models.

Table 2.6: Information Systems Theories / Models

Theory	Elements Behaviour	Reference
TRA	Individuals perceptions + attitudes towards the behaviour + social influences (SI)	(Fishbein & Ajzen, 1975)
TPB	Attitude toward behaviour + subjective norms + perceived behavioural control (PBC)	(Ajzen, 1991)
TAM	Perceived usefulness (PU) + Perceived ease of use (PEOU)	(Davis, 1989)
TAM 2	Perceived usefulness (PU) + Perceived ease of use (PEOU) + subjective norms	(Venkatesh & Davis, 2000)
UTAUT	Performance expectancy (PE) + effort expectancy (EE) + social influence (SI) + facilitating conditions (FC)	(Venkatesh et al., 2003)
DOI	Innovation attributes + innovators characteristics	(Rogers, 2003)
SCT	Self-Efficacy + outcome expectations + affect	(Venkatesh, 1999)
MM	Intrinsic motivation (enjoyment +fun) + perceived benefits (PU) + external pressure	(Igbaria et al.,1996)
MPCU	Peoples beliefs + affect + social norms + perceived consequences + habit + facilitating conditions.	(Triandis, 1979)

Unified Theory of Adoption and Use of Technology (UTAUT) model was constructed through an appraisal and link of the constructs, which intend to capture the usage behavior (Venkatesh et al., 2003). In this study UTAUT is adopted to explain the individual's level of adoption. The main purpose is to examine individuals' aspects for the use and issues affecting non-use of m-Government services.

2.10 SUMMARY

Traditional government was the primary channel that was used for many years to deliver public services to the society and as the internet transpired, e-Government was then embraced to better the delivery of the services. Chapter 2 explained in detail the background literature. e-Government is defined as the interactions concerning governments and employees, governments and citizens, governments and businesses and between governments and other government agencies. The researcher discussed the channels that the government has used over the years and some channels adopted to improve the service delivery.

e-Government offered various benefits such as an increased effectiveness, low government operations costs and outstanding services to citizens and stakeholders. However, it also brought up some challenges and this brought-about another mechanism to be introduced, being m-Government. m-Government is not the next step after e-Government, but relatively an additional mechanism that enhances the delivery of public services to the community effectively and efficiently. The researcher stipulated the benefits offered by the implementation of m-Government.

The researcher made a review and identified some initiatives and discussed m-Government services implemented in SA. The chapter also describes a Maturity Model, clarity on e-Government maturity model and the m-Government maturity model was provided. This chapter also presented the proposed m-Government maturity model that may be appropriate to be used at the DOH and DOE in the Free State Province. The m-Government maturity model proposed, can assist the departments in assessing the current level and steps that can be followed in order to move to the next phase. The results of factors affecting m-Government collected from literature review presented the following: technology infrastructure, security, application services, policy, knowledge management, human factors, privacy and user needs. The next chapter focuses on research methodology.

CHAPTER 3: RESEARCH METHODOLOGY

3.1 INTRODUCTION

This chapter describes the research design and methodology used in this study, in order to accomplish the main aim. Section 3.2 discusses the research design, followed by Section 3.3, which focuses on the research process. Section 3.4 discusses data triangulation, while Section 3.5 entails more on ethical consideration of the study. Lastly, Section 3.6 provides the summary of this chapter. The next segment explains the research design.

3.2 RESEARCH DESIGN

A research design is an adjustment of circumstance or collection of data, related with identifying a problem to be examined by setting up a study in a way that will generate detailed outcome to precise questions (Alhujran, 2009; Mohammad, 2013). The design of the study elucidates the study type, data collection, analysis plan and interpreting data (Creswell & Clark 2009; Bhattacherjee, 2012; Mehlomakulu, 2014). All research commences with at minimum one question about one specific phenomenon of importance. The questions are set to assist researchers to focal point opinions, accomplish exertions of the study and to select a proper method from which make sense of each phenomenon of importance (Oldekop et al., 2016). The resolutions on research design are constructed from the research purpose and on what best matches the research problem (Saunders et al., 2009). Research design in this study is the plan expended to gather data in an empirical research, aiming to answer the research questions and providing a research method suitable to be used (Lægreid & Christensen, 2017).

3.2.1 Research Questions

In this study research questions are categorised into main and sub-questions.

Main Research Question: m-Services in the Free State: to which extent have they been implemented and acknowledged by the citizens?
In order to achieve a greater focus, the researcher has formulated numerous sets of sub questions.

The sub-research questions are as follows:

- Which m-Services have been devised and developed for the citizens?
- What is the maturity level of these m-Services?
- What are the elements that influence the successful implementation of these m-Services?

3.2.2 Research Objectives

Main Objective: To evaluate and measure m-Government implementation in the Free State province and provide the roadmap and recommendations for future directions.
In order to achieve the main objective, the following **sub-objectives** were accomplished.

- Investigate m-Services currently available in the Free State province.
- Measure and evaluate the m-Services using mobile Government Maturity Model (mGMM).
- Establish the aspects that affect the attainment of m-services implementation.

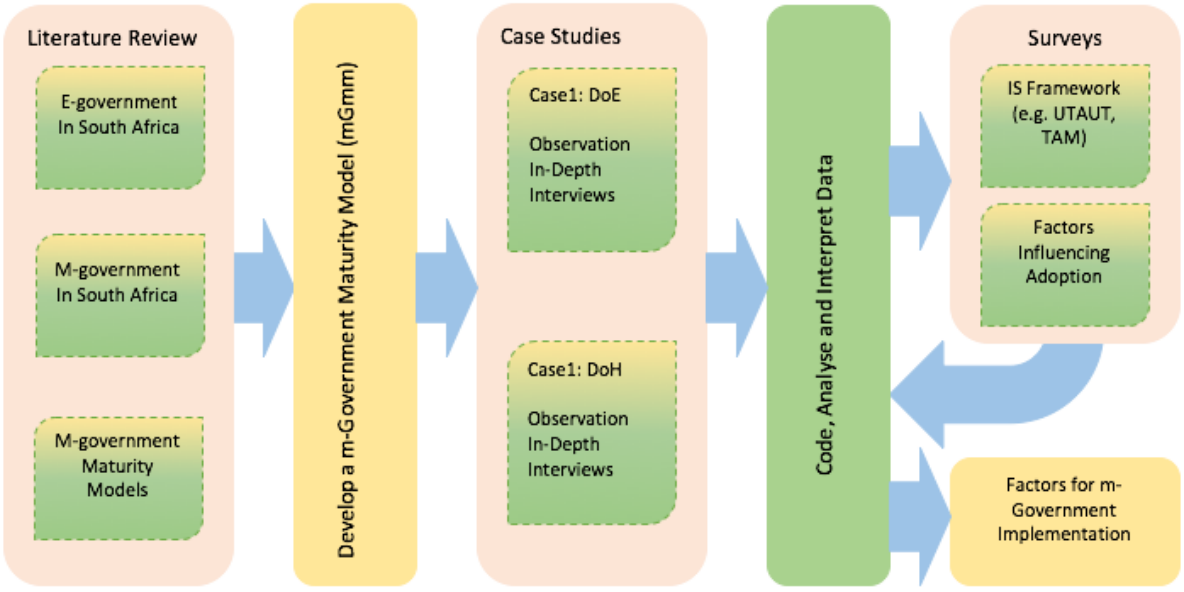


Figure 3.1: Research Design

The research design presented in Figure 3.1 is discussed in detail in Section 3.3 below.

3.3 RESEACRH PROCESS

The research process is following a logical imperative which defines the objective, management of information, and collaborating the outcomes that appear within created frameworks and in accordance with existing strategies (Mehlomakulu, 2014).

The following section commences with the research approach used for this study, then the research methodology. The research design in Figure 3.1 is fully explained through the data collection and analysis and the time horizon is also considered.

3.3.1 Research Approach

According to Saunders et al. (2009), a research approach directs the researcher to make insinuations regarding the outcomes and then draws meaning from the results found. There are two primary research approaches correlated with research (Trochim, 2006). Figure 3.2 illustrates a variety of segments that can be followed in deductive and inductive approaches.

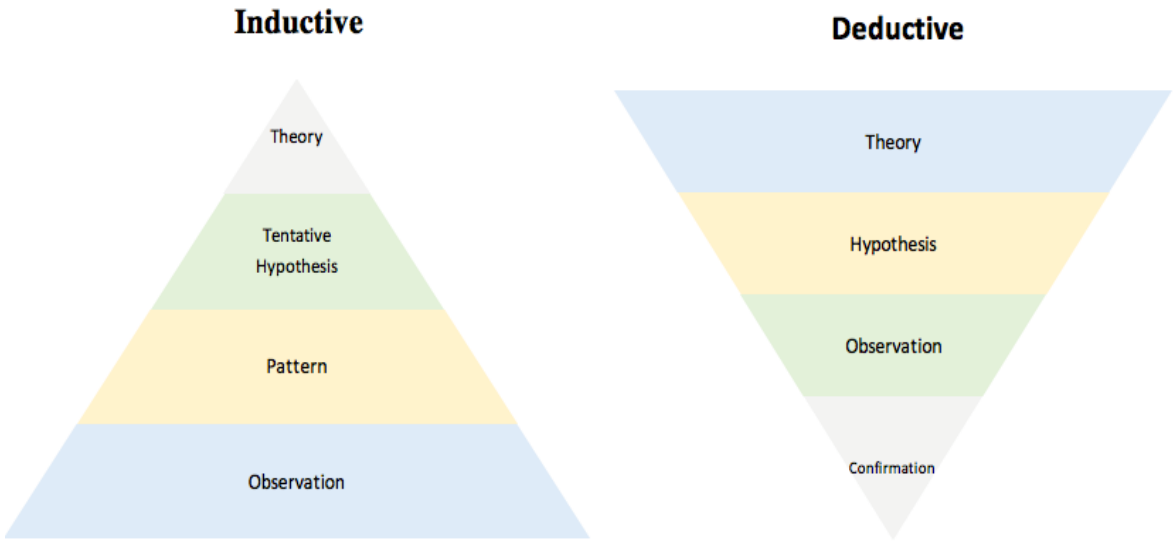


Figure 3.2: Inductive and Deductive Approaches (Trochim, 2006)

Deductive Approach

Silverman (2013) revealed that deductive approach establish hypothesis based on theory that already exists and then formulates the research to test that it works. This approach is appropriate to situations where the research study is focusing with assessing whether the observed phenomena fit with expectancy grounded upon previous research. Deductive approach is usually followed from top-down, works from general to specific, test theory against data and collecting data using quantitative approach (Wiles et al., 2011).

Inductive Approach

Klauer and Phye (2008) insinuates that inductive approach is a systematic process of analysing qualitative data that is apparent to be channeled by some specific objectives. It tends to be more exploratory and open-minded. Inductive reasoning shift from specific to the general, the researcher becomes part of the research course and it starts from bottom-up (Trochim, 2006).

Research Approach for this Study

This study took a more pragmatic approach and is best suited to apply inductive reasoning to choose the methods, techniques, and procedures of research that best suit the goal and requirements of this research (Lodico et al., 2006). In this study, inductive research approach was used. This allowed the researcher to discover patterns or datasets in order to generate a theory, which contributed to the proposed m-Government maturity model, as well as the factors for m-Government implementation.

3.3.2 Research Strategies

Research strategies define the type of study selected or the way in which research is conducted (Creswell, 2009; Saunders et al., 2007). A research strategy is vital as it assist each researcher to achieve the objectives and goals set for the study. The strategy can consist of a variety of different approaches such as experiments, action research, ethnography, grounded theory, case studies and surveys (Saunders et al, 2007). Some of the strategies are discussed next.

Experimental Research

Experimental research can be used in all areas of research, as it regularly encompasses the contemplation of a moderately limited number of features (Saunders et al., 2007). Experimental research aims to demonstrate causality or association between variables (Cohen et al., 2000). According to Welman et al. (2005), correct experimental research consist of three different features namely: control of an independent variable, random assignment of units of analysis to groups, and nuisance variables.

Action Research

According to Yin (2014), action research is characterised as gathering groups of people together to conduct research. It tends to include philosophical practice that is a systematic procedure by which the professional understand and experience of the practitioner can be evaluated. There are two types of action research namely: critical action research defined as research that is collaborative and applied to improve the lives of those who are being studied (Norwood, 2000). The second type is practical action research which is conducted to identify and solve problems for any research project (Saunders et al., 2007).

Ethnography

The researcher studies a cultural group in a natural scenery over a period by observing, collecting and examining data (Myers, 2009; Bryman, 2015). Cohen (2005) also states ethnography is more characterised by description than prediction, to generate more than verification, induction rather than deduction and subjectivities than objective knowledge. In general, ethnography helps the researcher to offer a picture with details of the culture group and a variety of sources of information (Bonilla & Rosa, 2015).

Archival Research

The archival research strategy guided by existing information (Wilson, 2009). Results of archival research can be established through referring to the existing sources of material and looking into historical research (Mills & Mills, 2017). Archival research can be distinguished in organizational research. Bryman (2012) mentioned that the use of archival research is common in the social sciences.

Grounded Theory

Grounded theory is a systematic, qualitative procedure that researchers use in order to generate grounded views of participants (Nuttall et al., 2011). According to May (2011) and Flick (2011), grounded theory is a qualitative methodology enabling patterns to result from the information as a prerequisite for the research study mainly on an inductive approach. It explains the action, process or interaction among people.

Surveys

Survey research is a research strategy that comprises of the use of standard interviews or questionnaires in order to collect data about people and thoughts they have, behaviors and preferences in a systematic way (Bhattacherjee, 2012). According to Davison (2012), surveys are mostly used in quantitative research projects and includes sampling a representative portion of the population. Surveys are more likely to be utilised for descriptive and exploratory research that have distinct people as the unit of analysis. Survey questions consist of three types: open-ended, partially open and closed-ended questions (Kreuger & Neuman, 2006).

Case Study

According to Lazar et al. (2010) and Creswell (2017), a case study involves one or more cases per research study with a thorough examination. Case studies are often applicable in the conditions where the research aims to answer 'how' and 'why' research questions (Yin, 2014).

There are different types of case study applications and designs and an important aspect of choosing a case study strategy is establishing the number of cases considered in the research. Table 3.1 summarises some of the types of case study designs available to researchers.

Table 3.1: Types of Case Studies (Baxter & Jack, 2008; Yin, 2014)

Case Study Type	Description
Explanatory	Describes fundamental links in real-life interventions that are too complex for other strategies such as surveys or experimental strategies
Exploratory	Explores situations in which an intervention being evaluated has no clear, single set of outcomes
Descriptive	Describes an intervention or phenomenon and the real-life context in which it occurs.
Single	The case study may represent a critical; extreme or unique; representative or typical; or revelatory instance of the phenomenon being studied or it may be a longitudinal study.
Multiple	Case studies which consider more than one case
Holistic	A single element within the case studied
Embedded	Using more than one element of analysis studied within the case

Research Strategy for this Study

Case study research is appropriate for this study, because it allows for the study of a complex phenomenon and offers more insights than any other strategy. Case studies can be utilised with any theoretical perception, including that of positivism (Dube & Pare, 2003). This study mixed two strategies in order to accomplish the main objective. The study used surveys and two case studies as the main strategies. Surveys were carried out among community members of the Free State Province in rural, township and urban areas. The survey collected data on m-Services that the citizens currently know of and are using; the factors that influence the use or non-use of m-Services and also m-Services they would like to use in the future. Multiple case studies were implemented in two different government departments (DoE and DoH) in the Free State to validate the mGMM. Each case study was thoroughly observed to gather information on m-Services that were currently available to the community.

3.3.3 Research Method

Qualitative Method

Qualitative method in research is collecting data in an interactive manner, which is normally associated with critical paradigms and informative information (Kraus, 2018). Qualitative research focuses on understanding and examining the actions and words of people without the use of numbers (Phillippi & Lauderdale, 2018).

Quantitative Method

Cheng et al. (2018) defines quantitative method as collecting data that is quantified or comprises of numerical values such as figures and tables.

Mixed Method

A mixed method research is study where the researcher collects and examines data that incorporates the findings and draws suggestions using both quantitative and qualitative approaches and methods in a single study (Byrne & Humble, 2007; Tashakkori & Creswell, 2009; Onwuegbuzie & Dickinson, 2008). Molina-Azorin and Cameron (2015) describe mixed methods research as a design with approaches of inquiry and includes philosophical assumptions that assist to lead when collecting and analyzing, as well as the mixture of data methods in a single or more studies.

Research Method for this study

This study made use of a mixed method, where both qualitative and quantitative data was collected, analysed and interpreted as presented in Table 3.2.

Table 3.2: Techniques and Research Method

Tools / Techniques	Research Method
1. Observation	Qualitative Data
2. In- depth Interviews	Qualitative Data and Quantitative Data
3. Surveys	Quantitative

In this research study, a mixed method was used to gather, analyse and interpret the collected data. There are various types of mixed method designs. According to Cameron (2011), the use of both qualitative and quantitative for the collection and elucidation of data is known as concurrent mixed method. Figure 3.3. illustrates the type of mixed method used in the study.

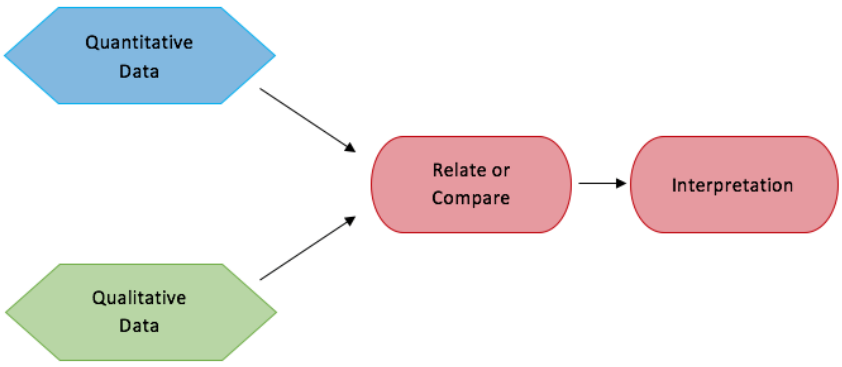


Figure 3.3: Convergent Parallel Design

Convergent parallel design was employed in this research, because data was collected concurrently for both quantitative and qualitative data. Gathered data was analysed individually and then later combined during the interpretation.

3.3.4 Time Horizon

Time horizon is an important element in planning a successful research project. According to Saunders et al. (2007) and Creswell (2009), time horizon reveals the time frame for the research project to be completed. Time horizon's significance to the research design is independent on which research method or research strategy the research is pursuing. There are two categories of time horizon namely: cross-sectional studies and longitudinal studies (Saunders et al., 2007).

Cross-Sectional Studies

Cross-sectional studies are descriptive studies and use a type of observational study that analyses data collected from a population (Schmidt & Kohlmann, 2008). According to Saunders et al., (2007) cross-sectional study allows the researcher to investigate a particular fact or phenomenon at a precise time and the research will be taken at a particular time. Furthermore, Robson (2002) and Easterby-Smith et al. (2008) state that cross-sectional is often likely to retain the survey strategy. It also pursues to explain how factors are associated in diverse organisations or explain the incidents of a phenomenon within a given period (Edwards et al., 2017).

Longitudinal Studies

According to Adams and Schvaneveldt (1991), longitudinal studies is the technique of observing events or people over a period of time. The researcher is able to practice a measure of regulator over variables actually being considered, only if the research procedure will not affect them (Bailey et al., 2018). Longitudinal studies concentrate on investigating groups or variables of subjects over a long period of time (Collis & Hussey, 2013). The main potency of longitudinal research is the capacity that it has to the study development and change it brings.

Time Horizon for this Study

Considering the nature of this research, this was a cross-sectional study as it did not need an investigation over a long period of time. The investigation within this study was expected to be carried out at a given point of time.

3.3.5 Data Collection and Analysis

Table 3.3 demonstrates an outline of research questions and objectives linked to data collection tools utilised in this study.

Table 3.3: Linking Research Questions and Objectives with Data Collection Tools

Research questions and objectives		
Research Problem	There is a need to investigate the maturity level of m-Government implementation in the Free State and explore the major issues faced by government towards fully realised m-Government services.	
Main Research Question	To which extent has m-Government services in the Free State been implemented and accepted by the citizens?	
Main Research Objective	To evaluate and measure m-Government implementation in the Free State province and provide the roadmaps and recommendations for future directions.	
Research Sub-questions	**Data Collection Tools**	**Objectives**
Which m-Services have been devised and developed for the citizens?	Literature, observation and in-depth interview.	Investigate m-Services currently available in the Free State province.
What is the maturity level of these m-Services?	Literature and in-depth interview.	Measure and evaluate the m-Services using mGMM.
What are the factors affecting the successful implementation of these m-Services?	Survey and in-depth interview.	Establish the aspects that affect the attainment of m-Services implementation.

Data Collection

For this study, four data collection tools were used namely: literature review, observation, questionnaires and survey. These data collection tools are defined in Table 3.4.

Table 3.4: Data Collection Tools Used in this Study

Technique/Tool	**Definition**
1. Literature Review	An essential summary by experts and other researchers in the given fields of existing knowledge (Gomm, 2008; Mackey & Gass, 2013).
2. Observations	Is often referred to as an unobtrusive method for gathering information through observing (Angrosino, 2005; Easterviskiy, 2016).
3. Survey	Is a research instrument used to collect information from participants through setting up questions (Bird, 2009).
4. In-depth Interviews	A technique formulated in a structured interview, enabling both the interviewee and interviewer a freedom to explore additional information (Yukalang et al., 2017).

The study commenced with an intensive **literature review**, by investigating e-Government and m-Government initiatives in SA and also investigated and assessed m-Government maturity models. This allowed the researcher to design and develop a mGMM that was

utilised in measuring and assessing m-Government implementation in the Free State. In order to validate the mGMM, case studies in two different government departments (DoE and DoH) in the Free State were conducted. Each case study was thoroughly **observed** to gather information on m-Services that were currently available to the community. The observations were followed by **in-depth interviews**, and the in-depth interviews assisted the researcher to assess and measure the level of maturity of m-Government services in these departments.

The data was immediately coded, analysed and interpreted. The data was analysed using qualitative content analysis method. The findings from this exercise were used to develop questions for the **survey** for the community. The survey was carried out among community members of the Free State province (in rural, urban and township areas). The survey enabled the researcher to collect data on m-Services that the citizens currently know of and are using; factors that are influencing the use or non-use of m-Services and also m-Services they would like to use in the future.

Sampling

Table 3.5 presents all the data collection tools utilised for this study, as well as the main objective that these tools were seeking to achieve. Included in the table are the sampling methods applied for each data collection tool.

Table 3.5: Data Collection Tools and Sampling Methods

Research Tool	Main Objective	Sampling Method
Observation	To find m-Government services designed or developed for the citizens and understand functionality of each	-Non- probability sampling -Purposeful sampling was used -Participants were all government officials from IT section working at DoE and DoH
Literature Review	To evaluate and measure m-Government implementation in the Free State province and provide roadmaps and recommendations for future directions	-Non-probability sampling -Purposeful sampling was used -The researcher used certain keywords to select documents for review *Keywords: Maturity models* *Mobile Government maturity model*
Survey	Investigate the factors affecting the use or non-use of m-Services	-Probability sampling -With a population of 2 817 900 151 participants were selected for DoE 151 participants were selected for DoH
In-depth Interviews	To measure and assess the m-Services using mGMM	-Non- probability sampling -Purposeful sampling was used -Selected senior officials were selected from DoE and DoH

Data Analysis

Data analysis is defined as the process that comprises of data decrease, data demonstration and conclusion drawing (Franke et al., 2017). According to Collis and Hussey (2013), there are different techniques that researchers can use for interpretation and analysis of research data, such as qualitative analysis and quantitative analysis.

1. Qualitative Data Analysis

Qualitative data analysis encompasses data identification, preparation, interpreting patterns and themes recorded to determine how the patterns and themes aid to answer the research question (Lee & Baskerville, 2003; Trochim, 2006). Qualitative data analysis is established on an interpretative philosophy. Qualitative analysis is valuable for defining various realities, emerging deep understanding, theory building, and apprehending everyday life. Qualitative data analysis methods are demonstrated in Table 3.6.

Table 3.6: Qualitative Data Analysis Methods (Myers, 2013; Pernecky 2016)

Qualitative Data Analysis Methods	
Narrative analysis	This is a technique that assists to understand the actions from people, the consequences of activities and occasions turning into a significant whole.
Semiotics	Essentially focuses on analysing signs and symbols, their respective meanings in art, culture, images, languages and rituals.
Thematic Approach	Is a method that identifies, analyse, and report the patterns found on the data collected.
Hermeneutics	This offers a philosophical foundation for positivism and it has the capabilities of helping to interpret and understand data in textual format. It is treated as both a specific mode of analysis and underlying philosophy.

2. Quantitative Data Analysis

Quantitative data analysis is a methodical approach where a researcher can examine numerical data collected and also observe and transform data collected into numerical data (Othman & Rahmani, 2014). Quantitative analysis permits an investigator to discover which phenomena is likely to be reflections of behavior and the results can be generalised to a large population. Table 3.7 depicts a comparison between descriptive and inferential statistics, the two most popular qualitative data analysis methods.

Table 3.7: Quantitative Data Analysis Methods (Garner & Scott, 2013)

Comparison	Descriptive Statistics	Inferential Statistics
Denotation	Is a method that focuses on describing the population under the study.	Is a method that is concerned with drawing up the conclusions about the population based on observation and sample analysis.
Purpose	Analyse, organize and present worthwhile data.	Predict, test and compare.
Final Result	Table, graph and chart.	Probability.
Practice	To describe a condition.	To justify the chances of occurrence of an event.

Data Analysis Method for this Study

For this study both qualitative and quantitative data analysis methods were used. Table 3.8 presents the data collection tools and type of data collected.

Table 3.8: Data Collection Tools and Type of Data

Data Collection Tools	Qualitative Data	Quantitative Data
Literature Review	√	
Observation	√	
Survey		√
In-depth Interviews	√	√

For qualitative data, the **thematic approach** was utilised. The thematic approach helped the researcher identify, analyse and report patterns found on the data collected. For quantitative data, **descriptive statistics** were used. This method assisted the researcher to focus on describing the data collected via the surveys and interviews. The data is interpreted and presented in chapter 4 and 5.

3.4 DATA TRIANGULATION

Triangulation was first enforced to research by Campbell and Fiske, (1959) and further established by Webb (1966) who articulated that researchers need to engage more than one technique to measure variables. Triangulation is defined as the use of multiple data collections to substantiate the research outcome for a study or multiple sources of data, it gives better a description, a balanced picture of the situation and gaining additional knowledge (Bryman, 2012; Altrichter et al., 2008; Saunders et al., 2009). According to O'Donoghue and Punch (2003), triangulation is a "method of cross-checking data from multiple sources to search for regularities in the research data". Triangulation refers to the use of two or more sources of refence such as documents, literature study, interviews and surveys (Denzin, 2012; Boylan et al., 2018).

In addition, triangulation is used to obtain the following advantages:

- To obtain thicker holistic data.
- To permit any researcher to be more assertive of their outcomes.
- To gain synthesis theories and develop creative ways of collecting data.

Figure 3.4 display five data triangulation methods.

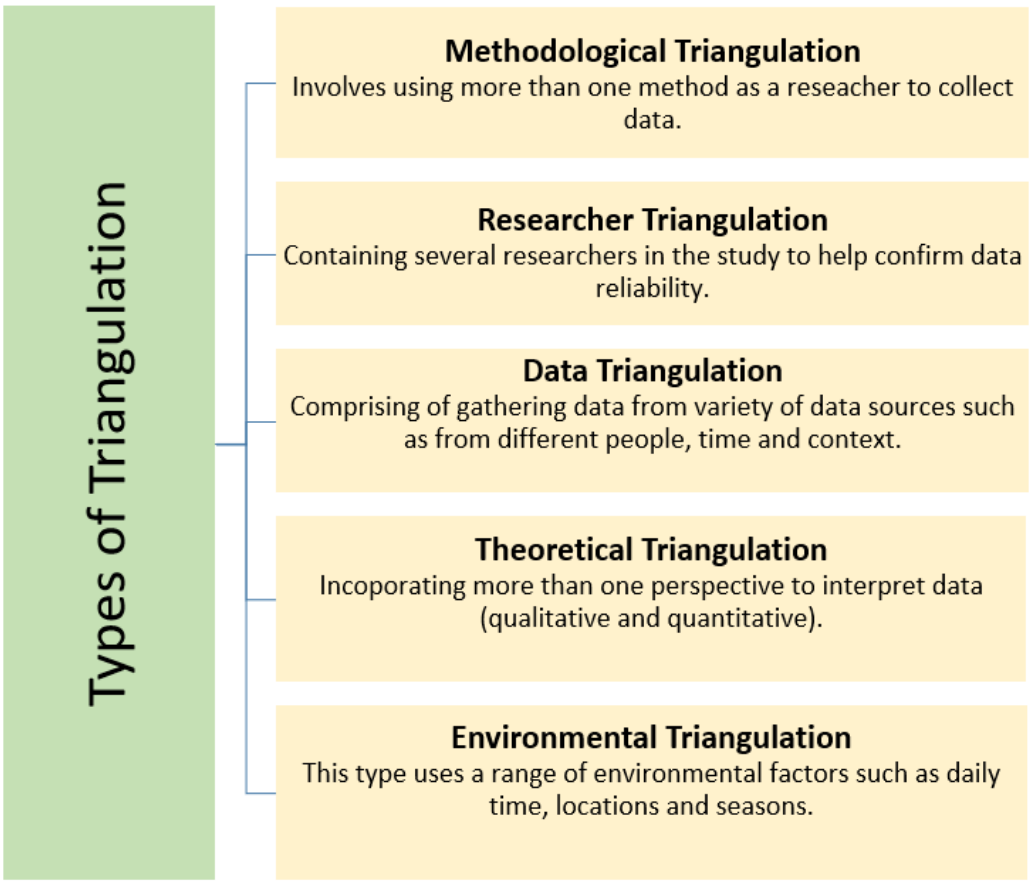


Figure 3.4: Data Triangulation Methods (Kennedy, 2009)

Data Triangulation for this Study

According to Kern (2018), triangulation increases consistency, complexity and the depth towards the research project that is being conducted. The first data triangulation method used was **Methodological Triangulation**. The researcher applied different methods for collecting data, this consisted of observation, survey and in-depth interviews. Secondly, **Researcher Triangulation** was used as more than one researcher assisted during the study to confirm data consistency and reliability of data. This was followed by **Data Triangulation** where the same survey questionnaires were distributed to 151 participants, and the same questions were asked to different people. Some answers were the same and others gave more insight. Lastly, **Theoretical Triangulation** was utilised. The researcher construed data using mixed methods in a combination of qualitative and quantitative methods.

3.5 ETHICAL CONSIDERATION

Ethical matters are vital for any research project and they need to be addressed. This study required the human respondents to partake, government employees specifically and the community living in the Free State. In order to ensure the safety and privacy of participants it was important that ethical issues be taken into account, as well as privacy and consent. Participants who were chosen for this study got notified of important information such as the aim and purpose of the study ahead of time.

This step was important in data collection method as it provided the respondent with the considerate of how significant their role is in successfully finishing the research. Participants had a choice to either remain till the interview was over or withdraw during the process. This study ensured that the confidentiality of participants was maintained by not revealing their names and personal information. This study comprised of relevant information that assisted the researcher to answer the research questions. The next Section is a summary of this chapter.

3.6 SUMMARY

This chapter has presented the research design and methodology that was utilised in order to achieve the objectives set at the beginning of the study. Figure 3.5 displays an overall review of what has been discussed in this chapter.

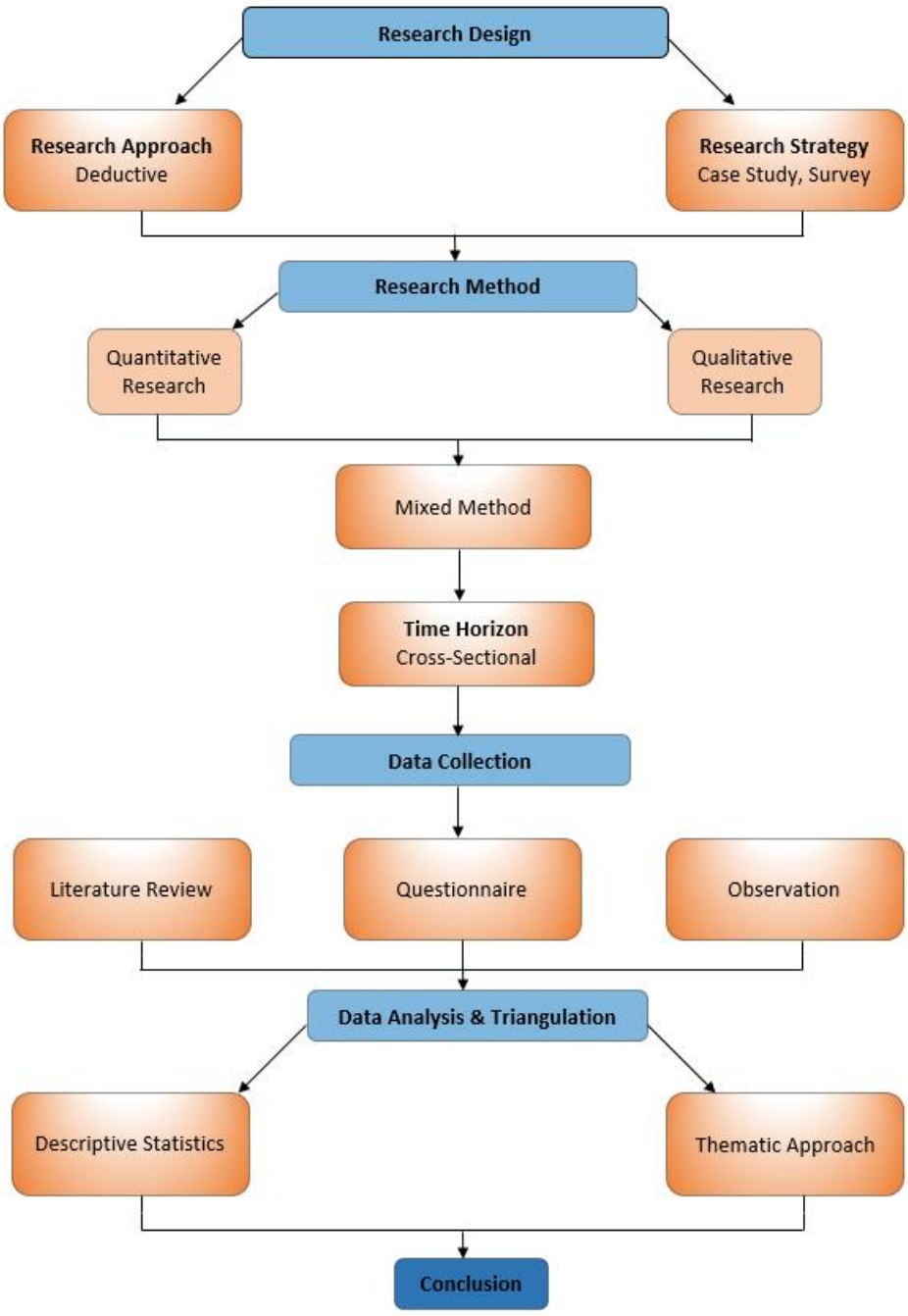


Figure 3.5: Research Design Overall

As exhibited Figure 3.5 a research approach and strategy were selected based on the goals and aims of the study. The research method chosen was mixed methods in order to be able to gather both qualitative and quantitative data, which was best for data triangulation that assisted the researcher to check and validate collected data. The study was a cross-sectional was selected, as the project needed to be completed within a specified time frame. Data was collected using observations, literature review, questionnaire and survey. Furthermore, data was analysed using thematic approach and descriptive statistics to guarantee reliability and integrity. Ethical clearance was observed to ensure that proper processes and procedures were followed. The next chapter discusses case study one for the Department of Education.

CHAPTER 4: CASE STUDY 1

4.1 INTRODUCTION

This study explored two case studies at the DoE and DoH in the Free State. This chapter presents findings from DoE. Section 4.2 commences with the case background. Section 4.3 presents the case background and the significance of ICT in education. Section 4.4 analyses and discusses data collected at DoE. The last Section is the summary of this chapter. The next Section briefly discusses the case background and demographics.

4.2 CASE BACKGROUND

4.2.1 Free State

The Free State Province is located on a concatenation of even green grasslands, latent on an overall of 3,800 feet. Before the year 1995, the province was known as Orange Free State Boer republic and the name was later changed. According to South African statistics (2018), Free State encompasses a population of 2 817 900 and 5.171% being the total of South African population as a whole. The capital city of this province is Bloemfontein and the languages that are dominant in this province are Setswana and Sesotho. Figure 4.1 is the map that represents the Free State.

Figure 4.1: Free State Map

4.3 CASE STUDY 1: DoE

4.3.1 Significance of ICT in Education

ICT has changed the lives of people, from how people work, play and do business. But most importantly, ICT has changed and improved the education system. ICT has become a driving force behind economic growth and a developmental tool as well. ICT has allowed information to be available at the right time, right place in the right format and to the right user. ICT in schools can be utilised as a school communiqué instrument to enhance student learning and improve teaching methods. ICT utilisation in education is extensive and increasingly growing worldwide (Prem; 2014, Tavakoli et al., 2016; Meerza & Beauchamp, 2017).

Benefits of using ICT in education:

- Allows learners to access learning material anytime anywhere
- Increases self-paced learning
- Promotes interactive learning
- Lack of skilled teachers: ICT empowers eLearning, video conferencing with other teachers elsewhere and to attend a remote class

4.4 DATA COLLECTION AND DATA ANALYSIS

This research study made use of four data collection methods. The researcher began collecting data following this order: literature review, observations, in-depth interviews and lastly survey. Table 4.1 presents a summary of research tools and techniques that were used in order to answer the main question and sub-questions.

Table 4.1: Data Collection Tools

	Research Question	Literature Review	Observation	In-depth interview	Survey
Main Question	To which extent has m-Government services in the Free State been implemented and accepted by the citizens?	√	√	√	√
Sub Questions	Which m-Services have been designed and developed for the citizens?		√	√	
	What is the maturity level of these m-Services?	√		√	
	What are the factors affecting the successful implementation of these m-Services?			√	√

4.4.1 Training of data collectors

During the course of this study, research assistants were utilised during data collection. The research assistants were trained in advance to ensure that data collected is adequate and precise. All research assistants were registered Information Technology (IT) students at

Central University of Technology (CUT) and most of them were BTech students. Figure 4.2 exhibits the training offered to the data collectors.

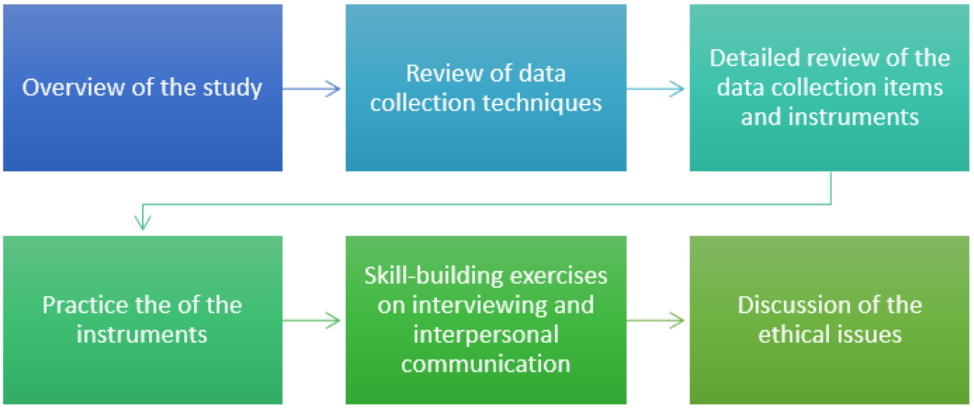


Figure 4.2: Data Collection Training for Research Assistants

4.4.2 Pilot Testing and Findings

Pilot testing was done for all three data collection tools: observation, in-depth interview and survey. Pilot testing is mainly expended to test the design before carrying out the research study. Pilot testing is often used as a feasibility study to ensure that research methods are sound, and also enhances the likelihood of success in the main study (Pew & Klute, 2017). According to Creswell and Clark (2009), pilot testing permits researchers to diminish non-sampling errors such as question design flaws, interviewer mistakes, non-response problems, data processing and analytical errors.

Observation

Pilot testing of the observation manual was conducted using a paper-based test. The pilot testing gave the researcher a chance to recognise some mistakes and make necessary modifications on a variety of probable problems concerning the observation manual. While pre-testing the following changes were made in Table 4.2. Two questions were merged to formulate one question.

Table 4.2: Observation Manual Old and New Questions

<table>
<tr><th>Old Questions</th><th>New Questions</th></tr>
<tr><td>4. Name a system
_____

5. Users of the system or app
_____</td><td>4. Users of the system or App
<table><tr><th>System/App</th><th>Users</th></tr><tr><td>A.</td><td></td></tr><tr><td>B.</td><td></td></tr></table></td></tr>
</table>

In-depth Interview

The in-depth interview was completed by one senior, three middle and two junior staff members at the Department of Education. In turn this enabled the researcher to modify some of the issues, make questions more user friendly and included open-ended questions that assisted in understanding how m-Government applications worked. Attempting to do pilot testing was a struggle, as some of the pilot participants were unavailable. However, the pilot testing was ultimately done and few minor mistakes were noted and the feedback was used to adjust the questions.

Table 4.3: In-depth Interview Old and New Questions

Old Questions	**New Questions**
1. m-Government services at DoE?	
m-Government services offered at Department of Education?	
2. Are you using your phone to access m-Government services?	
Have you used your phone to access m-Government services?	
3. Any aspect of m-Government services you would like to bring change?	
Is there any m-Government services you would like to see happening?	
4. Do you know what is m-Government?	
Do you understand what is m-Government?	
5. In future are you considering to use your mobile phone to access m-Government services?	
In the future would you use your mobile phone to access m-Government services?	

Table 4.3 shows the modifications that were made to the old questions, then other responses were that the questions are straight to the point and clear.

Survey

Thereafter the pilot testing that followed was survey questionnaire for the citizens, where ten students studying Baccalaureus Education were recruited, eight (8) students studying Baccalaureus IT and two (2) IT technicians. The total number of people that participated is twenty (20). Partakers were asked to give feedback, this mainly assisted the researcher to enhance legitimacy of the questionnaire and to ensure that the questions were applicable. The following are some of the questions that had to be changed:

Table 4.4: Survey Old and New Questions

Old Question	New Questions
Highest Qualification 1. Grade 7-less 2. Grade 8-Matric 3. Diploma 4. Degree/Postgraduate	Highest Qualification* 1. Below Matric 2. Matric 3. Diploma 4. Degree 5. Postgraduate
How would you amount your trust for services?	Rate the trust you have towards traditional services? *
If yes, specify	If yes, please indicate the challenges
Do you like m-Government?	How pleased are you with delivery of m-Government? *

Table 4.4 displays some of the questions that were adjusted according to the feedback received.

4.4.3 Observation - Findings

The structured observational study was of the Department of Education in the Free State (FS). The main reason to pursue observations was to gather information on the m-Services that were designed and developed for the citizens in the FS province. The participants were all government officials from Information Technology (IT) section, working at the Department of Education, except the ones who participated during the pilot testing. In order to get the information needed, the researcher observed and recorded the information from the first day till the last day.

The researcher used four tools for collecting and recording information:

- Observation guide or manual
- Field notes
- Cameras and audio tapes
- Memory

The process of observing at the DoE took exactly four (4) weeks to complete; the initial time set out was one week. The delay was caused by the fact that some days participants did not show up, and some of the applications that had to be observed were not accessible. Only three systems / applications were observed at DoE: the school portal, social media and school finder. These are discussed below.

Schools Portal

Schools portal is an application developed by the DoE for the citizens. The portal allows the learners, parents and teachers to find curriculum content, such as e-books, subject related videos, media releases and school related articles. The schools portal access requires using

any digital device, such as a tablet, mobile phone, or laptop. Figure 4.3 demonstrates the home page of schools portal.

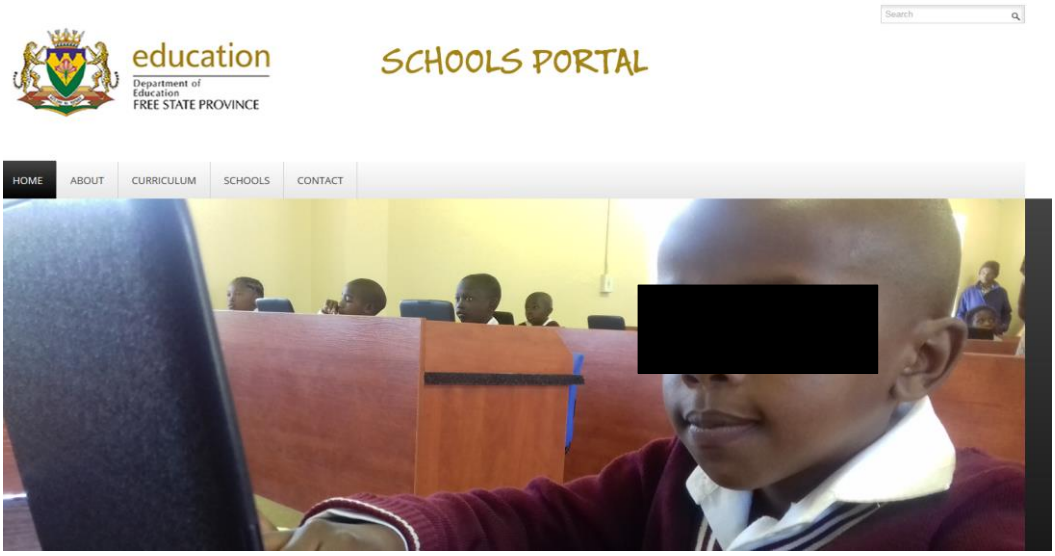


Figure 4.3: School Portal Home Page

The users wishing to access curriculum content have a selection to choose between content from primary and or secondary school as displayed in Figure 4.4.

Figure 4.4: Selecting Curriculum

The primary level is grouped into grades from grade R to grade seven (7). Then followed by secondary level which is grouped from grade eight (8) till grade twelve (12). The secondary level also has extra features that have been added specifically for the grade 12s: examination timetable, examination question papers and exemplars.

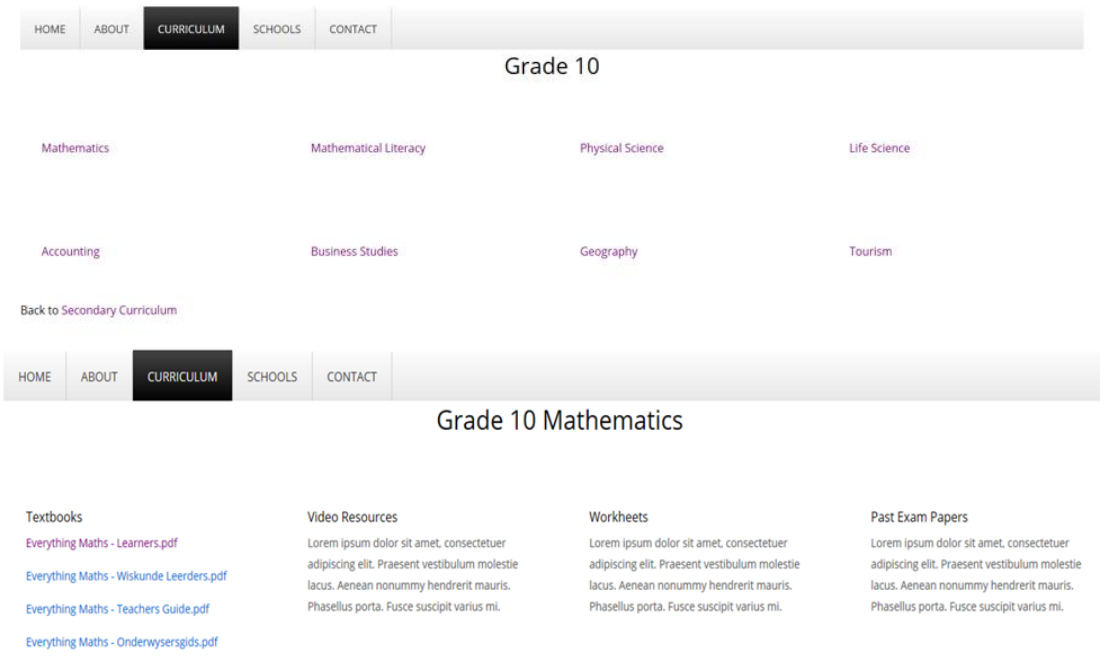


Figure 4.5: Content Grouped into Subjects

Figure 4.5 depicts content of the subjects categorised in groups when a grade is selected. Every subject when selected, offers three options: get content, video resources, worksheets and past exam papers.

Social Media

One person is able to communicate with hundreds or thousands of people through the incipient social media. The DoE in the FS saw it fit to start using social media platforms to share information with the society. The social platforms currently expended is Facebook, Instagram and Twitter. People are able to read the information shared, watch the videos uploaded, ask questions and share the information with others.

A Facebook page was created in the year 2011, the very first social media platform to be pursued by the DoE. Over the years the numbers of followers went up to 4 179 and this number keeps going up each month. Figure 4.6 shows a Facebook summary regarding the posts uploaded and how many people have liked it, the number of people reached through the post and how many people engaged on the post. One of the posts managed to reach up to 2 000 people and the lowest number among the posts was 195.

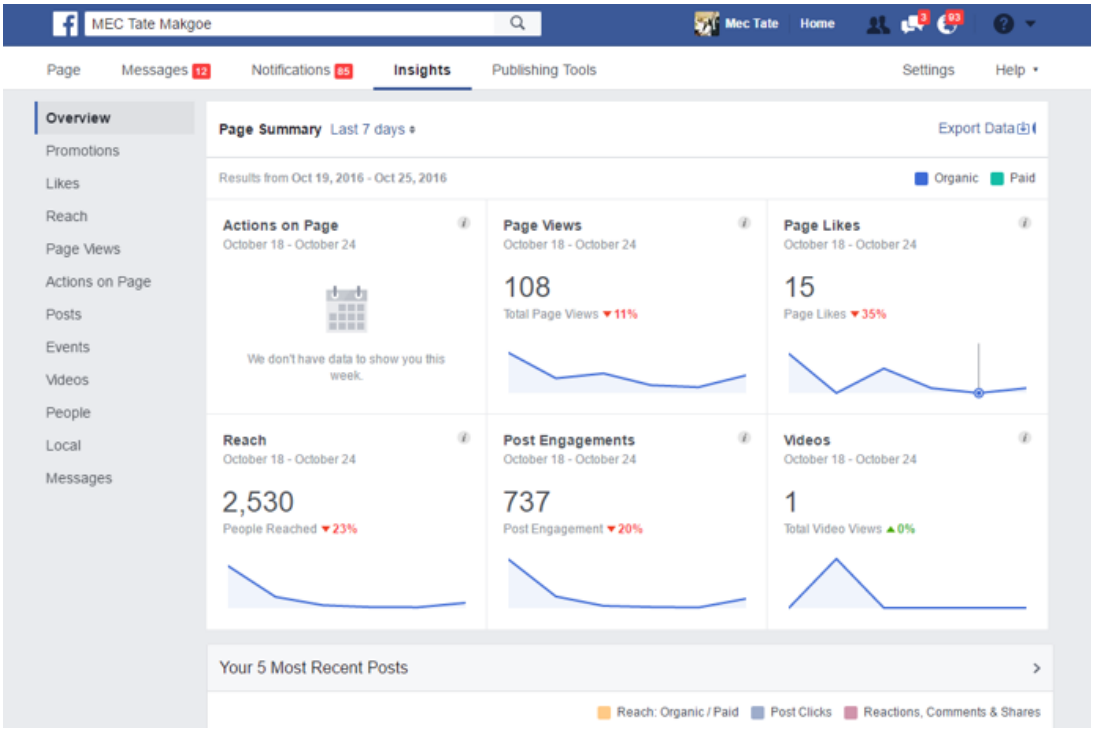


Figure 4.6: Facebook Page Summary

Twitter is another platform that assists the government to communicate with the citizens and get instant responses. The Twitter followers are 1 875 and this account commenced in 2013.

Instagram was later added in the year 2016, currently with 1 967 followers. All social media platforms are named after the Member of the Executive Council (MEC) of Education in Free State. Figure 4.7 displays an Instagram account.

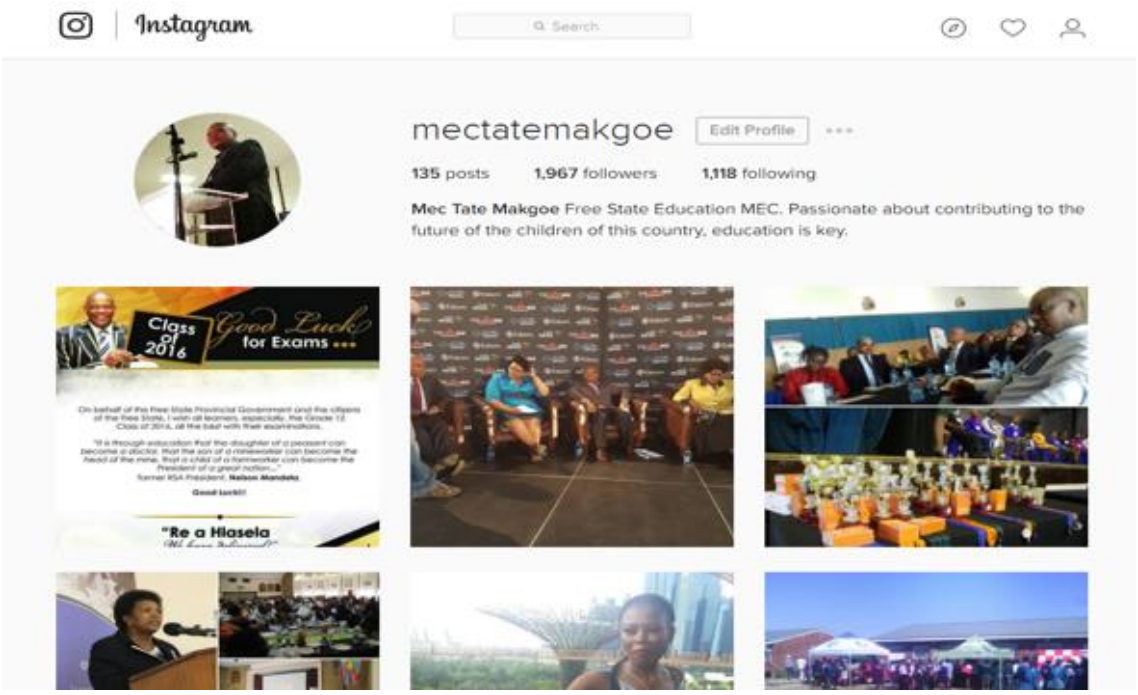


Figure 4.7: Instagram Account

School Finder

The school finder system permits any user to find a school in the Free State. This is the best tool for people moving to FS for the first time, people that already stay in FS, but desire to find a different school for their children. There are two ways one can use the system to locate the school: Firstly, find a school by name as seen in Figure 4.8. Secondly, find a school by query:

1. District: Select one district preferred from five presented in the Free State, an option for all districts is applicable as well.

2. City/Town: Choose a city best for the learner, if there is no city in mind, all cities or town will still be an option.

3. Category: Technical school, ordinary or a special school.

4. School Category: Select primary or secondary school.

5. Section 21: Options available are yes, no or partial.

6. School Type: Public, Independent or one with support services.

7. Boarding facilities: Yes / No

8. Medium of instruction: A medium of instruction for a learner needs to be selected. Other schools offer two mediums in parallel such as English and Sesotho or English and Afrikaans etc.

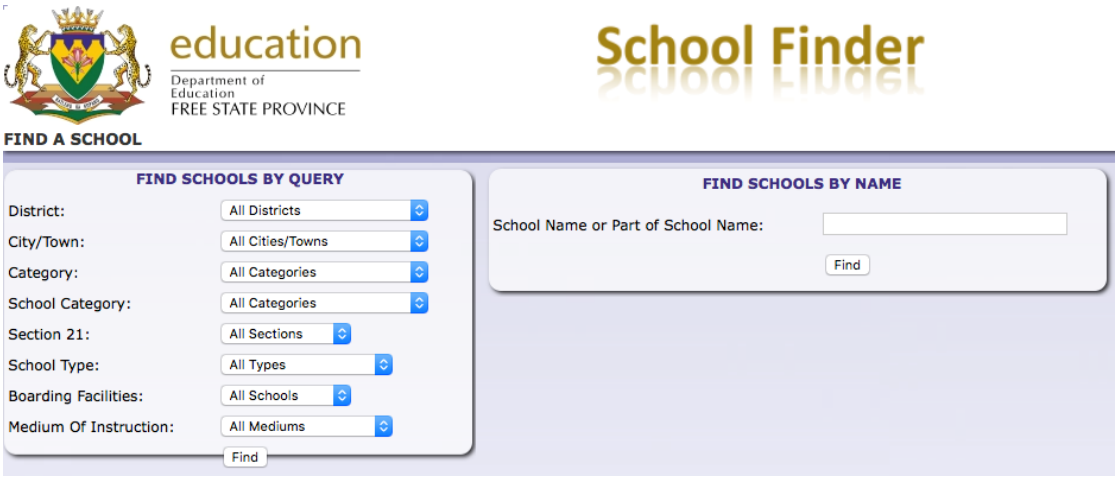


Figure 4.8: School Finder

The information that is displayed after selecting find, is all the schools in the Free State stored in the school finder database. After selecting a school, the website offers a plethora of other options such as:

- Geographical information of the school
- Contact details
- Number of learners per grade
- Pass rate of NSC exam of each year
- Statistics of previous NSC exam years

Figure 4.9 shows the information when the school is selected.

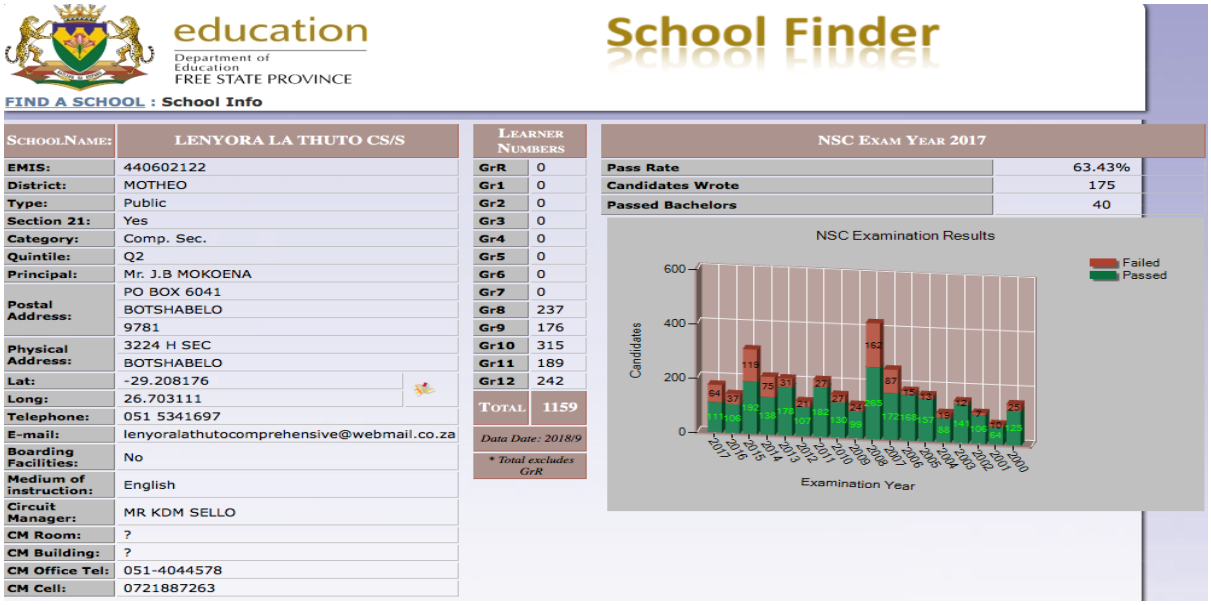


Figure 4.9: Public School Information

Another feature that the school finder system provides is reports and statistics, this allows users to view the results of each school from primary to secondary. The user selects a district and the year which they wish to view. Figure 4.10 illustrates the outcomes revealed.

MOTHEO

	EMIS	School Name	Centre Number	December PASS %									Bachelors									Number of learners 2017		
				2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	10th day	Wrote	Difference
45	443907249	MARIASDAL S/S	3173013	95	83	87	80	83	94	69.8	85.3	83.7	67	37	19	35	28	24	26	21	39	25	12	48	43	-5
46	440303216	MARTIE DU PLESSIS SPEC	3171045	100	92	100	100	100	91	81.6	97.2	100	100	2	3	7	7		3	2	8	3	10	46	45	-1
47	441002074	METSIMAPHODI S/S	3171046	91	61	39	54	58	77	73.6	49.2	78	75	12	6	2	16	7	22	17	30	19	19	111	105	-6
48	440304045	MOEMEDI S/S	3171048	93	74	59	87	78	94	76.1	76.9	87.5	96	23	21	13	21	11	14	16	24	18	23	96	91	-5
49	443907241	MOROKA S/S	3173015	77	66	77	85	83	96	86.2	76.5	92	84	36	27	24	33	41	50	52	77	69	60	139	129	-10
50	440602121	MPATLENG S/S	3172015	71	77	68	62	44	86	62.2	65.6	89.3	85	9	12	10	13	16	24	22	21	19	13	81	78	-3
51	440304208	NAVALSIG CS/S	3171052	81	87	90	83	76	80	78.5	83.4	88.1	84	40	25	48	37	38	42	40	42	31	37	125	120	-5
52	440602060	NTEMOSENG S/S	3172017	30	37	69	94	80	89	79.7	77.5	91.8	89	2	4	5	16	7	9	15	31	37	54	166	159	-7
53	440602090	NTUMEDISENG S/S	3172018	62	63	71	72	65	65	46.8	47.4	70.8	73	10	20	20	12	7	17	15	14	29	27	83	82	-1
54	440304250	PETUNIA S/S	3171056	69	64	79	84	94	85	89.9	93.2	81.4	69	11	11	17	26	13	16	25	36	24	19	158	156	-2
55	443907267	PHETOGANE S/S	3173017	60	66	72	54	66	87	70.4	75.2	92.9	80	9	10	15	11	12	33	29	20	18	12	121	103	-18
56	440602047	POPANO S/S	3172020	67	64	67	42	32	84	44.2	48.8	65.2	78	6	7	9	4	3	13	12	7	4	20	80	76	-4
57	440304218	PRESIDENT STEYN C/S	3171058	100	96	98	97	96	87	97.6	96.6	100	91	10	18	28	23	22	17	18	17	23	9	23	22	-1
58	444802025	QIBING S/S	3171059	64	65	62	43	61	78	76.9	94.1	94.2	88	4	9	2	8	12	16	8	17	20	24	81	80	-1
59	440602059	REAMOHETSE S/S	3172022	62	55	53	48	81	72	62.3	40.8	63.7	50	20	15	9	8	21	16	14	17	14	11	125	117	-8

Figure 4.10: Public School Reports and Statistics

4.4.4 In-depth Interviews - Findings

In-depth interviews were mainly used to collect more detailed information regarding the factors that influence the successful implementation of m-Services. The in-depth interviews were conducted in person for an hour and a half each, the discussions were documented on notes and audio recorder. Four (4) senior officials from the DoE were interviewed, the researcher was the one conducting the interviews and with the support of two assistants. Later, the researcher listened to the audio recording, converted into transcripts and compared with the notes of the assistants to ensure validity.

The data that was collected using the in-depth interviews, was analysed in order to address the following sub-questions:

- Which m-Services have been designed and developed for the citizens?
- What is the maturity level of these m-Services?
- What are the factors affecting the successful implementation of these m-Services?

The questions in the in-depth interview were grouped into three categories (Appendix A)

Section 1: Biographical Information

Section 2: m-Government in General

Section 3: m-Government Applications and Systems

The following section presents the data collected from in-depth interviews.

Section 1: Biographical Information

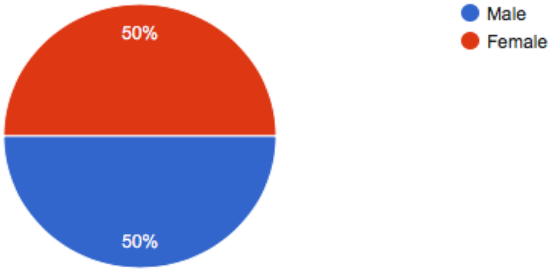


Figure 4.11: Gender

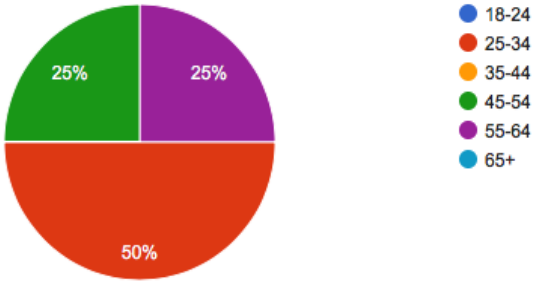


Figure 4.12: Age

Figure 4.11 presents the gender of participants interviewed: 50% were males and females were also 50%. While Figure 4.12 indicates the age of the respondents', majority being participants in their young adult years at 25-34 with 50%. Then the least number of participants were aged 45-54 and 55-64 with 25%.

The respondents were Africans and one respondent was a white person. All the participants had either a degree or postgraduate qualification.

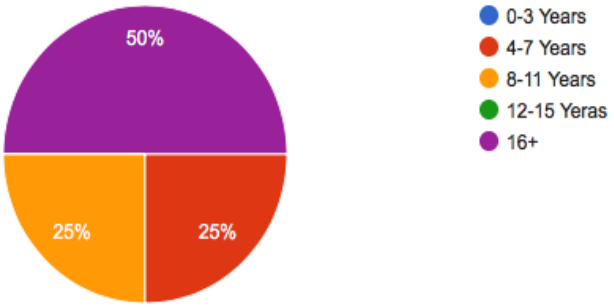


Figure 4.13: Work Experience

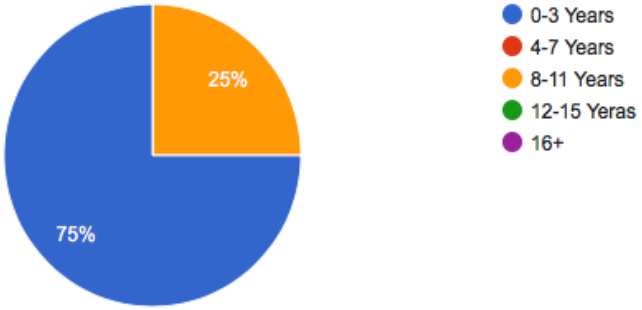


Figure 4.14: Experience Related to m-Government

In Figure 4.13, 50% of the respondents had worked for more than 16 years, while 25% of the remaining partakers worked for 4-7 and 8-11 years. In Figure 4.14 most participants had 0-3 years' experience related to m-Government implementation and one participant had 8-11 years of experience.

Section 2: m-Government in General

Questions 1 and 2 have been summarised in Table 4.5. All the people that responded did not perceive m-Government as a separate issue to e-Government. 100% of the participants stated that DoE does not have any m-Government policy in place.

Table 4.5: m-Government Knowledge and Policies

Question 1 and 2	Yes	No
Does your organization perceive m-Government as a separate issue to e-Government? If so why?	0	100%
Does your organization have any m-Government policies?	0	100%

Table 4.6: Challenges Encountered with m-Government Implementation

Question 3	What challenges did your organization encounter associated with m-Government implementation?
Participant 1	Instagram application is used but to check if followers really use and check the departments posts is a bit impossible to know as likes are used to determine that fact. So, if the likes are minimal, we are really not sure if it is effective
Participant 2	No
Participant 3	Nothing yet
Participant 4	Not applicable

In Table 4.6 most of the respondents have not encountered any challenges regarding m-Government implementation. One participant indicated with regards to Instagram, that it was difficult to keep track of the number of people that like the post. The participants also stated that they have not found a solution for this problem as they are still experiencing the challenges as a department (Table 4.7).

Table 4.7: Methods to Overcome Challenges

Question 4	How did your organization overcome these challenges or limitations?
Participant 1	We are still experiencing these challenges as a department
Participant 2	None
Participant 3	N/a
Participant 4	Not Applicable

Table 4.8: Lessons Learned and Recommendations to m-Government Implementation

Question 5	What lessons did the organization learn and would recommend with regards to m-Government implementation?
Participant 1	We are still working on them
Participant 2	None
Participant 3	N/a
Participant 4	One cannot commit to m-Government if the IT systems are extremely slow and not trusted

In Table 4.8 three participants had nothing to share, whilst one participant complained about IT systems that are extremely slow and not trusted.

Section 3: m-Government Applications and Systems

Table 4.9 displays different m-Government applications or systems that were being used by the DoE, as well as the description of each application.

Table 4.9: Current m-Government Applications/Systems

Question 1 & 2	Name of applications or systems	Description of each application	Target Population
Participant 1	Facebook Twitter Instagram	Facebook is an application used to post information about anything as well as pictures and videos. Twitter allows us to post information using only 160 characters, videos and pictures. Instagram is another application dedicated mainly for pictures and videos and using effects such as filter and changing the color of pictures.	Anyone 18-65 years
Participant 2	Education schools portal	Designed to bring information together from diverse sources in a uniform way. Free State schools portal aim to disseminate information to all targeted learners, schools and parents on curriculum matters.	Learners Educators Parents
Participant 3	Schools finder	School administration system	All schools in FS
Participant 4	BAS PERSAL LOGIS	Financial System HR System Procurement System	DoE Employee

All participants were asked the same question, but participants only mentioned one or two systems/applications that they are responsible for, as indicated in Table 4.9.

Table 4.10: Benefits of Each Application

Question 4	Benefits of each application or systems?
Participant 1	These applications assist with determining whether the public is aware of the Department of Education and its activities. The work that department is doing for learners in the Free State
Participant 2	Access to curriculum content, sharing of content between educators
Participant 3	Day to day information of all learners in the system
Participant 4	Governance and control

As exhibited in Table 4.10, some of the benefits of the applications include: access to the curriculum and to keep citizens up to date with DoE activities.

The researcher described in detail the 5-stages of the mGMM to the participants, then asked the participants to rate each application / system according to the described stages. The stages of mGMM were ascended from 1-5.

Augmentation ---- Elementary ---- Interaction --- Transactional --- Involvement

In Table 4.11, participants from the DoE rated the school portal at augmentation 100%, the social media pages were rated 100% at involvement and all the participants rated school finder application at augmentation.

Table 4.11: m-Government Maturity Level of Applications

Stages	School Portal					Social Media					School Finder				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
Participant 1	**X**									**X**	**X**				
Participant 2	**X**									**X**	**X**				
Participant 3	**X**									**X**	**X**				
Participant 4	**X**									**X**	**X**				

Factors affecting the successful implementation of m-Services (from In-depth Interviews)

The factors that could affect the implementation of m-Government were identified from the in-depth Interviews; and they are presented in Table 4.12.

Table 4.12: Factors Affecting m-Government Derived from In-depth Interviews

Factors	Participant 1	Participant 2	Participant 3	Participant 4
	DoE			
Technology Infrastructure				x
Trust				x
User Adoption				
Lack of investment				
Knowledge Management	x			
Security				
Lack of Training				
Executive Support				
Lack of Resources				
Agile Policies and Strategies				

Out of four participants from DoE two participants responded that technology infrastructure, trust and knowledge management falls among the factors that affect m-Government implementation.

4.4.5 Survey - Findings

In this study the survey was used to determine if the community is aware and makes use of m-Government services implemented by DoE and document the citizens' sentiments. A web-based questionnaire was formulated, about 151 participants were asked to complete the questionnaire and only 116 questionnaires were returned. The questionnaire took approximately 15 minutes. Survey questions (Appendix B) were grouped into six sections:

Section 1: Biographical Information

Section 2: Mobile Phone Usage

Section 3: m-Government in General

Section 4: Traditional Government

Section 5: Factors Influencing Use or Non-use of m-Government Services

Section 6: m-Government Services Offered at DoE in the Free State

Section 7: Measuring the Level of Satisfaction with m-Government Services

Section 1: Biographical Information

According to gender: 56% of participants were males and 44% were females. As many as 77% of the respondents were aged between 18-24 years.

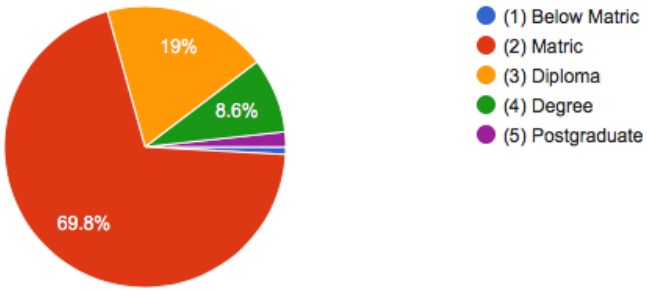


Figure 4.15: Highest Qualification

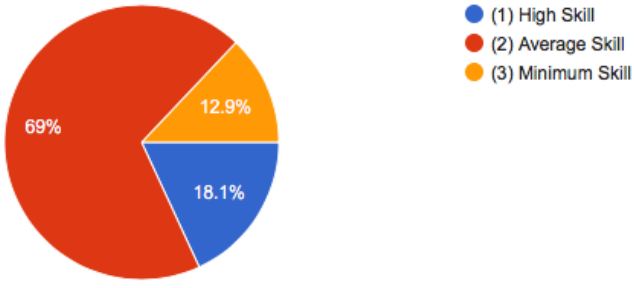


Figure 4.16: Level of ICT Skills

The majority (92%) of the respondents were African. As seen in Figure 4.15 the highest qualification for most people was matric at 69.8%. The level of ICT skill that the participants had at most was 69%, which is the average skill. Participants who indicated that they were from the township were 52% and 16% of the participants were from the rural areas.

Section 2: Mobile phone Usage

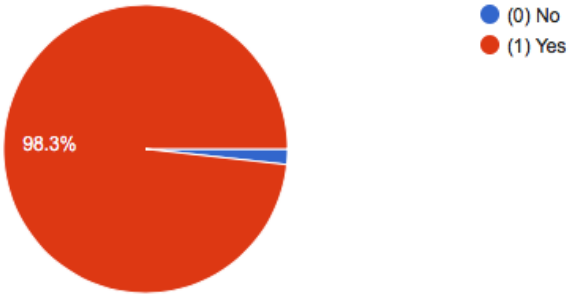


Figure 4.17: Cellphone Ownership

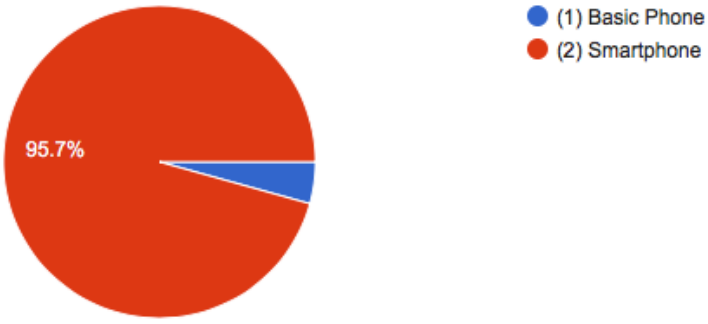


Figure 4.18: Type of phone

As displayed in Figure 4.17 98.3% of the participants had cellphones and 95.7% of those cellphones were smartphones (Figure 4.18). The participants were requested to indicate which activities were they using their cellphones for.

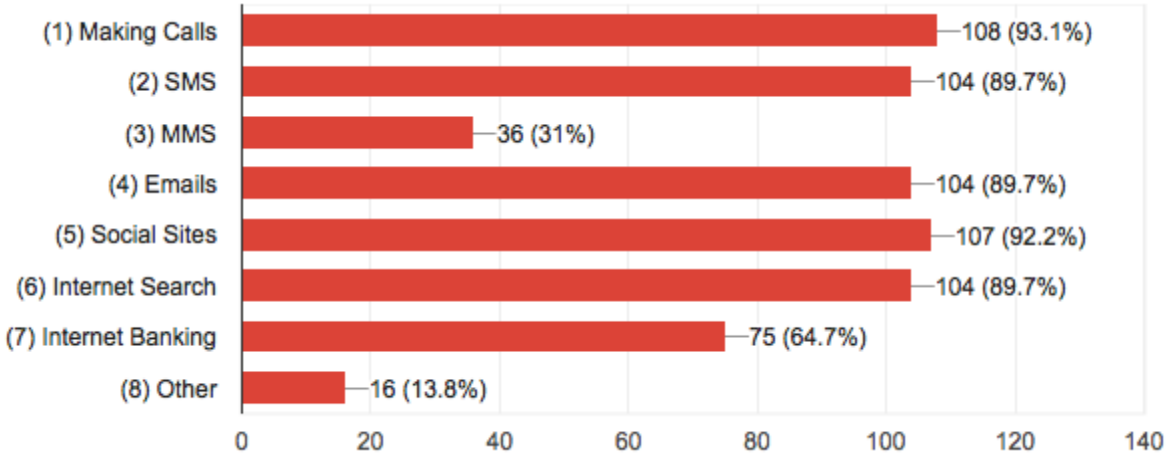


Figure 4.19: Phone Usage

The respondents used their cellphones for a variety of reasons, one of the exceptional usages was using the phone to access social sites with 92.2% and internet banking at 64.7% (Figure 4.19).

Section 3: m-Government in General

Table 4.13: m-Government Usefulness

Question 11 and 12	Yes	No
Do you understand what is m-Government?	77%	23%
Do you think m-Government is important and useful?	89%	11%

In Table 4.13 77% of the respondents knew what m-Government was and about 89% of the respondents thought that m-Government is important and useful.

Participants were requested to rate the significance and usefulness of them being able to interact with government using m-Government services. The participants were enquired to

rate significance and usefulness between 1 and 10, 1 being not significant at all and 10 being very significant. The numbers 1-5 were added together and 6-10 were added together to get the two extremes.

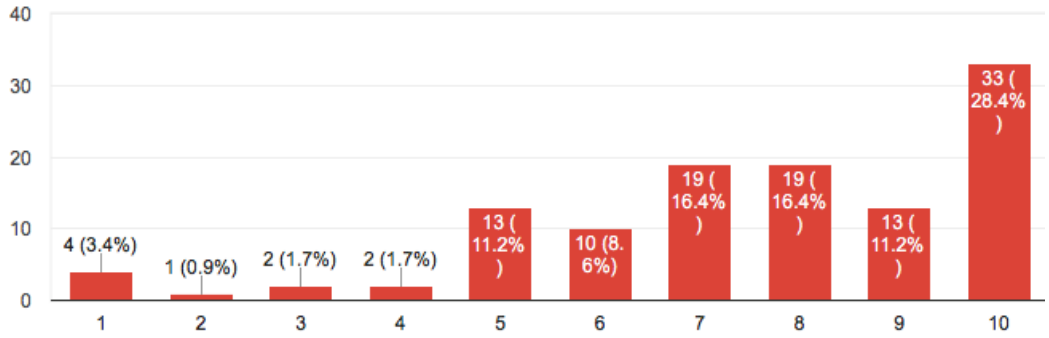


Figure 4.20: Significant and usefulness of m-Government

Figure 4.20 expresses that 28.4% respondents felt it was very significant for them to interact with the government using m-Government services, whilst 71.6% felt it was not significant.

Section 4: Traditional Government

Table 4.14: Traditional government and Challenges

Question 14 and 15	Yes	No
Do you prefer using traditional government (face-to-face) over m-Government?	41%	59%
Have you encountered any challenges with traditional government services?	50%	50%

Table 4.14 indicates that 41% of the respondents prefer using traditional government over m-Government. Half (50%) of the participants experienced challenges with traditional government services, whilst another half did not. Challenges that the participants indicated are summarised as following:

- Long queues
- Poor or bad service delivery
- People are rude
- Lack of proper assistance

Participants were requested to rate the delivery of traditional government services. The rating was scaled from 1-5, 1 represented “Not at all pleased” and 5 represented “Well pleased”.

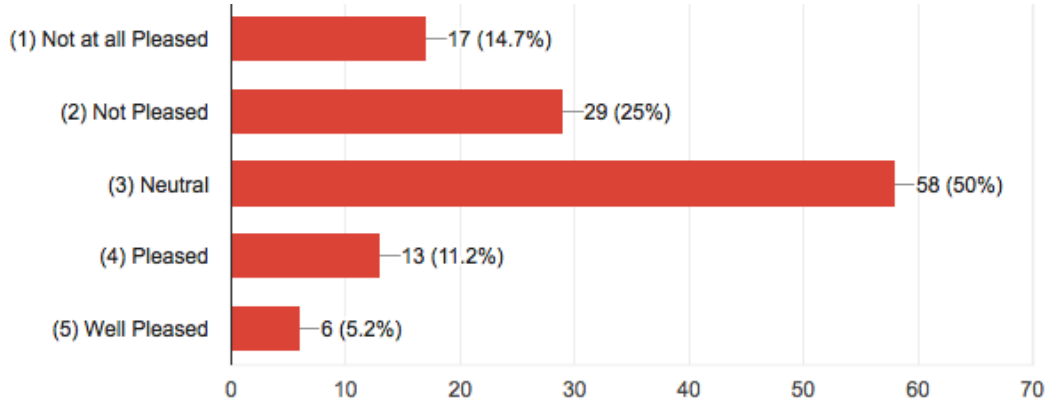


Figure 4.21: Rate Delivery of traditional government services

As illustrated in Figure 4.21, only 13 participants were pleased with traditional government services, 29 participants were not pleased and 58 participants were not sure (neutral).

Table 4.15: Trust and Satisfaction Towards Traditional Government

Question 18 and 19	1	2	3	4	5	6	7	8	9	10
Trust towards traditional government services?	9%	10%	9%	11%	33%	9%	7%	5%	2%	5%
Satisfaction with the traditional government services?	10%	9%	11%	13%	25%	13%	4%	8%	4%	3%

As seen in Table 4.15 72% of the participants indicated that they do not trust traditional government services. Whereas, 28% of the participants indicated they do trust traditional government services. Also 68% of participants were not satisfied with traditional government services, whilst 32% were satisfied.

Section 5: Factors influencing Use or None use of m-Government Services

In Table 4.16 only 18% of the participants have used their mobile phones to access m-Government services and 82% of the participants indicated that they have never used their mobile phones to access m-Government services. 88% indicated that they have never encountered any challenges with m-Government, while 12% has.

Table 4.16: Phone Usage and m-Government Services Challenges

Question 20 and 23	Yes	No
Have you used your phone to access m-Government services?	18%	82%
Have you encountered any challenges with m-Government services?	12%	88%

Some of the challenges the participants mentioned include: the system was down or slow, not enough information and it often takes a long time before getting feedback. The

participants were asked to identify factors (from a given list) that were preventing them from using m-Government. 76.7% of the participants identified lack of information as the biggest problem, followed by financial constraints (Figure 4.22).

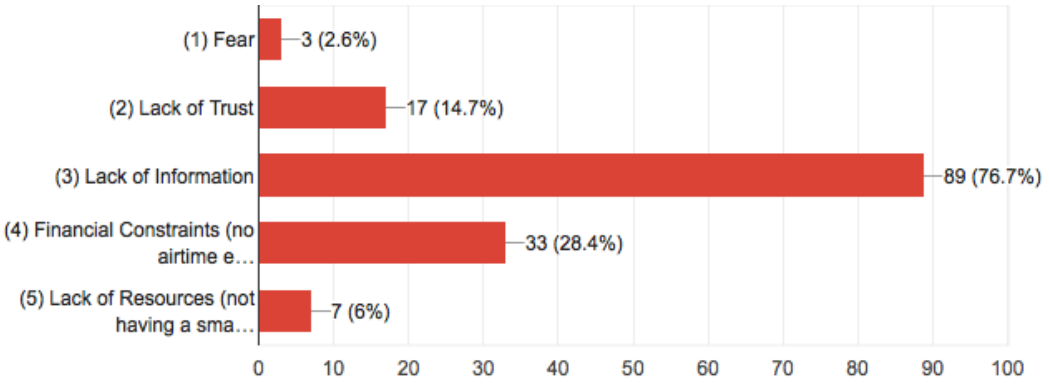


Figure 4.22: Factors preventing the use of m-Government

As seen in Table 4.17 more than 90% of the respondents would use their mobile phone to access m-Government services in the future.

Table 4.17: Factors Influencing Use of m-government Services

Questions	Yes	No
In the future would you use your mobile phone to access m-Government services?	92%	8%

The participants were then asked if they were pleased with delivery of m-Government services. 27% of participants indicated that they were pleased, whereas 5% of participants were not pleased and 57% were neutral. The participants were asked to rate their trust towards m-Government services. 45% of participants said they do not trust it at all, while 55% of participants said they do trust m-Government services. The participants were also asked to rate their satisfaction with m-Government services. 55% of participants were very satisfied, while 45% were not satisfied.
31% of the participants indicated that they would like to see more m-Government services available for use. The participants were asked to identify those m-Government services they would like to see in future, following are some of the services they identified:

1. E-Recruitment
2. Advertising of services offered by m-Government technology
3. Home Affairs services
4. Vacancies posted online
5. Making online appointments to visit government officials
6. Automation of paper-based systems
7. Report poor services via an application

Section 6: m-Government Services offered at Department of Education in the Free State

The respondents were asked to specify if they have accessed the three m-Government services provided by DoE. 57% of the respondents have accessed social media pages, while 17% of respondents have used school finder and student portal has been used by 61% of the respondents as depicted in Table 4.18.

Table 4.18: Usage of m-Government Services from DoE

Questions	Yes	No
Have you accessed DoE social media pages?	57%	43%
Have you used school finder offered by DoE?	17%	83%
Have you used school / student portal by DoE?	61%	39%

In Table 4.19 77% of the participants stated that they did benefit from using social media and also 72% of the participants indicated that the student portal provides benefits. Participants who were not benefiting from using school finder were 78%.

Table 4.19: DoE m-Government Service Benefits

Questions	Yes	No
Are you benefiting from accessing social media?	77%	23%
Are you benefiting from using school finder?	22%	78%
Are you benefiting from using student portal?	72%	28%

Section 7: Measuring the level of satisfaction with m-Government Services

This section was made up of six statements that the participants were asked to rate, the rating was on a five-point Likert-scale from SD “Strongly Disagree”, D “Disagree”, N “Neutral”, A “Agree” and SA “Strongly Agree”. Table 4.19 presents the responses in percentage (%) form.

Table 4.20: Department of Education m-Government Services

Statements	SD	D	N	A	SA
Social Media					
1. Social media make it easier for me to communicate instantly with the DoE and other people	6.1%	8.6%	31.9%	29.3%	24.1%
2. I find social media easy to use	3.4%	1.7%	19.8%	33.7%	41.4%
3. People who have used social media think I should use it	6.9%	6.9%	27.6%	40.5%	18.1%
4. I have basic resources to use social media	5.2%	9.5%	18.9%	37.1%	29.3%
5. I aim to use social media regularly	5.2%	12%	30.2%	31%	21.6%
6. I plan to use social media in future	6%	6.9%	18.1%	34.5%	34.5%
School Finder					
1. School finder saves me money and time	4.3%	11.2%	47.4%	21.6%	15.5%
2. My interaction with school finder is clear	6.1%	12.1%	54.3%	18.9%	8.6%
3. People who are important to me advise me to use school finder	6.1%	17.2%	41.4%	24.1%	11.2%
4. I have basic resources to use school finder	5.2%	14.7%	39.6%	24.1%	16.4%
5. I aim to use school finder regularly	5.2%	17.2%	39.7%	24.1%	13.8%
6. I plan to use school finder in future	6%	12.1%	27.6%	25%	29.3%
Student Portal					
1. Student portal make it easy for me to get school content immediately	3.5%	6.9%	31%	29.3%	29.3%
2. I find it easy to learn how to operate student portal	3.4%	1.8%	19.8%	33.6%	41.4%
3. People who are important to me advise me to use student portal	6.9%	11.2%	24.1%	31.1%	26.7%
4. I have the necessary knowledge to use student portal	5.2%	6.9%	24.1%	30.2%	33.6%
5. I aim to use student portal regularly	3.4%	5.2%	26.7%	31.9%	32.8%
6. I plan to use student portal in future	4.3%	5.2%	27.6%	29.3%	33.6%

Table 4.20 was presented as follows Strongly Disagree and Disagree were combined, neutral remained as it is, Agree and Strongly Agree were combined. As seen in Table 4.19 about 75% of the participants found social media easy to use and only 5% found it not easy to use. 70% of the participants plan to use social media in the future and 66% of the participants already have the basic resources to use social media.

The results on school finder showed that the participants felt that their interaction with school finder was clear (28%), while 18% did not find it clear and 54% of the participants were neutral. 54% of the participants plan to use school finder in the future.

5% of the participants did not find it easy to learn how to operate student portal and 75% of the participants found it easy to learn operate it. 65% of the respondents aim to use student portal regularly and 9% of the participants do not aim to use it on a regular basis.

Factors affecting the successful implementation of m-Services (from Surveys)

The factors that could affect the implementation of m-Government were established from primary data which is surveys. The outcomes from respondents revealed the following: fear 2.6%, lack of trust 14.7%, lack of information 48.3%, financial constraints 28.4%, lack of resources 6%. Furthermore, 16 participants added access to systems, lack of marketing and efficient systems that they also contribute to the successful implementation of m-Government and they are presented in Table 4.21.

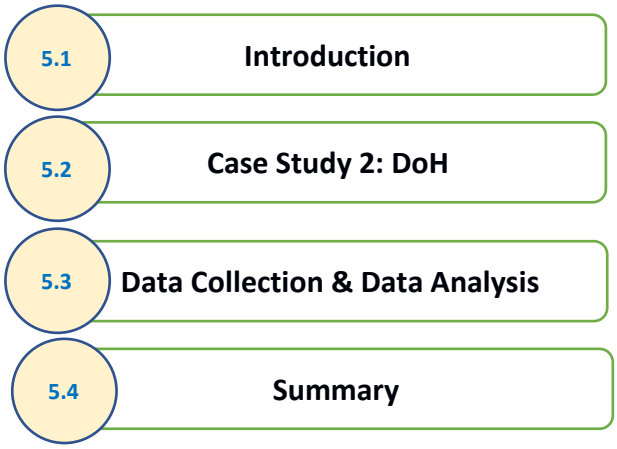
Table 4.21: Factors Affecting m-Government Derived from Surveys

Factors	DoE
Fear	x
Lack of Trust	x
Lack of Information	x
Financial Constraints	x
Lack of Resources	x
Access to Systems	x
Lack of Marketing	x
Efficient Systems	x

4.5 SUMMARY

This chapter described in detail the first case study (DoE) selected for the research study. The Chapter commenced with the case study background, then presented the significance of ICT in education. The use of ICT enables learners to be interactive when learning, increase self-paced learning and allows easy access to learning content. A recap of the research objectives and tools used to collect data was done, four data collection methods utilised were: literature review, observation, in-depth interview and survey. The researcher needed assistants for data collection, they were recruited and trained to ensure they understood the research study. Pilot testing was done, all the mistakes found from the feedback were improved to ensure that the questions were correct and clear. From the observation done at DoE three m-Government services were discovered (School Finder, Social media pages and Student Portal). The in-depth interviews were conducted to find at which level / stage were these m-Government services when rated using the mGMM. The results indicate that two of these m-Government services are at the augmentation stage and the last m-Government service is at the involvement stage. Furthermore, the results indicate that some of the participants find the m-Government services easy to use and other participants would like to see more m-Government services provided in the future. Findings from in-depth interviews regarding the factors that can affect the implementation of m-Government included: technology infrastructure, trust and knowledge management. Factors affecting m-Government derived from survey comprised of fear, lack of trust, lack of information, financial constraints, lack of resources, access systems, lack of marketing and efficient systems. The next chapter focuses on the second case study: DoH.

CHAPTER 5: CASE STUDY 2



5.1 INTRODUCTION

The purpose of this chapter was to examine the second case study, which was conducted at the Department of Health in the Free State Province. Section 5.2 focused on the importance of ICT in health. Section 5.3 discussed data collection and data analysis. Section 5.4 is the summary. The next segment looks at another case study chosen for the study.

5.2 CASE STUDY 2: DoH

5.2.1 Significance of ICT in health

In health the use of ICT is essential as it offers the following benefits:

- Promotes patient-centered health care
- Simplifies retrieval of patient information by using electronic files
- Offers improvements to health system efficiency
- Encourages quality of care and prevents medical errors

5.3 DATA COLLECTION AND DATA ANALYSIS

Four data collection techniques were used in this research study, namely: literature review, observation, in-depth interviews and a survey. Table 5.1 presents research tools used in this study.

Table 5.1: Data Collection Tools

	Research Question	Literature Review	Observation	In-depth interview	Survey
Main Question	To which extent has m-Government services in the Free State been implemented and accepted by the citizens?	√	√	√	√
Sub Questions	Which m-Services have been designed and developed for the citizens?		√	√	
	What is the maturity level of these m-Services?	√		√	
	What are the factors affecting the successful implementation of these m-Services?			√	√

5.3.1 Pilot Testing

Pilot testing of data collection tools was done thoroughly before case study 1 (DoE). The pilot testing process assisted the researcher in improving all data collection tools, such that minor changes had to be made to prepare for the DoH case study. Five participants assisted during this pilot and these participants were excepted from the main data collection (observation and interviews). The feedback from participants did not have much that the researcher could amend.

5.3.2 Observation Findings

The researcher conducted an observational study at the DoH in Free State Province. The Information Technology segment within DoH was targeted, in order to collect the m-Government applications that have been developed for the citizens. During the data collection sessions, the following tools in Figure 5.1 were utilised.

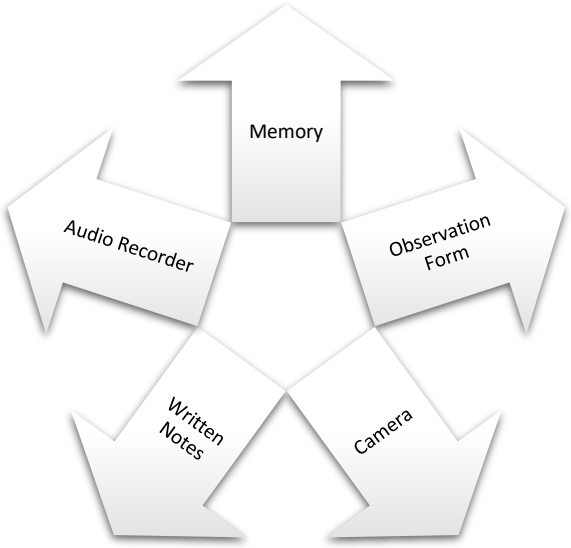


Figure 5.1: Tools used during Observation

The observation at DoH lasted for three weeks, when the researcher had scheduled it for one week. The observation would take two to three hours per day, depending on the availability of the participants. Only two (2) systems / applications were observed at DoH and are presented.

AitaHealth

AitaHealth is a smartphone-based application mainly used to bring preventative support services to societies at a home based level. This is used by Community Health Workers to manage, record and report all health care service information. AitaHealth is able to brace administrative and clinical decision making on real time basis. The following section describes the functionalities supported by AitaHeath.

1. Visit: A community health worker goes to see a patient and captures information about health vitals using a smart phone.

Figure 5.2: Community Health Worker Visit

In order for a community health worker to capture the information they need to sign-in first as illustrated in Figure 5.3.

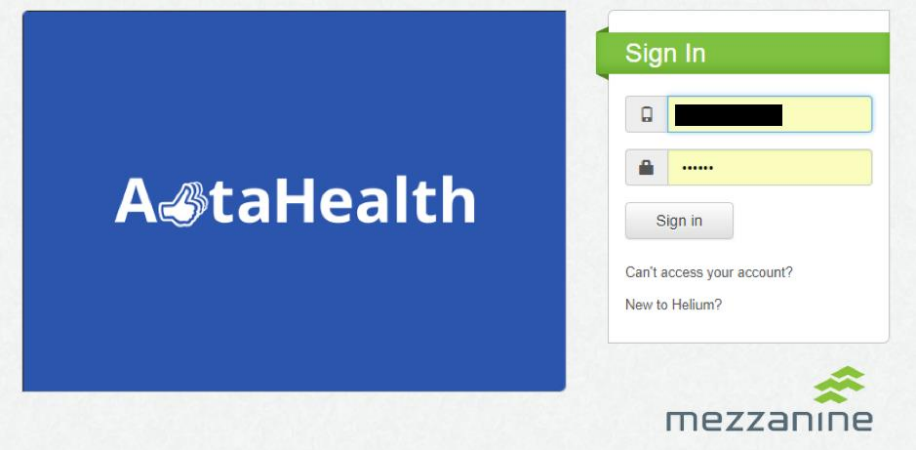


Figure 5.3: AitaHealth Sign-In page

After signing in, AitaHealth home page appears as illustrated in Figure 5.4. An administrator can view his/her team's activities, triage dashboard, manage mobile users, task dashboard and view the reports.

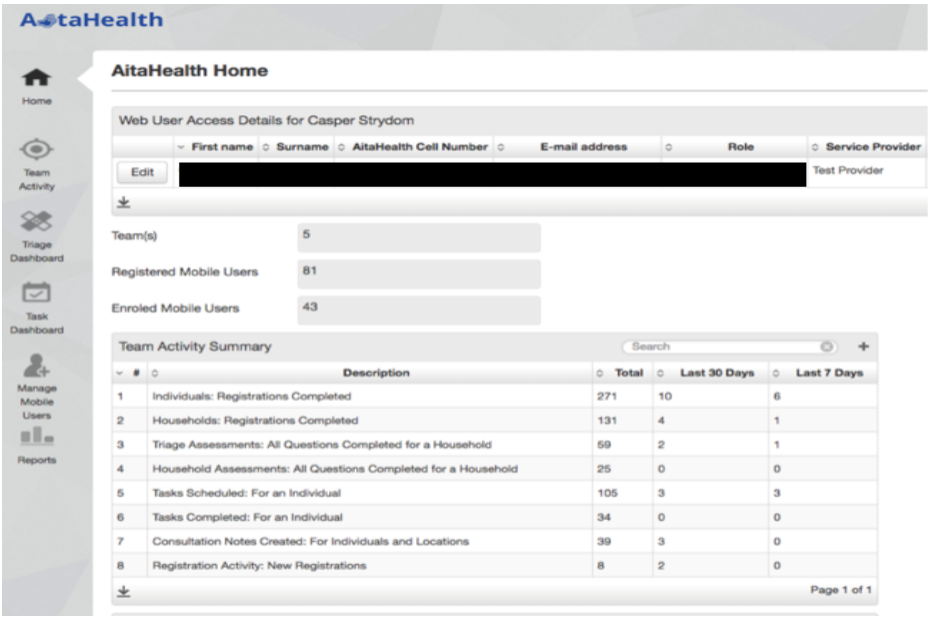


Figure 5.4: AitaHealth Home Page

2. Information Transfer: All the information captured by a community health worker is then transferred to a cloud-based data management system.

Figure 5.5: Smartphone to Cloud

3. Health Professionals: Health vital information can be used by health care professionals or the government to better deliver care to patients and plan for health care needs for the society more effectively.

A health professional can view the information that was captured by a community health worker. Triage dashboard gives an option to view from current day, a day before, the last seven days and up to the last 30 days.

Mom-Connect

Mom-connect is a messaging service essentially designed for women that are pregnant and their infants. Detailed messages on enhancing health, and what to do when confronted with a problem during pregnancy are sent via SMS, depending on the stage of pregnancy of each client mom. MomConnect permits patients to rate the services at the clinics and aims to develop a digital registry of pregnant women. The purpose of MomConnect is to impart health knowledge. Figure 5.6 displays the steps for momConnect registration.

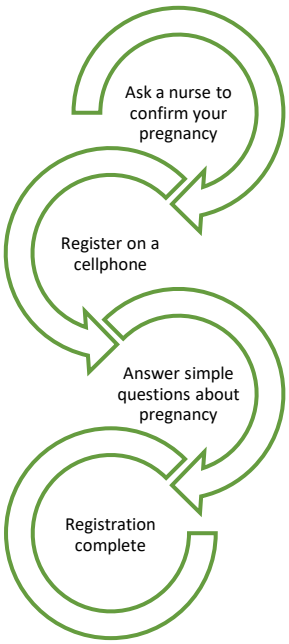


Figure 5.6: MomConnect Registration Steps

Ask a nurse: pregnant women desiring to register are recommended to ask an individual at a public health premises to affirm their pregnancy prior to registering.

Register on cellphone: this requires a cellphone, the number to dial is *134*550# from a mobile phone to register.

Answer simple questions: this stage will require answers to the simple questions. Some of these questions comprises of: Welcome to Department of Health's MomConnect. Please select your language? MomConnect sends free support messages to pregnant mothers. Are you or do you suspect that you are pregnant? To register we need to collect, store and use your info. You may get messages on public holidays and weekends. Do you consent?

Registration complete: this is the end of registration, when successful an SMS will be sent to the pregnant woman welcoming them. Once the registration is complete, the pregnant woman will be able to receive SMS messages relevant to their stage of pregnancy. Expecting mothers are encouraged through momConnect to start ante-natal care, test for conditions such as HIV/Aids, diabetes and hypertension at an early stage of their pregnancy.

Pregnant women will still continue to receive SMS messages for a year after the baby is born, until the baby is two years, where the messages this time will incorporate advice on the baby such as immunization, breastfeeding, check-up periods and family planning for the mother. Numbers to dial for MomConnect are listed in Table 5.2.

Table 5.2: MomConnect Numbers to Dial

Number to Dial	Reason for Each Line
*134*550#	This is a central line for all pregnant mothers to dial when registering for MomConnect, to get all the information concerning pregnancy and it is free of charge. They can also log a complaint or a compliment.
*134*550*1#	This number is used to stop receiving any messages from MomConnect.
*134*550*2#	This allows pregnant mothers to be registered for a full set of messages. A clinic code will be required to complete a registration, only a nurse or clinic representative can be able to register pregnant mothers.
*134*550*3#	Community health workers can dial this number to register a pregnant woman to receive a small set of messages about MomConnect. However, for a full MomConnect program and full set of messages, registration will have to be done at the clinic.
*134*550*4#	The number is used to rate the service. Only pregnant women registered for a full program for MomConnect at a clinic will be able to participate.
*120*550*0#	This number may be used for testing, training purposes or for demonstration.

5.3.4 In-depth Interviews Findings

All necessary arrangements were made for in-depth interviews to be conducted, data was collected using an audio recorder and also written down. In-depth interviews took approximately an hour and a half, where two senior officials from the DoH were interviewed. The researcher reached saturation after interviewing two people, no newer information was presented. IT department consist of small people. Researcher could not interview junior staff members because they were interns and had recently got employed.
The questions were grouped into three categories (Appendix A):

Section 1: Biographical Information
This section captured demographic information, which included gender and age, ethnicity, highest qualification, work experience and experience related to m-Government.

Section 2: m-Government in General
This section focused more on the opinion of participants with regards to m-Government in general.

Section 3: m-Government Applications and Systems
This section captured all mobile-Government applications offered by the department, and the data collected is presented below.

Section 1: Biographical Information

There were two respondents, one male and one female. One participant was between the ages 25-44 and the other participant was between 35-44 years of age. Both participants were

African and held either a degree or postgraduate qualification. Both participants had between 8-11 years of general work experience and 0-3 years of m-Government work experience.

Section 2: m-Government in General

Table 5.3: m-Government

Question 1	How does your organisation define m-Government?
Participant 1	The use of mobile technologies to the provision of internal and external government services or workflows
Participant 2	Essential

The participants defined m-Government as essential, but also as a key driver that allows the department to the provision of internal and external government services as shown in Table 5.3. Both participants perceived m-Government as a subset of e-Government.

The participants indicated that the provincial department does not have an m-Government policy, but national government does have an e-Government policy. One of the participants also explained that within the department there is limited adoption of mobile technologies, which means that e-Government / m-Government proliferation will be slow to non-existent as displayed in Table 5.4.

Table 5.4: m-Government Policies

Question 3	Does your organisation have any m-Government policies?
Participant 1	The national government has an e-Government policy. However, there is still limited adoption of mobile technologies in the department
Participant 2	No

Table 5.5: Challenges Faced with m-Government Implementation

Question 4	What challenges did your organisation encounter associated with m-Government implementation?
Participant 1	User adoption, executive management user and lack of investment on the part of the department to drive user adoption
Participant 2	Some community health care workers are not technological savvy and theft

In Table 5.5 when the respondents were asked about the challenges they faced implementing m-Government, the following was mentioned:

- User adoption
- Lack of investment
- No ICT knowledge

Table 5.6: Ways to Overcome Challenges

Question 5	How did your organisation overcome these challenges or limitations?
Participant 1	The challenges persist, however specialized support from the National Department of Health (NDoH) in terms of resources and continuously improving on the mobile applications to assist
Participant 2	Facilitate training

In Table 5.6 the participants indicated that some of the challenges are still there although the National Department of Health is assisting the department with resources. One participant also emphasised on basic IT training for staff is still needed.

Table 5.7 Lessons Learned and Recommendations to m-Government Implementation

Question 6	What lessons did the organisation learn and would recommend with regards to m-Government implementation?
Participant 1	Ensure executive support, adequate resourcing in terms of skills and budget allocation, drive user adoption, develop agile policies and strategies that ensure scalability
Participant 2	Ensure that the employees are computer literate

In Table 5.7, the participants were asked to list the lessons they have learnt during m-Government implementation in their department, they mentioned the following:

- Develop Agile policies
- Drive user adoption
- Computer training literacy

Section 3: m-Government Applications and Systems

Table 5.8 Names of Applications

Question 1	Name of m-Government applications or systems
Participant 1	Mom-Connect
Participant 2	AitaHeath

In Table 5.8, when respondents were asked about the m-Government applications/ systems they have, they mentioned only two: AitaHealth and MomConnect. It was also noted that one participant was the project leader for one system, while the other was the project leader for the other system. Each participant then answered questions that were related to their own system or project, not the other.

Table 5.9: Applications Description

Question 2	Description of each application?
Participant 1	Mom-connect is a mobile application that uses a USSD strings to assist potential mothers with maternal advice
Participant 2	Aita Health is a ward based outreach system

MomConnect (Table 5.9) was described as a mobile application that uses USSD strings to assist potential mothers with maternal advice, this system is specifically for pregnant women. AitaHealth was described as a ward based outreach system, used by community health workers only at Thabo Mofutsanyane district in the Free State.

The respondents were queried to rate each application according to the mGMM stages. Before the respondents could rate, the researcher described in detail the five stages of mGMM to the participants. The stages of mGMM were ranging from 1-5.

Augmentation ---- Elementary ---- Interaction --- Transactional --- Involvement

Table 5.10: m-Government Maturity Level of Applications

Stages	**AitaHealth**					**MomConnect**				
	1	2	3	4	5	1	2	3	4	5
Participant 1	**X**						**X**			
Participant 2	**X**						**X**			

As seen in Table 5.10 the respondents from DoH rated AitaHealth at the first stage being augmentation and MomConnect was rated at second level of mGMM called elementary.

Factors affecting the successful implementation of m-Services (from In-depth Interviews)

The factors that could affect the implementation of m-Government were identified from the in-depth Interviews; and they are presented in Table 5.11.

Table 5.11: Factors Affecting m-Government Derived from In-depth Interviews

Factors	Participant 1	Participant 2
	DoH	
Technology Infrastructure		
Trust		
User Adoption	x	
Lack of investment	x	
Knowledge Management		
Security		x
Lack of Training		x
Executive Support	x	
Lack of Resources	x	
Agile Policies and Strategies	x	

First participant revealed that factors affecting m-Government implementation consist of the following: user adoption, lack of investment, executive support, lack of resources and agile policies and strategies. The second responded stated two factors being security and lack of training as two factors that affect m-Government implementation.

5.3.5 Survey Findings

The survey consisted of questions and the questions were distributed to citizens living in the Free State. 151 questionnaires were distributed and 115 participants completed the questionnaire. The survey took roughly 30 minutes for each participant to complete. The survey questionnaire was grouped into seven sections:

- **Section 1:** Biographical Information
- **Section 2:** Mobile Phone Usage
- **Section 3:** m-Government in General
- **Section 4:** Traditional Government
- **Section 5:** Factors Influencing Use of Non-use of m-Government Services
- **Section 6:** m-Government Services Offered at DoH in the Free State
- **Section 7:** Measuring the Level of Satisfaction with m-Government Services

Section 1: Biographical Information

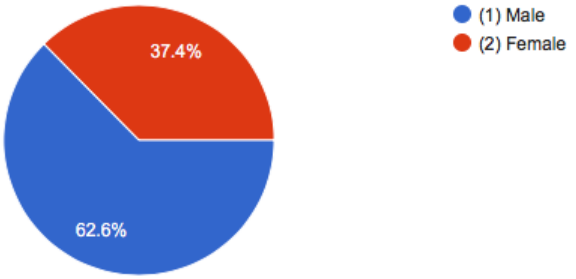


Figure 5.7: Gender

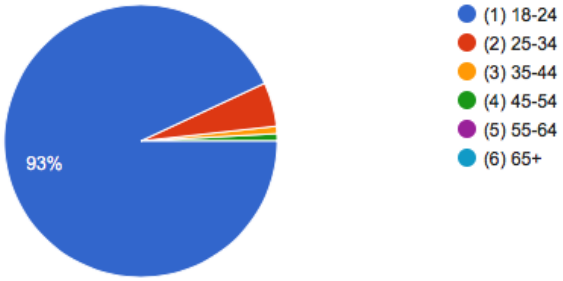


Figure 5.8: Age

As seen in Figure 5.7, out of 115 participants, 62.6% were females and 37.4% were males. The majority (93%) of the respondents were between the ages of 18-24 (Figure 5.8). 91% of the participant were African. About 88% of the participants had a matric qualification and only 10% had a diploma.

As many as 66% of the respondents has an average ICT skill. Out of 115 participants, 44% lived in the township, 38% in urban area and 18% in rural areas.

Section 2: Mobile phone Usage

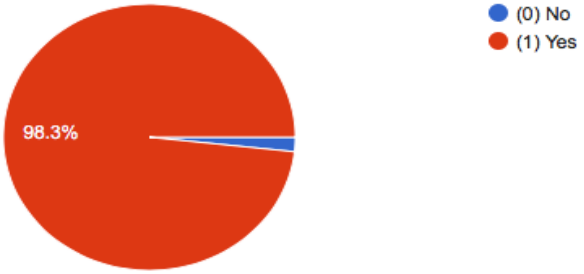


Figure 5.9: Cellphone Ownership

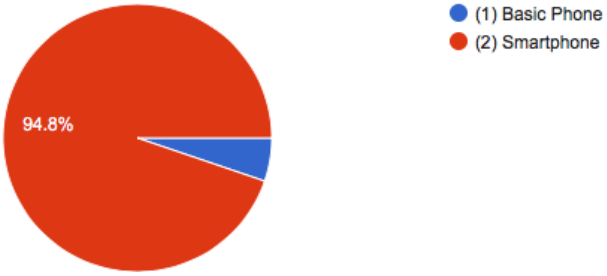


Figure 5.10: Type of phone

As depicted in Figure 5.9, almost all (98.3%) the participants indicated that they had a cellphone. Amongst the participants that had cellphones, 94.8% of them had smartphones as displayed in Figure 5.10.

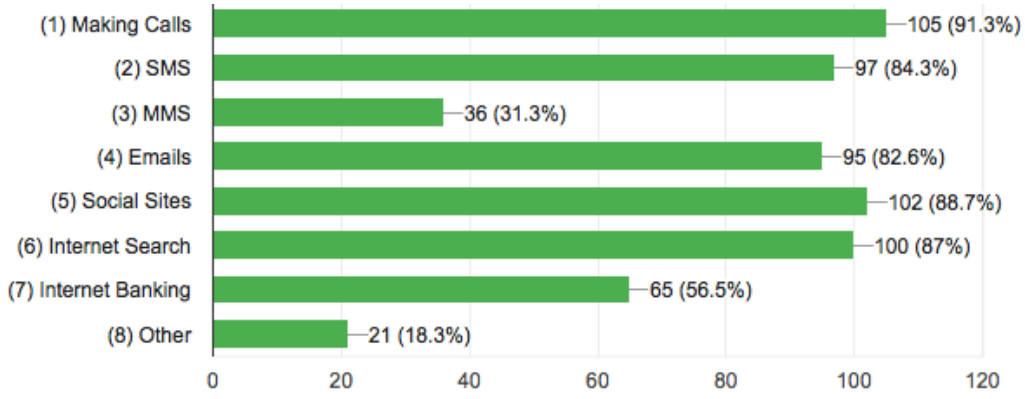


Figure 5.11: Phone Usage

Figure 5.11 indicates that most (91.3%) respondents utilised their cellphones to make calls, followed by accessing social sites (88.7%).

Section 3: m-Government in General

Table 5.12: m-Government

Question	Yes	No
Do you understand what m-Government is?	76%	24%
Do you think m-Government is important and useful?	81%	19%

In Table 5.11, a total of 76% of the participants understood what m-Government is and 81% of the participants thought m-Government was important and useful.

The participants were requested to rate the significance and usefulness for them to be able to interact with government using m-Government. The rating scale was from 1-10, 1 being "not significant" and 10 being "very significant". 71% of the participants indicated that it was very significant and useful for them to use m-Government, whilst 29% indicated that it was not significant.

Section 4: Traditional Government

Table 5.13: Traditional Government

Questions	Yes	No
Do you prefer using traditional government (face-to-face) over m-Government?	58%	42%
Have you encountered any challenges with traditional government services?	65%	35%

According to Table 5.13 58% of the respondents essentially desired the use of m-Government than using the traditional government services. About 65% of the participants had encountered difficulties with traditional government services and mentioned challenges such as: *slow and poor assistance, system offline, language barrier and long queues*.

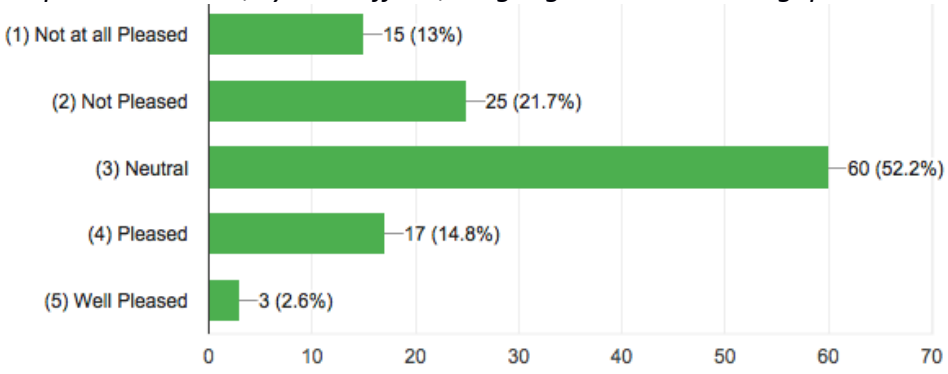


Figure 5.12: Delivery of Traditional Government Services

In Figure 5.12 the participants were asked to rate their satisfaction with traditional government services. The participants had to indicate whether they are “Well pleased” or “Not at all pleased” with these services. 34.7% of the participants indicated that they were not pleased with traditional government services, 17.4% were pleased, whereas the majority (52.5%) of the participants were neutral.
The participants were asked if they trusted traditional government services, the rating scale was 1-10. 1 being “I don’t trust it at all” and 10 being “I trust it very much”. The numbers 1-5 were added together and 6-10 were added together to get the two extremes. In Figure 5.13 71.3% of the participants indicated that they do not trust traditional government services and 28.7% indicated that they do trust traditional government services.

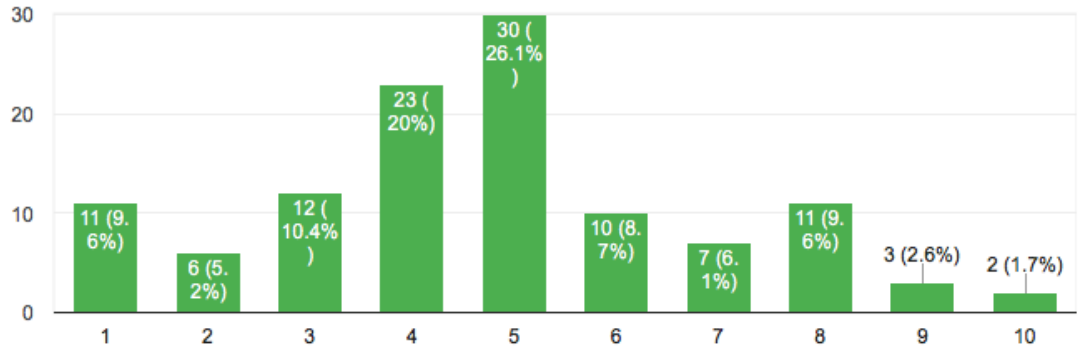


Figure 5.13: Trust Towards Traditional Government Services

The participants were also asked to rate their satisfaction with traditional government services. The rating scale was 1-10. 1 being “Not satisfied at all” and 10 being “Very satisfied”. The numbers 1-5 were added together and 6-10 were added together to get the two extremes. 70.4% were not satisfied, while 29.6% were satisfied with traditional government services.

Section 5: Factors influencing Use or None-use of m-Government Services

Table 5.14 Challenges Using of m-Government Services

Questions	Yes	No
Have you used your phone to access m-Government services?	21%	79%
Have you encountered any challenges with m-Government services?	9%	91%

As seen in Table 5.14, only 21% of the participants indicated they used their cellphones to access m-Government services and 91% of the respondents had not encountered problems with m-Government services.

The participants were asked what are the factors that prevented them from using m-Government services. 73.9% indicated “lack of information” and 27% of the participants indicated “financial constraints” as illustrated in Figure 5.14.

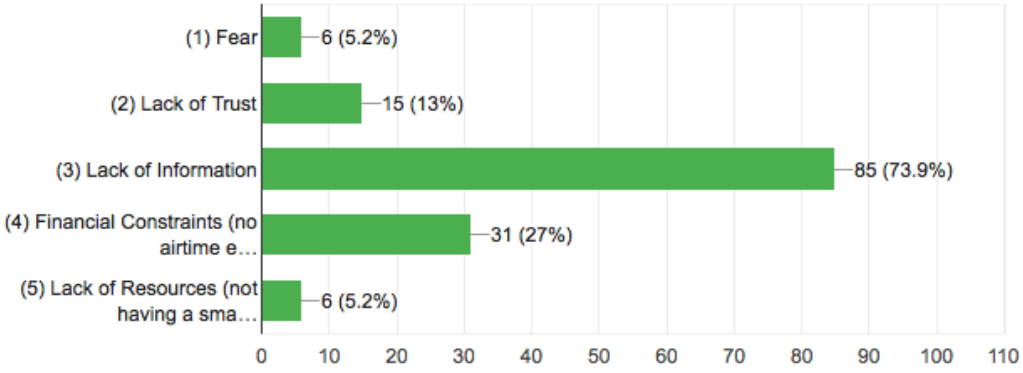


Figure 5.14: Factors Preventing the Use of m-Government

The respondents were questioned if they were “Pleased” or “Not pleased” with the delivery of m-Government services. Responses indicated that 58% of participants were neutral, 15% were not pleased and 27% respondents were pleased with the delivery of m-Government services.

The respondents were requested to rate their level of trust towards m-Government services, the rating scale was 1-10. 1 being “I don’t trust it at all” and 10 being “I trust it very much”. The numbers 1-5 were added together and 6-10 were added together to get the two extremes. 57% of the respondents indicated that they do not trust and 43% of respondents trust m-Government services as shown in Figure 5.15.

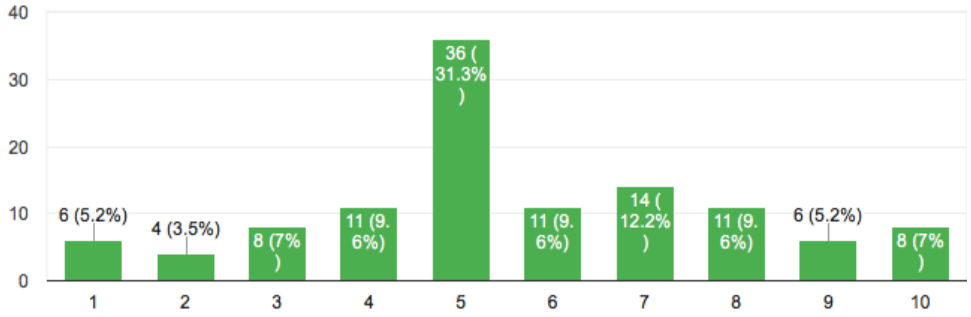


Figure 5.15: Level of Trust with m-Government

The respondents were requested to rate the level of their satisfaction regarding m-Government services. Rating scale was 1-10. 1 being “Not satisfied at all” and 10 being “Very satisfied”. The majority (60%) of respondents are not satisfied and 40% of respondents are satisfied with m-Government services.

Table 5.15: Factors Influencing Use of m-Government Services

Questions	Yes	No
In the future would you use your mobile phone to access m-Government services?	81%	19%

As seen in Table 5.15 about 81% of the respondents would like to use their mobile phones to access m-Government services in the future. Also 25% of the participants indicated that they

would like to see more services being implemented as this would make their lives easier. Some of the systems they mentioned include:

- Automated patient system
- Online booking of doctors and collection of medication
- Capture information on phones
- Wi-Fi in rural areas
- Automated Home Affairs service
- Hospital finder

Section 6: m-Government Services offered at Department of Education in the Free State

93% of the respondents have never used Mom-Connect and only 7% have used Mom-Connect. Most of these respondents indicated that they did not know about the system and as a result 92.2% of the respondents did not benefit from using Mom-Connect.

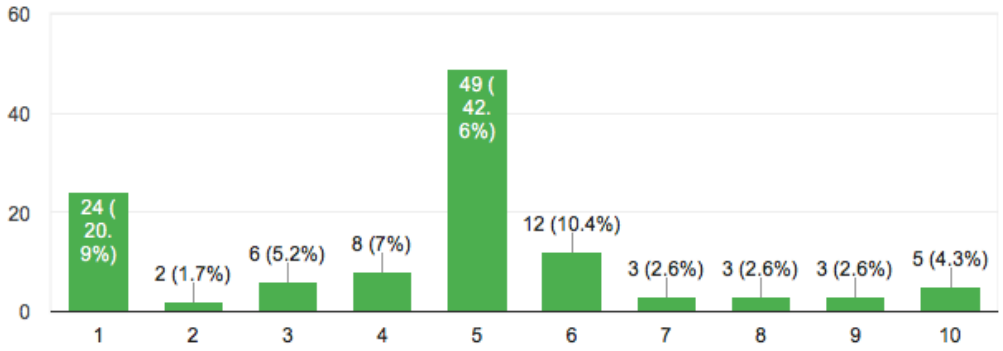


Figure 5.16: Mom-Connect Satisfaction

The participants were requested to rate the level of their satisfaction regarding Mom-Connect. The rating scale was 1-10. 1 being “Not satisfied at all” and 10 being “Very satisfied”. The numbers 1-5 were added together and 6-10 were added together to get the two extremes. In Figure 5.16, 77.5% of the participants were not satisfied with Mom-Connect, whilst 22.5% were satisfied. With regards to AitaHealth, 96.5% of the participants have never used AitaHealth, while 3.5% of the participants have used AitaHealth.

The respondents were requested to rate the level of their satisfaction regarding AitaHealth. The rating scale was 1-10. 1 being “Not satisfied at all” and 10 being “Very satisfied”. 37.9% of the respondents indicated that they were satisfied with AitaHealth, whereas the majority (62.1%) of the participants were not satisfied with AitaHealth.

Section 7: Measuring the Level of Satisfaction with m-Government Services

This section was made up of six statements that the respondents were asked to rate, the rating was on a five-point Likert-scale from SD “Strongly Disagree”, D “Disagree”, N “Neutral”,

A “Agree” and SA “Strongly Agree”. Table 5.16 presents the responses asked regarding m-Government services in a percentage form.

Table 5.16: Department of Health m-Government Services

Statements	SD	D	N	A	SA
Mom-Connect					
1. Mom-Connect provided by the department of health address all my maternal issues	11.3%	10.4%	54.8%	16.6%	6.9%
2. I find Mom-Connect easy to use	12.2%	9.5%	53%	18.3%	7%
3. People who are important to me encourage me to use Mom-Connect	14.8%	15.7%	46.9%	15.7%	6.9%
4. I have basic resources to use Mom-Connect	13.1%	19.1%	40%	17.4%	10.4%
5. I aim to use Mom-Connect regularly	13.9%	13.9%	47.8%	18.3%	6.1%
6. I plan to use Mom-Connect in future	9.6%	8.7%	46.9%	23.5%	11.3%
AitaHealth					
1. The use of AitaHealth enhances my effectiveness	12.2%	8.7%	60.9%	10.4%	7.8%
2. AitaHealth saves me time and money	13.1%	10.4%	55.7%	15.6%	5.2%
3. Government has support for AitaHealth	11.3%	16.5%	49.6%	15.7%	6.9%
4. I have basic resources to use AitaHealth	9.6%	20%	46.1%	20%	4.3%
5. I aim to use AitaHealth regularly	10.4%	13.1%	51.3%	17.4%	7.8%
6. I plan to use AitaHealth in future	6.9%	9.6%	48.7%	22.6%	12.2%

Table 5.16 was presented as follows Strongly Disagree and Disagree were added, neutral remained as it is, Agree and Strongly Agree were added. As illustrated in Table 5.16 only 21.7% participants did not find Mom-Connect easy to use, while 25.3% participants agreed that Mom-Connect was easy to use and 53% participants were not sure (neutral). Only 18.3% of participants do not plan to use Mom-Connect in future, while 34.5% plan to use Mom-Connect in future.

20.9% of participants indicated that AitaHealth does not enhance their effectiveness, 60.9% were neutral and 18.2% thought AitaHealth would enhance their effectiveness. When asked if AitaHealth saves them time and money, 20.8% participants agreed. 48.7% participants were neutral regarding the future use of AitaHealth, whereas 16.5% participants do not plan to use AitaHealth and 34.8% participants plan to use AitaHealth in future.

Factors affecting the successful implementation of m-Services (from Surveys)

The factors that could affect the implementation of m-Government were established from primary data which is surveys and they are presented in Table 5.17.

Table 5.17: Factors Affecting m-Government Derived from Surveys

Factors	DoH
Fear	x
Lack of Trust	x
Lack of Information	x
Financial Constraints	x
Lack of Resources	x
Access to Systems	
Lack of Marketing	
Efficient Systems	

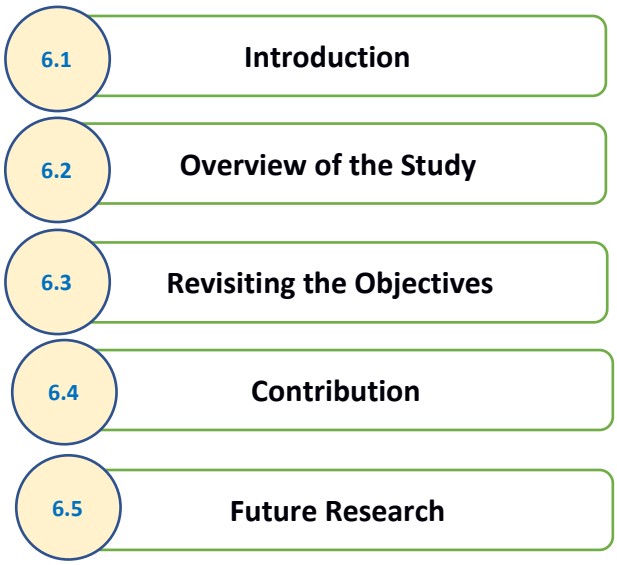
As marked in Table 6.6 results presented five factors as follows fear 5.2%, lack of trust 13%, lack of information 49.6%, financial constraints 27% and lack of resources 5.2% factors that affect the implementation of m-Government from the participants.

5.4 SUMMARY

This chapter reviewed the case study conducted at the Department of Health. The importance of ICT in health was looked at. The data collection and analysis was discussed thoroughly, starting with pilot testing of the data collection tools. For this research study, four data collection tools were used, namely: observation, literature review, survey and in-depth interview. From the observations, the study discovered that the Department offered m-Government services by offering citizens only two mobile applications that they can use (Mom-Connect and AitaHealth).

Mom-Connect was developed by the National Department of Health, but handed down to provincial to make use of. The m-Services currently offered by DoH when rated using mGMM, the results indicate that AitaHealth is at Augmentation stage, while Mom-Connect at Elementary stage. This chapter also discovered factors that affect m-Government services from in-depth interview which included: user adoption, lack of investment, security, lack of training, executive support, lack of resources and agile policies and strategies. While the factors identified from the survey consisted of fear, lack of trust, lack of information, financial constraints and lack of resources. The next chapter summarises the dissertation.

CHAPTER 6: CONCLUSION



6.1 INTRODUCTION

This last chapter of the research study gives a thorough summary of the research outcomes. Section 6.2 presents the overview of the study. Section 6.3 reconsiders research objectives established at the beginning of this study. Section 6.4 highlights the contributions made. Section 6.5 provides future research.

6.2 OVERVIEW OF THE STUDY

The study commenced with chapter 1; this was after the researcher identified the researcher discovered that there is limited research focusing on evaluating the extent to which m-Services has been accepted and adopted by the citizens. The problem description enabled the study to be feasible. The chapter comprised of a primary research question: **To which extent has m-Government services in the Free State been implemented and accepted by the citizens?**

The sub-questions were framed in order to successfully answer the primary research question:

1. **Which m-services have been designed and developed for the citizens?**
2. **What is the maturity level of these m-Services?**
3. **What are the factors affecting the successful implementation of these m-Services?**

Chapter 2 presented a literature review by vigorously looking at the existing information. This chapter defined e-Government, as well as m-Government, stating some challenges and the benefits of m-Government. It also lists types of m-Government services offered in South Africa and also defined a maturity model. Through investigation and comparison an M-Government Maturity Model (mGMM) was proposed. The model is in Figure 6.1.

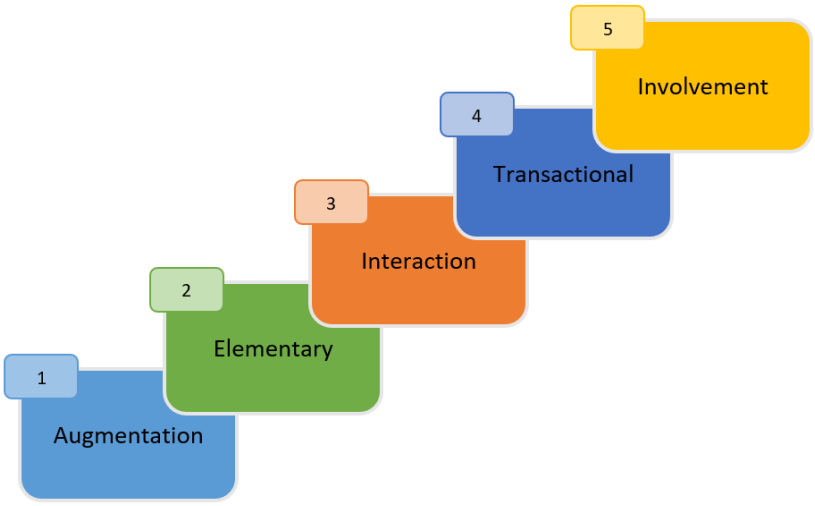


Figure 6.1: Proposed Mobile Government Maturity Model (mGMM)

Chapter 3 focused on the research methodology and design used for this study. This chapter discussed the research approaches, research strategy, data collection and analysis, data triangulation and ethical considerations. The research design is presented in Figure 6.2.

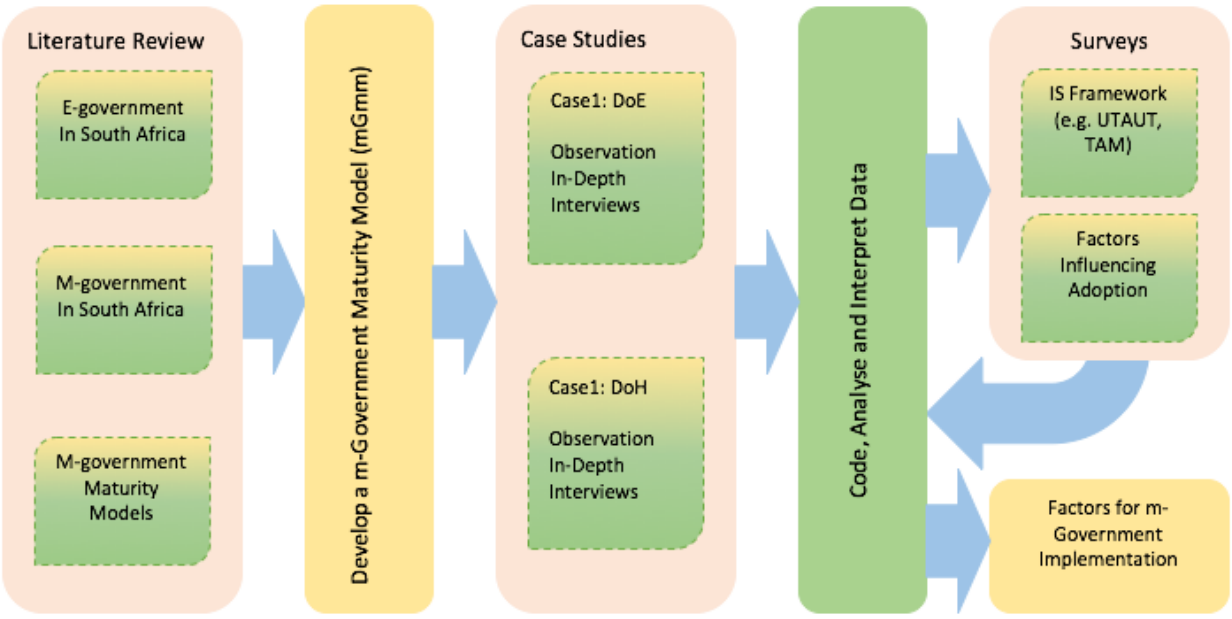


Figure 6.2: Research Design

The data collection commenced with a literature review, followed by the case study which made use of observations to collect data for both DoE and DoH. Then in-depth interviews were conducted, which was followed by the survey. The study was a mixed method study, hence data was collected using a range of data collection tools. This also allowed for data validity and triangulation.

Chapter 4 and 5 presented the two case studies selected for this research study. The first case study concerted on the DoE and the second case study on the DoH. The chapters further discussed the data collection and analysis, by looking at pilot testing and training research assistants. The three (3) systems which were observed at DoE are:

1. School portal
2. Social media pages and
3. School finder

Two (2) systems were observed at DoH:

1. Mom-Connect and
2. AitaHealth

The next section highlights the major findings of the study.

6.3 REVISITING THE OBJECTIVES

The primary research objective and sub-objectives are displayed in Table 6.1:

Table 6.1: Research Objectives and Data Collection Methods

	Research Objectives	Literature Review	Observation	In-depth interview	Survey
Main	To evaluate and measure m-Government implementation in the Free State province and provide the roadmaps and recommendations for future directions.	√	√	√	√
RO1	Investigate m-Services currently available in the Free State province.		√	√	
RO2	Measure and assess the m-Services using mGMM.	√		√	
RO3	Establish the aspects that affect the attainment of m-Services implementation.			√	√

Investigate m-Services currently available in the Free State province

This **sub-objective** was discussed in detail both in chapter 4 and 5. A thorough observation was conducted at two selected Departments, which was followed by in-depth interviews. The results from observation and in-depth interviews revealed that five m-Services were developed for the citizens in the Free State Province. Three of these m-Services are from the Department of Education namely: Schools portal, social media and school finder. The Department of Health also presented two m-Services: AitaHealth and MomConnect presented in Table 6.2.

Table 6.2: M-Services in the Free State – DoE and DoH

Department	System / Application	Description
DoE	Schools portal	The portal allows the learners, parents and teachers to find curriculum content such as e-books, subject related videos, media releases and school related articles.
	Social media	Applications that permits users to create and share content. The social platforms currently expended are Facebook, Instagram and Twitter.
	School finder	Permits assist users to find a school in the Free State. Displays the pass rate of schools selected, number learners per grade.
DoH	Mom-Connect	Mom-connect is a messaging service essentially designed for women that are pregnant and their infants. Messages about improving health, what to do when faced with a problem during pregnancy are sent via SMS depending on the stage of each pregnancy
	AitaHealth	AitaHealth is a smartphone-based application mainly used to deliver preventive care services to communities on a home base level. This is used by Community Health Workers to manage, record and report all health care services information.

Measure and assess the m-Services using mGMM

This **sub-objective** was addressed in chapter 2, 4 and 5. Chapter 2 proposed a suitable mobile Government Maturity Model (mGMM) that can be utlilised to measure and assess m-Services in the Free State province. Figure 6.4 is the proposed mGMM.

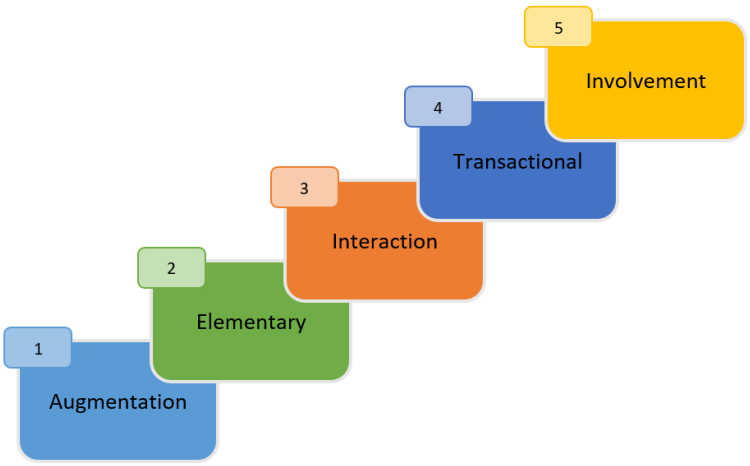


Figure 6.3: Proposed Mobile Government Maturity Model (mGMM)

The in-depth interviews were conducted at DoE and DoH. Table 6.5 presents the assessment results.

Table 6.3: m-Services and mGMM Stages

Department	System / App	Augmentation	Elementary	Interaction	Transactional	Involvement
DoE	School Portal	X				
	Social Media Page					X
	School Finder	X				
DoH	Mom-Connect		X			
	AitaHealth	X				

Using the information presented in Table 6.3 one can infer that Free State government, particularly Health and Education, are not ready to transition to m-Government. Three (3) out of five (5) systems, are still at augmentation stage and only one system is at involvement stage.

Establish the aspects that affect the successful implementation of m-Services

This sub-objective is fully explored in chapter 2, 4 and 5. Chapter 2 discussed the factors from literature in detail, while chapter 4 identified factors from DoE's point of view. Chapter 5 identified factors from DoH's perspective and collectively identified the nine (9) factors that affect m-Government implementation are presented in Table 6.6.

The factors (from the literature) that could influence the implementation of m-Government are presented in Table 6.4.

Table 6.4: Factors Affecting m-Government Derived from the Literature

Factors	Kannan & Chang (2002)	Fasanghari & Samimi (2009)	Goldstuck (2003)	Sandy & McMillan (2005)	Wilson (2012)	Lanvin (2002)	Ogunleye (2017)
Technology Infrastructure		X		X			X
Security	X	X		X		X	
Application Services				X			
Policy				X			
Knowledge Management				X			
Human factors				X	X		
Privacy	X			X		X	
User Needs			X				

The in-depth interviews (from Case 1 and Case 2) revealed factors affecting m-Government implementation as displayed in Table 6.5.

Table 6.5: Factors Affecting m-Government Derived from In-depth Interviews

Factors	Participant 1	Participant 2	Participant 3	Participant 4	Participant 5	Participant 6
	DoE				DoH	
Technology Infrastructure				x		
Trust				x		
User Adoption					x	
Lack of Investment					x	
Knowledge Management	x					
Security						x
Lack of Training						x
Executive Support					x	
Lack of Resources					x	
Agile Policies and Strategies					x	

The surveys (from Case 1 and Case 2) discovered factors affecting m-Government implementation depicted in Table 6.6.

Table 6.6: Factors Affecting m-Government Derived from Surveys

Factors	DoE	DoH
Fear	x	x
Lack of Trust	x	x
Lack of Information	x	x
Financial Constraints	x	x
Lack of Resources	x	x
Access to Systems	x	
Lack of Marketing	x	
Efficient Systems	x	

A lengthy list of factors influencing the successful implementation of m-Government were identified and listed in Table 6.7.

Table 6.7: Long List of Factors for m-Government Implementation

Factors
Technology Infrastructure
Security
Application Services
Policy
Knowledge Management
Human Factors
Privacy
User Needs
Trust
User Adoption
Lack of Investment
Fear
Lack of Training
Executive Support
Lack of Resources
Agile Policies and Strategies
Lack of Information
Financial Constraints
Access to Systems
Lack of Marketing
Efficient Systems

In order to decrease these factors, the study combined any identical factors based on their explanation. At the end of this process, the study identified nine (9) factors that might affect the implementation of m-Government (See Table 6.8).

Table 6.8: Main factors for m-Government Implementation

Factors
Technology Infrastructure
Security, Trust and Privacy
Application Services
Agile Policies and Strategies
Knowledge Management
Human factors
Adequate Investment
Training, Education and Support
Marketing

The recommendation is that as both Departments design and develop m-Government services for the citizens in the Free State province, it is vital that they inform people of new services that have implemented, as this will enhance user adoption. Results from the survey

indicated that 77% of the participants were not using m-Government services, not because they do not want to, but simply due to lack of information. Training is essential at work places to ensure that employees are computer literate. It is necessary for IT applications to be regularly updated. Security measures must be taken into consideration to ensure that employees can trust the applications they work with, in turn this will reduce the fear and lack of trust that the citizens have towards m-Government services.

Support from executive staff members is important. Participants were asked if they would like to use their mobile phones to access m-Government services. The results indicated that 81% of the participants would like to interact with government via m-Government channels. This study recommends the proposed factors for m-Government implementation in Figure 6.4 as a roadmap and future direction for Free State Government. The factors are crucial for the successful implementation of m-Government services.

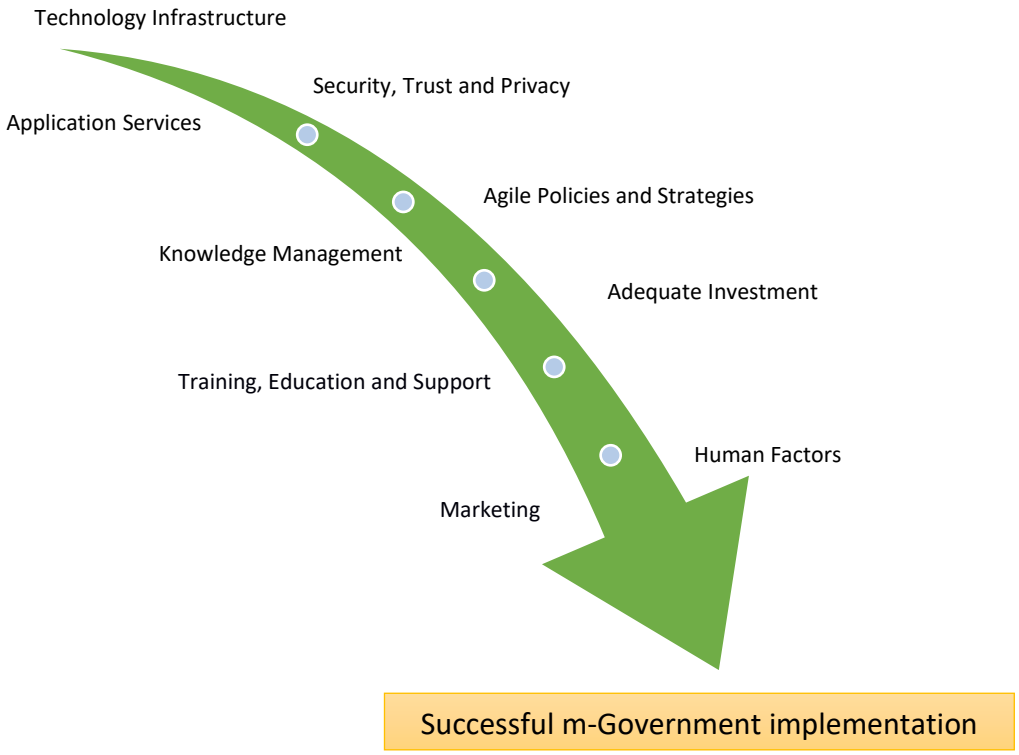


Figure 6.4: Proposed Factors for m-Government Implementation

These proposed factors could serve as a basis in developing a conceptual framework for successful m-Government implementation.

6.4 CONTRIBUTION

In the journey of addressing the research questions for this project, new information was contributed to the existing body of knowledge. The purpose of this study was to evaluate and

measure m-Government implementation in the Free State Province. The main contributions of this study are as follows:

- The researcher was able to identify and present a list of m-Government services implemented in DoE and DoH in the Free State Province.
- A mobile-Government Maturity Model (mGMM) was proposed, this was crucial in this study to assist in evaluating m-Government services.
- A paper-based observation manual developed by the researcher was used as a guide that aided to gather all the important information during observation. Appendix A illustrates the observation manual.
- The study also proposed factors for successful m-Government implementation.

6.5 FUTURE RESEARCH

This study was able to add to the body of knowledge by demonstrating the need for this kind of research. However, the study proposes potential future research that can be conducted, these are listed below:

- A number of studies has been conducted on m-Government using a small sample size, but more research is needed on m-Government, this time with a larger sample size that can be generalised.
- Another study can seek to develop and implement m-Government policy that will deal with factors affecting successful m-Government, including legal issues for the country selected.
- Studies around security in m-Government are limited. Security is a vital factor in ICT, as m-Government continues to gain significant attention especially in developing countries, security needs to be taken into consideration.
- Proposed factors for m-Government need to be evaluated to verify their reliability. The proposed m-Government factors can be evaluated and tested for validity.
- The limitation this study was not interviewing junior staff members, researchers can consider that.
- Researchers can consider the factors as the base when developing a conceptual framework for m-Government.

REFERENCES

Abdelghaffar, H., & Magdy, Y. (2012). The adoption of mobile government services in developing countries: The case of Egypt. *International Journal of Information, 2*(4), 333-341.

Abu-Shanab, E., & Haider, S. (2015). Major factors influencing the adoption of m-government in Jordan. *Electronic Government, an International Journal*, *11*(4), 223-240.

Achieng, M. S. (2013). *The Adoption and Challenges of Electronic Voting Technologies within The South African Context.* Cape Town: Cape Peninsula University of Technology.

Adams, G. R., & Schvaneveldt, J. D. (1991). Understanding research methods 2nd edition.

Ahsan, A., Chang, V., & Issa, T. (2012). *Community perception of mobile payment in e-Government services.* Australasian Conference on Information Systems.

Akinboade, O. A., Mokwena, M. P., & Grobler, W. (2015). An Analysis of Taxpayer Service needs of Private Sector Tax Practitioners from South Africa Revenue Service. *Journal of Administrative Sciences and Policy*, *3*(1), 27-44.

Al Thunibat, A., Zin, N. A., & Sahari, N. (2010). Mobile government services in Malaysia: Challenges an opportunites. *International Symposium on Information Technology, 3*, 1244-1249.

Al Thunibat, A., Zin, N. A. M., & Sahari, N. (2011). Identifying user requirements of mobile government services in Malaysia using focus group method. *Journal of E-Government Studies and Best Practices*, *2011*, 1-14.

Al-Hadidi, A., & Rezgui, Y. (2010). Adoption and diffusion of m-government: Challenges and future directions for research. *In Working Conference on Virtual Enterprises*, 88-94.

Al-Hujran, O. (2012). An assessment of Jordan's e-government maturity: a user-centric perceptive. *International Journal of Electronic Governance, 5*(2), 134-150.

Al-Hujran, O., Al-Debei, A., Chatfield, A., & Migdadi, M. (2015). *The imperative of influencing citizen attitude toward e-government adoption and use* (Vol. 53). Computers in Human Behavior.

Alijerban, M., & Sahafi, F. (2010, May). M-government maturity model with technological approach. In *4th International Conference on New Trends in Information Science and Service Science* (pp. 164-169). IEEE.

Al-Juaifari, M. K. R. (2016). Secure SMS Mobile Transaction with Peer to Peer Authentication Design for Mobile Government. *American Journal of Engineering Research (AJER)*, *4*(11), 143-149.

Almarabeh, T., & AbuAli, A. (2010). A general framework for e-government: Definition maturity challenges, opportunities, and success. *European Journal of Scientific Research, 39*(1), 29-42.

Alomari, M. A., & Elrehail, H. H. (2013). Mobile-Government: Challenges and opportunities Jordan as case study. *International Journal of Electronic Governance, 4*(12).

Alomari, M. A., & Elrehail, H. H. (2013). Mobile-Government: Challenges and opportunities Jordan as case study. *International Journal of Business and Social Science*, *4*(12).

Alrazooqi, M., & De Silva, R. (2010). Mobile and wireless services and technologies for m-government solution proposal for Dubai government. *WSEAS Trans, 7*(8), 1037-1047.

Alzaylaee, M. K., Yerima, S. Y., & Sezer, S. (2016). DynaLog: An automated dynamic analysis framework for characterizing android applications. In *International Conference On Cyber Security And Protection Of Digital Services (Cyber Security)* (pp. 1-8).

Amos, W. (2011). Exploring m-government readiness: The case of Vanuatu. *(Doctoral thesis, Auckland University of Techonolgy*.

Andersen, K. V., & Henriksen, H. Z. (2006). E-government maturity models: Extension of the Layne and Lee model. *Government Information Quarterly, 23*(2), 236-248.

Angrosino, M. V. (2005). Recontextualizing observation: Ethnography, pedagogy, and the prospects for a progressive political agenda.

Atkinson, D. (2007). Taking to the streets: Has developmental local government failed in South Africa. *State of the Nation: South Africa*, *2007*, 53-77.

Bakar, N. S. A., Rahman, A. A., & Hamed, H. N. A. (2016). M-Government services in Malaysia: Issues, challenges and better services to citizen. In *IEEE Conference on e-Learning, e-Management and e-Services (IC3e)* (pp. 116-121).

Bataineh, M., Abu-Shanab, E., & Jdaitawi, A. (2009). M-government in Jordan: Today and the future. *In Proceedings of the 4th International Conference in Information Technology*, 1-9.

Baxter, P., & Jack, S. (2008). Qualitative Case Study Methodology: Study Design and Implementation for Novice Researchers. *The Qualitative Report TQR*, 544-559.

Belanger, F., & Hiller, J. S. (2006). A framework for e-government: privacy implications. *Business Process Management Journal, 12*(1), 48-60.

Bhattacherjee, A. (2012). Social science research: Principles, methods, and practices.

Bird, D. K. (2009). The use of questionnaires for acquiring information on public perception of natural hazards and risk mitigation - A review of current knowledge and practice. *Natural Hazards and Earth System Science, 9*(4), 1307.

Boylan, M., Coldwell, M., Maxwell, B., & Jordan, J. (2018). Rethinking models of professional learning as tools: a conceptual analysis to inform research and practice. *Professional Development in Education, 44*(1), 120-139.

Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research Psychology, 3*(2), 77-101.

Brown, M. A., & Emmert, G. L. (2006). On-line monitoring of trihalomethane concentrations in driking water distribution systems using capillary membrane sampling-gas chromatography. *Analytica Chimica Acta, 555*(1), 75-83.

Bryman, A. (2012). *Social Research Methods 4th edition.* Oxford University Press.

Bryman, A., & Bell, E. (2012). *Business Research Methods.* United Kingdom: Oxford University Press.

Byrne, J., & Humble, A. M. (2007). An introduction to mixed method research. *Atlantic Research Centre for Family - Work Issues*, 1-4.

Campbell, D. T., & Fiske, D. W. (1959). Convergent and discriminant validation by the multitrait-multimethod matrix. *Psychological Bulletin, 56*(2), 81.

carroll, J. (2005). Risky business: Will citizens accept m-government in the long term. *In Euro mGov*, 77-87.

Chan, C. M., & Pan, S. L. (2008). User engagement in e-government systems implementation: A comprehensive case study of two Singaporean e-government initiatives. *The Journal of Strategic Information Systems, 17*(2), 124-139.

Chang, A. M., & Kannan, P. K. (2008). *Leveraging Web 2.0 in government*. Washington, DC: IBM Center for the Business of Government.

Chen, J., Yan, Y., & Mingins, C. (2011). A three-dimensional model for e-government development with cases in China's regional e-government practice and experience. *Management of e-Commerce and e-Government (ICMeCG) fith International Conference*, 113-120.

Chete, F. O., Oyemade, D., Abere, R., Chiemeke, S. C., & Ima-Omasogie, I. (2012). Citizens Adoption of SMS based e-government services in Lagos state, Nigeria". *Journal of Emerging Trends in Computing and Information Sciences*, *3*(4), 654-659.

Cohen, A. P. (2005). Village on the border, anthropology at the crossroads: The significance of a classic British ethnography. *The Sociological Review, 53*(4), 603-620.

Cohen, L., Manion, L., & Morrison, K. (2005). *Research Methods in Education.* Taylor and Francis e-Library.

Cohen, M., Gilboa, I., Jaffray, J. Y., & Schmeidler, D. (2000). An experiment study of updating ambiguous beliefs. *Risk, Decision and Policy, 5*(2), 123-133.

Cho, D. C., & Shin, D. B. (2017). Development of general purpose model for park and green space management system in South Korea. *Spatial Information Research*, *25*(4), 593-604.

Collis, J., & Hussey, R. (2013). Business research: A practical guide for undergraduate and postgraduate students. *Palgrave Macmillan*.

Comulada, W. S., Wynn, A., van Rooyen, H., Barnabas, R. V., Eashwari, R., & van Heerden, A. (2019). Using mHealth to deliver a home-based testing and counseling program to improve linkage to care and ART adherence in rural South Africa. *Prevention Science*, *20*(1), 126-136.

Creamer, E. G., & Ghoston, M. (2013). Using a mixed methods content analysis to analyze mission statements from colleges of engineering. *Journal of Mixed Methods Research, 7*(2), 110-120.

Creswell, J. W. (2009). *Research design qualitative, quantitative and mixed methods approaches.* Los Angeles: SAGE.

Creswell, J. W., & Creswell, J. D. (2017). Research design: Qualitative, quantitative and mixed methods approaches. *Sage Publications*.

Creswell, J. W., Plano, C., Gutmann, M. L., & Hanson, W. E. (2003). Advanced mixed methods research designs. *Handbook of Mixed in Social and Behaviour Research, 209*, 240.

Danial, M. (2014). Electronic government: A case for Papua New Guinea. *DWU Research Journal, 21*, 154-166.

Danyluk, M. (2019). Fungible Space: Competition and Volatility in the Global Logistics Network. *International Journal of Urban and Regional Research*, *43*(1), 94-111.

Davison, J., McLean, C., & Warren, S. (2012). Exploring the visual in organizations and management. *Qualitative Research in Organizations and Management: An International Journal, 7*(1), 5-15.

De Carolis, A., Macchi, M., Negri, E., & Terzi, S. (2017). A maturity model for assessing the digital readiness of manufacturing companies. *In IFIP International Conference on Advances in Production Management Systems*, 13-20.

Denzin, N. K. (2012). Triangulation 2.0. *Journal of Mixed Methods Research, 6*(2), 80-88.

Du Preez, A. (2013). Mandela poster project collective: Mandela: Icon lost and regained: exhibition review. *Image and Text: A Journal for Design, 21*(1), 140-149.

Du Preez, A. (2009). Assessing the m-government readiness within the provincial government Western Cape. *(Doctoral thesis, University of Stellenbosch*.

Dube, L., & Pare, G. (2003). Rigor in Information Systems Positivist Case Research: Current practices, trends and recommendations. *MIS Quarterly, 4*, 597-636.

Dudovskiy, J. (2016). The ultimate guide to writing a dissertation in business studies: a step-by-step assistance. *Pittsburgh, USA*.

Easterby-Smith, M., Lyles, M. A., & Tsang, E. W. (2008). Inter-organizational knowledge transfer: Current themes and future prospects. *Journal of Management Studies, 45*(1), 677-690.

Fasanghari, M., & Samimi, H. (2009). A novel methodology for m-government performance evaluation in fuzzy area. *In Computer Science and Convergence Information Technology. Fourth International Conference*, 335-340.

Fath-Allah, A., Cheikhi, L., Al-Qutaish, R. E., & Idri, A. (2014). E-government maturity models: A comparative study. *International Journal of Software Engineering and Applications, 5*(3), 71.

Flick, U. (2011). *Introducing Research Methodology: A beginners guide to doing research project.* London: SAGE.

Garner, R., & Scott, G. M. (2013). Doing qualitative research: designs, methods and techniques. *Pearson Education*.

Goddard, W., & Melville, S. (2004). *Research Methodology: An introduction 2nd edition.* Oxford: Blackwell Publishing.

Goldstuck, A. (2003). Government Unplugged-Mobile and wireless technologies in the public sector. *Centre of Public Service Innovation, Tshwane, South Africa*.

Goldstuck, A. (2011). Mobility. *World Wide Worx, Johannesburg*.

Gomm, R. (2008). Social research methodology: A critical introduction. *Palgrave Macmillan*.

Goodall, W., Dovey, T., Bornstein, J., & Bonthron, B. (2017). The rise of mobility as a service. *Deloitte Rev*, *20*, 112-129.

Grima-Izquiedo, C. (2010). A generic architecture for e-government and e-democracy: Requirements, design and security risk analysis. *LAP Publishing*.

Haris, F. (2010). IT infrastructure maturity model (ITI-MM: A roadmap to Agile IT infrastructure). *Masters thesis, university of Twente*.

Heeks, R. (2013). Information technology impact sourcing. *Communications of the ACM, 56*(12), 22-25.

Henning, E., Van Rensburg, W., & Smit, B. (2004). *Finding Your Way in Qualitative Research.* Pretoria: Van Schaik.

Hussain, M., & Imran, A. (2014). mGovernment services and adoption: Current research and future direction. *International Working Conference on Transfer and Diffusion of IT*, 311-323.

Jahanshahi, A. A., Khaksar, S. M., Yaghoobi, N. M., & Nawaser, K. (2011). Comprehensive model of mobile government in Iran. *Indian Journal of Science and Technology, 4*(9), 1188-1197.

Jalil, M. M. (2013). *Practical guidelines for conducting research, summarising good research practice in line with DCED standard.* The Donor Committee for Enterprise Development.

Johnson, R., Shaw, J., Berding, J., Gather, M., & Rebstock, M. (2017). European national government approaches to older people's transport system needs. *Transport Policy*, *59*, 17-27.

Joshi, A., Bollen, L., Hassink, H., De Haes, S., & Van Grembergen, W. (2018). Explaining IT governance disclosure through the constructs of IT governance maturity and IT strategic role. *Information and Management, 55*(3), 368-380.

Källander, K., Tibenderana, J. K., Akpogheneta, O. J., Strachan, D. L., Hill, Z., ten Asbroek, A. H., ... & Meek, S. R. (2013). Mobile health (mHealth) approaches and lessons for increased performance and retention of community health workers in low-and middle-income Countries: A review. *Journal of Medical Internet Research*, *15*(1), e17.

Kannan, A. M., & Chang, P. K. (2002). Preparing for Wireless and Mobile Technolgies in Government. *IBM: The Business of Government., Available from: http://www. businessofgovernment. org/allsearch/i ndex. asp*.

Karokola, G., & Yngström, L. (2009). Discussing E-government maturity models for the developing world security view. *In ISSA*, 81-89.

Kennedy, P. (2009). How to combine multiple research methods: Practical triangulation . *Holland Magazine*.

Kern, F.G. (2018). The trials and tribulations of applied triangulation: Weighing different data sources. Journal of Mixed Methods Research, 12 (2), 166-181.

Khobzi, N., Strike, C., Cavalieri, W., Bright, R., Myers, T., Calzavara, L., & Millson, M. (2009). A qualitative study on the initiation into injection drug use: Necessary and background processes. *Addiction Research and Theory, 17*(5), 546-559.

Khothari, C. R. (2009). Research Methodology: Methods and techniques. *New Delhi: New Age International Publishers*.

Khothari, C. R. (2009). Research Methodology: Methods and techniques. *New Delhi: New Age International Publishers*(978-81-224-15222-3).

Kim, D. Y., & Grant, G. (2010). E-government maturity model using the capability maturity model integration. *Journal of Systems and Information Technology, 12*(3), 230-244.

Klauer, K. J., & Phye, G. D. (2008). Inductive reasoning: A training approach. *Review of Educational Research*, *78*(1), 85-123.

Kreuger, L. W., & Neuman, W. L. (2006). Social work research methods: Qualitative and quantitative applications. *Boston and New York: Pearson and Allyn Bacon*.

Lallana, E. C. (2008). mGovernment: Mobile/wireless applications in government. *eGovernment for Development.*

Lanvin, B. 2002. The E-government handbook for developing countries [Online]. Available: www.infodev.org/en/Document.16.pdf.

Lanza, B. B., Gil-Garcia, J. R., & Gimenez, F. (2017). Understanding business models for mobile government: The case of SMS at the Parana Department of Motor Vehicles (DMV). *In Proceedings of the 10th International Conference on Theory and Practice of Electronic Governance*, 590-591.

Lazar, J., Feng, H. J., & Hochheiser. (2010). *Research Methods in Human-Computer Interaction.* UK: Wiley.

Lee, A. S., & Baskerville, R. L. (2003). Generalizing generalizability in information systems research. *Information Systems Research, 14*(3), 221-243.

Lee, G., & Kwak, Y. H. (2012). An open government maturity model for social media-based public engagement. *Government Information Quarterly, 29*(4), 492-503.

Lieber, E., & Weisner, T. (2010). Dedoose [Apparatus and software]. *CA: SocioCultural Research Consultant*.

Linder, M. (2012). Mobile health technology: touching lives across the globe. *Health management technology, 33*(6), 6-7.

Littig, B., & Pochhacker, F. (2014). Socio-translational collaboration in qualitative inquiry: The case of expert interviews. *Qualitative Inquiry, 20*(9), 1085-1095.

Lodico, M. G., Spaulding, D. T., & Voegtle, K. H. (2006). *Methods in educational research: from theory to practice.* San Francisco: Josset-Bass.

Malalgoda , C., Amaratunga, D., & Haigh, R. (2013). Empowering local governments in making cities resilient to disasters: Case study as a research strategy.

Maranny, E. A. (2011). Stage maturity model of m-government (SMM m-Gov): Improving e-government performance by utilizing m-government in a South African. *University of Twente*.

Maumbe, B. M., & Owei, V. (2006). Bringing m-government to South African citizens: Policy framework, delivery challenges and opportunities.

Meerza, A. H., & Beauchamp, G. (2017). Factors influencing attitudes towards information and communication technology (ICT) amongst undergraduates: An empirical study conducted in Kuwait Higher Education Institutions (KHEIs).

Mehlomakulu, S. (2014). The readiness for m-government in a South African provincial government. *(Doctoral thesis, University of the Western Cape)*.

Mengistu, D., Zo, H., & Rho, J. J. (2009). M-government: Opportunities and challenges to deliver mobile government services in developing countries. *In Computer Science and Convergence Information Technology. Fourth International Conference*, 1445-1450.

Mettler, T. (2011). Maturity assessment models: A design science research approach. *International Journal of Society Systems Science, 3*(1-2), 81-98.

Misuraca, G. C. (2013). E-Government 2015: Exploring m-government scenarios, between ICT-driven experiments and citizen-centric implications. In *Foresight for Dynamic Organisations in Unstable Environments* (pp. 131-148). Routledge.

Mitrovic , Z., Thompson, K., Klaas, V., & Mabhele, F. (2014). E-skills for successful m-government in the Western Cape. *In 4th International Conference on Design, development and research*, 273-284.

Mitrovic, Z., & Klaas, N. (2012). The perceived benefits of introducing m-government services in the Western Cape. *In 2012 Conference*.

Mohammad, M. J. (2013). *Practical Guidelines for conducting research, summarising good research practice in line with the DCED standard.* The Donor Committee for Enterprise Development.

Molina-Azorín, J. F., & Cameron, R. A. (2015). History and emergent practices of multimethod and mixed methods in business research. *In The Oxford Handbook of multimethod and mixed methods research inquiry*.

Morse, J. M. (2003). Principles of mixed methods and multimethod research design. *Handbook of mixed methods in social and behavioral research, 1*, 189-208.

Mpinganjira, M. (2013). E-government project failure in Africa: Lessons for reducing risk. *African Journal of Business Management*, *7*(32), 3196-3201.

Mtingwi, J. E. (2012). Mobile government readiness in Africa: The case of Malawi. *(Doctoral Dissertation, University of Cape Town)*.

Mtingwi, J., & Van Belle, J. P. (2013). E-government status and m-government readiness readiness in Malawi. *E-government implementation and practice in developing countries. IG Global*, 211-241.

Muguti, P. K. (2013). Mobile government adoption in Zimbabwe: Lessons learnt from South Korea and South Africa. *Global Information Telecommunications and Technology Program. School of Innovation*.

Mukonza, R. M. (2013). M-government in South Africa's local government: A missed opportunity to enhance public participation? *In Proceedings of the 7th International Conference on Theory and Practice of Electronic Governance*, 374-345.

Mulki, J. P., Jaramillo, J. F., & Locander, W. B. (2009). Critical role of leadership on ethical climate and salesperson behaviors. *Journal of Business Ethics*, *86*(2), 125-141.

Neuman, W. L. (2006). *Social Research Methods: Quantitative and qualitative approaches 6th edition.* Boston: Pearson.

OECD/ITU. (2011). M-government: Mobile technologies for responsive government and connected societies. *OECD Publishing*.

Oghuma, A. P., Park, M. C., & Rho, J. J. (2012). Adoption of mGovernment services initiative in developing countries: A citizen-centric public service delivery perspective.

Ogunleye, O. S. (2017). A framework for enhancing service delivery using mobile technologies: An African countries context. *(Doctoral thesis, University of Cape Town).*

Ogunleye, O. S., Makitla, I., Botha, A., Tomay, J. P., Fogwill, T., Seetharam, D., & Geldenhuys, P. (2011). Mobi4D: A next generation service delivery platform for mobile government services: An African perspective. In *3rd IEEE International Conference on Adaptive Science and Technology (ICAST 2011)* (pp. 15-20).

Ogunleye, O. S., & Van Belle, J. P. (2014). Exploring the success, failure and factors influencing m-government implementation in developing countries. *IST-Africa Conference Proceedings*, 1-10.

Oui-Suk, U. (2010). Introduction of m-government and IT convergence technology. *KAIST Institute for IT Convergence, Daejeon*.

Palka, W., Jurisch, M., Schreiber, V., Wolf, P., & Krcmar, H. (2013). "Mobile government, Quo Vadis?-Opportunities and risks of mobile e-government services". *ICMB*, 19.

Paoli, A. D., & Leone, S. (2015). Challenging conceptual and empirical definition of e-government toward effective e-governance. *International Journal of Social Science and Humanity, 5*(2), 186.

Patel, I., & White, G. (2005). M-government: South African approaches and experiences. In *EURO mGov* (pp. 313-323).

Pew, C., & Klute, G. K. (2017). Pilot testing of a variable stiffness transverse plane adapter for lower limb amputees. *Gait and Posture, 51*, 104-108.

Rajabion, L. (2015). Critical factors for adoption of mobile commerce services. *International Journal of Business and Social Science*, *6*(12), 26-35.

Rogers, E. M. (2003). Diffusion of innovations.

Rubin, H. J., & Rubin, I. S. (2012). *Qualitative Interviewing: The art of hearing data.* London: SAGE Publications.

Sandy, G. A., & McMillan, S. (2005). A success factors model for m-government. *In Euro mGov, 2005*, 349-358.

Saxena, S. (2017). Enhancing ICT infrastructure in public services: Factors influencing mobile government (m-government) adoption in India. *The Bottom Line*, *30*(4), 279-296.

Saunders, M., Lewis, P., & Thornhill, A. (2007). *Research Methods for Business Students 4th edition.* England: Pearson Education Limited.

Saunders, M., Lewis, P., & Thornhill, A. (2009). *Research methods for business students 5th edition.* Pearson Education Limited.

Sekyere, E., Tshitiza, O., & Hart, T. (2016). Levering m-governance innovations for active citizenship engagement.

Shackel, B. (2009). Usability - Context, framework, definition, design and evaluation. Interacting with computers. *21*(6), 339-346.

Sheng, H., & Trimi, S. (2008). M-government: Technologies, applications and challenges. *Electronic Government, An International Journal, 5*(1), 1-18.

Silverman, D. (2013). *Doing Qualitative Research: A practical handbook.* London: SAGE.

Singh, A. K., & Sahu, R. (2008). Integrating internet, telephones and call centers for delivering better quality e-governance to all citizens. *Government Information Quarterly, 25*(3), 477-490.

Solar, M., Sabattin, J., & Parada, V. (2013). A maturity model for assessing the use of ICT in school education. *Educational Technology and Society, 16*(1), 206-218.

Sowaileh, A. H. (2011). A study on the adoption of a mobile government model for the kingdom of Bahrain from the perspective of the government and services providers. *(Doctoral dissertation, Asia university)*.

Statistics. (2018). [Online]. Retrieved February 22, 2018, from (www.statista.com/statistics/3306595/number-of-smartphone-users-worlwide/)

Tair, H. Y., & Abu-Shanab, E. A. (2014). Mobile government services: Challenges and opportunities. *International Journal of Technology Diffusion, 5*(1), 17-25.

Tapia, R. S. (2009). ICoNos MM: The IT-enabled collaborative networked organizations maturity model. *In Working Conference on Virtual Enterprises*, 591-599.

Tassabehji, R. (2005). Inclusion in eGovernment: A security perspective. *In proceedings of eGovernment Workshop, 5*.

Tavakoli, F., Ghasemi, M., & Yaghoubi, N. (2016). A survey of technical factors affecting mobile government implementation in the public services of Fars Province. *Journal of Productivity and Development, 2*(4), 76-85.

Tozsa, I., & Budai, B. (2005). M-government, m-workflow in Hungarian research. *Available: Brightontozsa1-1_2005, 04-29*.

Turck, L. (2016). *An investigation into the utilisation of social media by the SAPS in resolving crime* (Doctoral dissertation).

United Nations. (2014). United Nations Department of Economic and Social Affairs. *United Nations Government Survey, Retrieved 2014-09-16*.

Venkatesh, V., Morris, M. G., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quartely, 27*, 425-478.

Wang, C. (2014). Antecedents and consequences of perceived value in mobile government continuance use: An empirical research in China. *Components in Human Behaviour, 34*, 140-147.

Wei, Z., Gao, X., Jia, D., & Yang, Y. (2010). Research of mobile government based on multi-modal platform with unified engine. *In Intelligent Computing and Integrated Systems. 2010 International Conference*, 786-789.

Welman, J. C., Kruger, F., Mitchelli, B., & Huysamen, G. K. (2005). *Research Methodology.* Cape Town: Oxford University Press Southern Africa.

Wiinbladh, J., Gummeson, E., Ericsson, N., & Queitsch, S. (2006). A survey on mobile readiness in the city of Oresand and its regional context. *Oresund: Europe Innova (Innovation and clusters)*.

Wiles, R., Crow, G., & Pain, H. (2011). Innovation in Qualitative Research Methods: A narrative review. *Qualitative Research, 5*, 587-604.

Wilson, F. (2012). User requirements framework for mobile government in the Western Cape. *(Masters dissertation, Nelson Mandela Metropolitan University*.

WSIS. (2015). Outcomes: A ten-year review/ United Nations. *Trade and Development World Summit on the Information Society*.

Yaghoubi, N. M., Pahlavani, M., & Bakhshimazde, M. (2012). Effective development of mobile government: Governance approach. *International Journal of Business and Development Studies, 4*(1), 87-100.

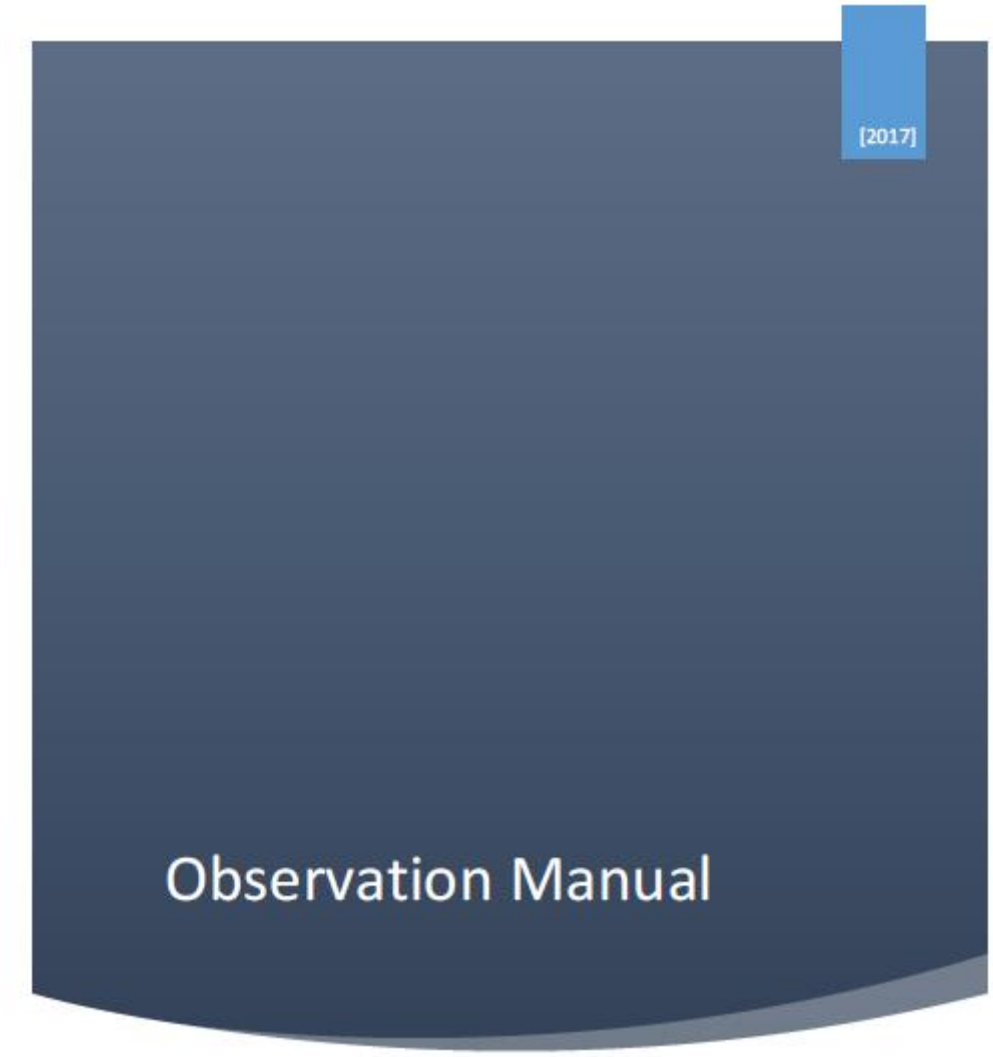
Yin, R. K. (2014). *Case Study Research: Design and methods 5th edition.* CA: SAGE.

Zefferer, T. (2011). Mobile government: E-government for mobile societies. Stocktaking of current trends and initiatives. *Vienna: Secure Information Technology Center.*

Zukang, M. S., Toure, H. I., General, S., & Gurria, M. A. (2011). M-government: Mobile technologies for responsive government and connected societies. *International Telecommunication Union, OECD Publishing*.

APPENDICES

APPENDIX A: Observation Manual



Goal or Aim: To find m-Government services designed or developed for the citizens and get full understanding of how they function.

Observer Name: _____

Date: _____

Time: _____

Place: _____

Actors	Position	Tick where Applicable
	DoE/ DoH Manager	
	Social Media Editor or Analyst	
	Web Developers	

1. Systems or applications implemented

_____

_____

2. Main Objective of system or application

System/App	Objective
A.	
B.	

3. System Compatibility (web-based/mobile)

System/App	Compatibility
A.	
B.	

4. Users of the system or App

System/App	Users
A.	
B.	

5. Accessibility of system or app does it have any limitations in terms of location

_____

_____

_____

6. Any other comments

APPENDIX B: Interview Questions DOE

Interview Questionnaires

My name is Diteboho Refiloe Dlamini and I am currently doing my Masters at Central University of Technology. My dissertation is titled: An evaluation of m-Government services proliferation in South Africa. Aim of this interview questionnaires is to find m-Government services presently available to the community and assess the m-Government maturity level within the Department of Education (DoE) and Department of Health (DoH).

The Survey will take approximately 15 minutes of your time to complete. Participation in this survey is voluntary. You may decide to discontinue answering questions further at any given time and withdraw from this survey. The survey is anonymous and your personal details will not be collected at any time. Thank you so much for taking time to answer this questions. Your corporation is highly appreciated and will contribute to the success of this study. Completing the following questionnaires shows that you are consent.

* Required

Biographical Information

This section we collect detailed description of a person's life.

1. **Gender** *
   Mark only one oval.
   - ◯ Male
   - ◯ Female

2. **Age Group** *
   Mark only one oval.
   - ◯ 18-24
   - ◯ 25-34
   - ◯ 35-44
   - ◯ 45-54
   - ◯ 55-64
   - ◯ 65+

3. **Ethinicity** *
   Mark only one oval.
   - ◯ African
   - ◯ Colored
   - ◯ Indian
   - ◯ White

4. **Highest Qualification** *
Mark only one oval.

- ◯ Grade 8 - Matric
- ◯ Diploma
- ◯ Degree/ Postgraduate

5. **Work Experience** *
Mark only one oval.

- ◯ 0-3 Years
- ◯ 4-7 Years
- ◯ 8-11 Years
- ◯ 12-15 Yeras
- ◯ 16+

6. **Experience Related to m-Government Implementation** *
Mark only one oval.

- ◯ 0-3 Years
- ◯ 4-7 Years
- ◯ 8-11 Years
- ◯ 12-15 Yeras
- ◯ 16+

7. **Current Job Description** *

_____

m-Government in General

This section gather all the information related to m-Government.

8. **How does your organization define m-Government?** *

_____

_____

_____

_____

_____

9. **Does your organization perceive m-Government as a separate issue to e-Government? If so why?** *

10. **Does your organization have any m-Government related policies? Explain.** *

11. **What challenges did your organization encounter associated with m-Government implementation?** *

12. **How did your organization overcome these challenges or limitations?** *

13. **What lessons did the organization learn and would recommend with regards to m-Government implementation?** *

m-Government Applications or Systems

This section we accumulated all the systems or applications that the organization has successfully adopted.

14. **Name of Application or System?** *

15. **Description of each?** *

16. **Target Population?** *

17. **Benefits of system or application?** *

18. **Rate application 1 based on m-Government Maturity Levels** *
Check all that apply.

- [ ] Augmentation
- [ ] Elementary
- [ ] Interaction
- [ ] Transactional
- [ ] Involvement

19. **Rate system 1 based on m-Government Maturity Levels** *
Check all that apply.

- [ ] Augmentation
- [ ] Elementary
- [ ] Interaction
- [ ] Transactional
- [ ] Involvement

APPENDIX C: Interview Questions DOH

Interview Questionnaires

My name is Diteboho Refiloe Dlamini and I am currently doing my Masters at Central University of Technology. My dissertation is titled: An evaluation of m-Government services proliferation in South Africa. Aim of this interview questionnaires is to find m-Government services presently available to the community and assess the m-Government maturity level within the Department of Education (DoE) and Department of Health (DoH).

The Survey will take approximately 15 minutes of your time to complete. Participation in this survey is voluntary. You may decide to discontinue answering questions further at any given time and withdraw from this survey. The survey is anonymous and your personal details will not be collected at any time. Thank you so much for taking time to answer this questions. Your corporation is highly appreciated and will contribute to the success of this study. Completing the following questionnaires shows that you are consent.

* Required

Biographical Information

This section we collect detailed description of a person's life.

1. **Gender** *
   Mark only one oval.
   - ◯ Male
   - ◯ Female

2. **Age Group** *
   Mark only one oval.
   - ◯ 18-24
   - ◯ 25-34
   - ◯ 35-44
   - ◯ 45-54
   - ◯ 55-64
   - ◯ 65+

3. **Ethinicity** *
   Mark only one oval.
   - ◯ African
   - ◯ Colored
   - ◯ Indian
   - ◯ White

4. **Highest Qualification** *
Mark only one oval.

- ◯ Grade 8 - Matric
- ◯ Diploma
- ◯ Degree/ Postgraduate

5. **Work Experience** *
Mark only one oval.

- ◯ 0-3 Years
- ◯ 4-7 Years
- ◯ 8-11 Years
- ◯ 12-15 Yeras
- ◯ 16+

6. **Experience Related to m-Government Implementation** *
Mark only one oval.

- ◯ 0-3 Years
- ◯ 4-7 Years
- ◯ 8-11 Years
- ◯ 12-15 Yeras
- ◯ 16+

7. **Current Job Description** *

m-Government in General

This section gather all the information related to m-Government.

8. **How does your organization define m-Government?** *

9. **Does your organization perceive m-Government as a separate issue to e-Government? If so why?** *

10. **Does your organization have any m-Government related policies? Explain.** *

11. **What challenges did your organization encounter associated with m-Government implementation?** *

12. **How did your organization overcome these challenges or limitations?** *

13. **What lessons did the organization learn and would recommend with regards to m-Government implementation?** *

m-Government Applications or Systems

This section we accumulated all the systems or applications that the organization has successfully adopted.

14. **Name of Application or System?** *

15. **Description of each?** *

16. **Target Population?** *

17. **Benefits of system or application?** *

18. **Rate application 1 based on m-Government Maturity Levels** *
Check all that apply.

- [ ] Augmentation
- [ ] Elementary
- [ ] Interaction
- [ ] Transactional
- [ ] Involvement

19. **Rate system 1 based on m-Government Maturity Levels** *
Check all that apply.

- [ ] Augmentation
- [ ] Elementary
- [ ] Interaction
- [ ] Transactional
- [ ] Involvement

APPENDIX D: Survey Questionnaire DOE

mobile-Government Survey for Citizens

My name is Diteboho Refiloe Mokhohlane, I am currently doing my Masters degree at Central University of Technology. My dissertation is titled: An evaluation of m-Government services proliferation in South Africa. The main purpose of this survey is to collect data on m-Government services that the citizens are using and know of, particularly at the Department of Education (DoE) and Department of Health (DoH). Also, to find factors that are influencing the use or non-use of m-Government services and collect information on m-Government services they would like to use in the future.

The Survey will take roughly 15 minutes of your time to complete. Participation in this survey is voluntary. You may decide to discontinue answering questions further at any given time and withdraw from this survey. The survey is anonymous and your personal details will not be collected at any time. Thank you so much for taking time to answer this questionnaire. Your corporation is highly appreciated and will contribute to the success of this study. Completing the following survey shows that you are consent.

* Required

Biographical Information

This section gathers biographical information.

1. **Gender** *
   Mark only one oval.
   - ◯ (0) Male
   - ◯ (1) Female

2. **Age Group** *
   Mark only one oval.
   - ◯ (1) 18-24
   - ◯ (2) 25-34
   - ◯ (3) 35-44
   - ◯ (4) 45-54
   - ◯ (5) 55-64
   - ◯ (6) 65+

3. **Ethnicity** *
   Mark only one oval.
   - ◯ (1) African
   - ◯ (2) Coloured
   - ◯ (3) Indian
   - ◯ (4) White

4. **Highest Qualification** *
Mark only one oval.

- (1) Below Matric
- (2) Matric
- (3) Diploma
- (4) Degree
- (5) Postgraduate

5. **Level of ICT skills** *
Mark only one oval.

- (1) High Skill
- (2) Average Skill
- (3) Minimum Skill

6. **Residential Area** *
Mark only one oval.

- (1) Rural
- (2) Township
- (3) Urban

Mobile Phone Usage

This section collects data based on the phone usage and personal preferences.

7. **Do you have a cellphone?** *
Mark only one oval.

- (0) No
- (1) Yes

8. **Type of Phone?** *
Mark only one oval.

- (1) Basic Phone
- (2) Smartphone

9. **Phone Usage?** *
Check all that apply.

- [ ] (1) Making Calls
- [ ] (2) SMS
- [ ] (3) MMS
- [ ] (4) Emails
- [ ] (5) Social Sites
- [ ] (6) Internet Search
- [ ] (7) Internet Banking
- [ ] (8) Other

10. **State other**

_____

m-Government in General

This section collects data related to mobile-government (m-Government). Mobile-Government allows the delivery of government services both internally and externally through the use of mobile technologies such as portable computers, mobile phones and Personal Digital Assistant (PDA).

Likert scale ratings: Strongly Disagree (SD), Disagree (D), Neutral (N), Agree (A), Strongly Agree (SA)

11. **Do you understand what is m-Government?** *
Mark only one oval.

- ◯ (0) No
- ◯ (1) Yes

12. **Do you think m-Government is important and useful?** *
Mark only one oval.

- ◯ (0) No
- ◯ (1) Yes

13. **Rate how significant and useful it would be for you to be able to interact with government using m-Government services?** *
Mark only one oval.

	1	2	3	4	5	6	7	8	9	10	
Not Significant at all	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	Very Significant

Traditional Government

This section collects data based on individual preference regarding traditional government.

14. **Do you prefer using traditional government (face-to-face) over m-Government services?** *
Mark only one oval.

- ◯ (0) No
- ◯ (1) Yes

15. **Have you encountered any challenges with traditional government services?** *
Mark only one oval.

- ◯ (0) No
- ◯ (1) Yes

16. **If yes, please indicate the challenges?**

_____

_____

_____

_____

_____

17. **How pleased are you with the delivery of traditional government?** *
Check all that apply.

- ☐ (1) Not at all Pleased
- ☐ (2) Not Pleased
- ☐ (3) Neutral
- ☐ (4) Pleased
- ☐ (5) Well Pleased

18. **Rate the trust you have towards traditional government services?** *
Mark only one oval.

	1	2	3	4	5	6	7	8	9	10	
I don't trust at all	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	I trust it very much

19. **Rate your satisfaction with the traditional government services?** *
Mark only one oval.

	1	2	3	4	5	6	7	8	9	10	
Not Satisfied at all	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	Very Satisfied

Factors influencing use or non-use of m-Government services?

This section collects data to discover personal reasons for the use or non-use of mobile based applications offered.

20. **Have you used your phone to access m-Government services?** *
Mark only one oval.

- ◯ (0) No
- ◯ (1) Yes

21. **If no, what are the factors preventing you from using m-Government?** *
Check all that apply.

- ☐ (1) Fear
- ☐ (2) Lack of Trust
- ☐ (3) Lack of Information
- ☐ (4) Financial Constraints (no airtime etc.)
- ☐ (5) Lack of Resources (not having a smartphone)

22. **State other factors**

_____

_____

_____

_____

_____

23. **Have you encountered any challenges with m-Government services?** *
Mark only one oval.

- ◯ (0) No
- ◯ (1) Yes

24. **If yes, please indicate the challenges?**

25. **How pleased are you with delivery of m-Government?** *
Check all that apply.

- [ ] (1) Not at all Pleased
- [ ] (2) Not Pleased
- [ ] (3) Neutral
- [ ] (4) Pleased
- [ ] (5) Well Pleased

26. **Rate the trust you have towards m-Government services?** *
Mark only one oval.

	1	2	3	4	5	6	7	8	9	10	
I don't trust it at all	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	I trust it very much

27. **Rate your satisfaction with the m-Government services?** *
Mark only one oval.

	1	2	3	4	5	6	7	8	9	10	
Not Satisfied at all	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	Very Satisfied

28. **In the future would you use your mobile phone to access m-Government services?** *
Mark only one oval.

- ◯ (0) No
- ◯ (1) Yes

29. **Is there any m-Government services you would like to see happening?** *
Mark only one oval.

- (0) No
- (1) Yes

30. **If Yes, what?**

_____

_____

_____

_____

_____

m-Government Services Offered at Department of Education (DoE) in the Free State

This section collects data related to m-Government systems and applications for public service delivery.

31. **Have you accessed social media platform(s) offered by DoE?** *
Mark only one oval.

- (0) No
- (1) Yes

32. **If yes, which social media platform(s) offered by DoE?**
Check all that apply.

- [ ] (1) Facebook
- [ ] (2) Twitter
- [ ] (3) Instagram

33. **For what purpose do you access the above mentioned social media pages?**

_____

_____

_____

_____

_____

34. **Are you benefiting from accessing the social media pages?** *
Mark only one oval.

- (0) No
- (1) Yes

35. **Please explain** *

36. **Rate your satisfaction with the social media pages?** *
Mark only one oval.

	1	2	3	4	5	6	7	8	9	10	
Not Satisfied at all	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	Very Satisfied

Measuring the Level of Satisfaction with m-Government Services

This segment collects data based on individual perspective regarding social media platform(s): facebook, instagram and / or twitter offered by the Department of Education.

37. **Performance Expectancy** *
Mark only one oval per row.

	SD	D	N	A	SA
I find social media provided by the Department of Education useful for offering the news instantly	◯	◯	◯	◯	◯
Social media enables me to view published events quickly at all times	◯	◯	◯	◯	◯
Using social media provided by the Department of Education improves my participation online	◯	◯	◯	◯	◯
Social media make it easier for me to communicate instantly with the Department of Education and other people	◯	◯	◯	◯	◯

38. **Effort Expectancy** *

Mark only one oval per row.

	SD	D	N	A	SA
I find it easy to develop the skills needed to use social media					
My interaction with social media is understandable					
I find social media easy to use					
I find it easy to learn how to operate social media					

39. **Social Influence** *

Mark only one oval per row.

	SD	D	N	A	SA
People who influence my behaviour think that I should use social media					
People who are important to me advice me to use social media					
People who have used social media think that I should use it					
Department of Education provide important information on social media and encourages all citizens to participate					

40. **Facilitating Conditions** *

Mark only one oval per row.

	SD	D	N	A	SA
I have basic resources to use social media					
I have necessary knowledge to use social media					
Using social media fits well with my lifestyle					
I have necessary understanding to deal with social media functions					

41. **Behavioural Intention** *

Mark only one oval per row.

	SD	D	N	A	SA
I aim to use social media regularly					
I intend to use social media in the next 3 months					
I predict that I would use social media in the next 3 months					
I plan to use social media in future					

m-Government Services Offered at Department of Education (DoE) in the Free State

School Finder

School finder allows any person to review all schools located in the Free State (it displays the pass rate for each year per school, number of learners per grade, if the school has boarding facilities etc.). The listing is categorised by district or town, this is established by the Department of Education.

42. **Have you used school finder offered by DoE?** *
Mark only one oval.

- ◯ (0) No
- ◯ (1) Yes

43. **For what purpose do you use school finder?**

_____

_____

_____

_____

_____

44. **Are you benefiting from using school finder?** *
Mark only one oval.

- ◯ (0) No
- ◯ (1) Yes

45. **Please explain** *

_____

_____

_____

_____

_____

46. **Is there any feature you would like to be incorporated on school finder?** *
Mark only one oval.

- ◯ (0) No
- ◯ (1) Yes

47. **If yes, what?**

48. **Rate you satisfaction with school finder?** *
Mark only one oval.

	1	2	3	4	5	6	7	8	9	10	
Not Satisfied at all	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	Very Satisfied

Measuring the Level of Satisfaction with m-Government Services

This section collects data based on individual inclination regarding school finder offered by the Department of Education.

49. **Performance Expectancy** *
Mark only one oval per row.

	SD	D	N	A	SA
I find school finder useful to get a proper school	◯	◯	◯	◯	◯
School finder make it easier for me to get instant response	◯	◯	◯	◯	◯
Using school finder enables me to quickly locate school around my area	◯	◯	◯	◯	◯
School finder save me money and time	◯	◯	◯	◯	◯

50. **Effort Expectancy** *
Mark only one oval per row.

	SD	D	N	A	SA
I find it easy to develop the skills needed to use school finder	◯	◯	◯	◯	◯
I find school finder easy to use	◯	◯	◯	◯	◯
My interaction with school finder is clear	◯	◯	◯	◯	◯
I find it easy to learn how to operate school finder	◯	◯	◯	◯	◯

51. **Social Influence** *
Mark only one oval per row.

	SD	D	N	A	SA
People who influence my behaviour think that I should use school finder					
People who have used school finder think that I should use it					
People who are important to me advice me to use school finder					
Department of Education provide important information on school finder and encourages all citizens to participate					

52. **Facilitating Conditions** *
Mark only one oval per row.

	SD	D	N	A	SA
I have basic resources to use school finder					
I have the necessary knowledge to use school finder					
Using school finder fits well with my life style					
Government provide all the resources needed to use school finder and they are available to everyone					

53. **Behavioural Intention** *
Mark only one oval per row.

	SD	D	N	A	SA
I aim to use school finder regularly					
I intend to use school finder in the next 3 months					
I predict that I would use school finder in the next 3 months					
I plan to use school finder in future					

m-Government Services Offered at Department of Education (DoE) in the Free State

Student Portal

Student portal enable learners, teachers and parents to find curriculum content such as e-books, subject related videos, media releases and school related articles offered by Department of Education. The schools portal can be accessed using any digital devices like cell phones, tablets and laptops.

54. **Have you used a student / school portal by DoE?** *
Mark only one oval.

- (0) No
- (1) Yes

55. **For what purpose do you use student portal?**

56. **Are you benefiting from using student portal?** *
Mark only one oval.

- (0) No
- (1) Yes

57. **Please explain** *

58. **Is there any feature you would like to be incorporated on student portal?** *
Mark only one oval.

- (0) No
- (1) Yes

59. **If yes, what?**

60. **Rate your satisfaction with student portal?** *
Mark only one oval.

	1	2	3	4	5	6	7	8	9	10	
Strongly Disagree	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	Strongly Agree

Measuring the Level of Satisfaction with m-Government Services

This section collects data based on individual perception regarding student portal.

61. **Performance Expectancy** *
Mark only one oval per row.

	SD	D	N	A	SA
I find student portal provided by the Department of Education useful to improve my performance	◯	◯	◯	◯	◯
The use of student portal enables me to accomplish school related tasks quickly	◯	◯	◯	◯	◯
Using school portal increase my effectiveness towards education	◯	◯	◯	◯	◯
Student portal make it easy for me to get school content immediately	◯	◯	◯	◯	◯

62. **Effort Expectancy** *
Mark only one oval per row.

	SD	D	N	A	SA
I find it easy to develop the skills needed to use student portal	◯	◯	◯	◯	◯
My interaction with student portal is understandable	◯	◯	◯	◯	◯
I find it easy to learn how to operate student portal	◯	◯	◯	◯	◯
I find student portal easy to use	◯	◯	◯	◯	◯

63. **Social Influence** *

Mark only one oval per row.

	SD	D	N	A	SA
People who influence my behaviour think that I should use student portal					
People who have used student portal think that I should use it					
People who are important to me advice me to use student portal					
Department of Education provide important information on student portal and encourages all citizens to participate					

64. **Facilitating Conditions** *

Mark only one oval per row.

	SD	D	N	A	SA
I have the necessary knowledge to use student portal					
I have basic resources to use student portal					
Using student portal fits well with my life style					
Government provide all the resources needed to use student portal					

65. **Behavioural Intention** *

Mark only one oval per row.

	SD	D	N	A	SA
I aim to use student portal regularly					
I intend to use student portal in the next 3 months					
I predict that I would use student portal in the next 3 months					
I plan to use student in future					

APPENDIX E: Survey Questionnaire DOH

mobile-Government Survey for Citizens

My name is Diteboho Refiloe Mokhohlane, I am currently doing my Masters degree at Central University of Technology. My dissertation is titled: An evaluation of m-Government services proliferation in South Africa. The main purpose of this survey is to collect data on m-Government services that the citizens are using and know of, particularly at the Department of Education (DoE) and Department of Health (DoH). Also, to find factors that are influencing the use or non-use of m-Government services and collect information on m-Government services they would like to use in the future.

The Survey will take roughly 15 minutes of your time to complete. Participation in this survey is voluntary. You may decide to discontinue answering questions further at any given time and withdraw from this survey. The survey is anonymous and your personal details will not be collected at any time. Thank you so much for taking time to answer this questionnaire. Your corporation is highly appreciated and will contribute to the success of this study. Completing the following survey shows that you are consent.

* Required

Biographical Information

This section gathers biographical information.

1. **Gender** *
   Mark only one oval.
   - ◯ (1) Male
   - ◯ (2) Female

2. **Age Group** *
   Mark only one oval.
   - ◯ (1) 18-24
   - ◯ (2) 25-34
   - ◯ (3) 35-44
   - ◯ (4) 45-54
   - ◯ (5) 55-64
   - ◯ (6) 65+

3. **Ethnicity** *
   Mark only one oval.
   - ◯ (1) African
   - ◯ (2) Coloured
   - ◯ (3) Indian
   - ◯ (4) White

4. **Highest Qualification** *
Mark only one oval.

- (1) Below Matric
- (2) Matric
- (3) Diploma
- (4) Degree
- (5) Postgraduate

5. **Level of ICT skills** *
Mark only one oval.

- (1) High Skill
- (2) Average Skill
- (3) Minimum Skill

6. **Residential Area** *
Mark only one oval.

- (1) Rural
- (2) Township
- (3) Urban

Mobile Phone Usage

This section collects data based on the phone usage and personal preferences.

7. **Do you have a cellphone?** *
Mark only one oval.

- (0) No
- (1) Yes

8. **Type of Phone?** *
Mark only one oval.

- (1) Basic Phone
- (2) Smartphone

9. **Phone Usage?** *
Check all that apply.

- [ ] (1) Making Calls
- [ ] (2) SMS
- [ ] (3) MMS
- [ ] (4) Emails
- [ ] (5) Social Sites
- [ ] (6) Internet Search
- [ ] (7) Internet Banking
- [ ] (8) Other

10. **State other**

_____

m-Government in General

This section collects data related to mobile-government (m-Government). Mobile-Government allows the delivery of government services both internally and externally through the use of mobile technologies such as portable computers, mobile phones and Personal Digital Assistant (PDA).

Likert scale ratings: Strongly Disagree (SD), Disagree (D), Neutral (N), Agree (A), Strongly Agree (SA)

11. **Do you understand what is m-Government?** *
Mark only one oval.

- ◯ (0) No
- ◯ (1) Yes

12. **Do you think m-Government is important and useful?** *
Mark only one oval.

- ◯ (0) No
- ◯ (1) Yes

13. **Rate how significant and useful it would be for you to be able to interact with government using m-Government services?** *
Mark only one oval.

	1	2	3	4	5	6	7	8	9	10	
Not Significant at all	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	Very Significant

Traditional Government

This section collects data based on individual preference regarding traditional government.

14. **Do you prefer using traditional government (face-to-face) over m-Government services?** *
Mark only one oval.

- ◯ (0) No
- ◯ (1) Yes

15. **Have you encountered any challenges with traditional government services?** *
Mark only one oval.

- ◯ (0) No
- ◯ (1) Yes

16. **If yes, please indicate the challenges?**

_____

_____

_____

_____

_____

17. **How pleased are you with the delivery of traditional government?** *
Check all that apply.

- ☐ (1) Not at all Pleased
- ☐ (2) Not Pleased
- ☐ (3) Neutral
- ☐ (4) Pleased
- ☐ (5) Well Pleased

18. **Rate the trust you have towards traditional government services?** *
Mark only one oval.

	1	2	3	4	5	6	7	8	9	10	
I don't trust it at all	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	I trust it very much

19. **Rate your satisfaction with the traditional government services?** *
Mark only one oval.

	1	2	3	4	5	6	7	8	9	10	
Not Satisfied at all	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	Very Satisfied

Factors influencing use or non-use of m-Government services?

This section collects data to discover personal reasons for the use or non use of mobile based applications offered.

20. **Have you used your phone to access m-Government services?** *
Mark only one oval.

- ◯ (0) No
- ◯ (1) Yes

21. **If no, what are the factors preventing you from using m-Government?** *
Check all that apply.

- ☐ (1) Fear
- ☐ (2) Lack of Trust
- ☐ (3) Lack of Information
- ☐ (4) Financial Constraints (no airtime etc.)
- ☐ (5) Lack of Resources (not having a smartphone)

22. **State other factors**

_____

_____

_____

_____

_____

23. **Have you encountered any challenges with m-Government services?** *
Mark only one oval.

- ◯ (0) No
- ◯ (1) Yes

24. **If yes, please indicate the challenges?**

_____

_____

_____

_____

_____

25. **How pleased are you with delivery of m-Government?** *
Check all that apply.

- [ ] (1) Not at all Pleased
- [ ] (2) Not Pleased
- [ ] (3) Neutral
- [ ] (4) Pleased
- [ ] (5) Well Pleased

26. **Rate the trust you have towards m-Government services?** *
Mark only one oval.

	1	2	3	4	5	6	7	8	9	10	
I don't trust it at all	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	I trust it very much

27. **Rate your satisfaction with the m-Government services?** *
Mark only one oval.

	1	2	3	4	5	6	7	8	9	10	
Not Satisfied at all	◯	◯	◯	◯	◯	◯	◯	◯	◯	◯	Very Satisfied

28. **In the future would you use your mobile phone to access m-Government services?** *
Mark only one oval.

- ◯ (0) No
- ◯ (1) Yes

29. **Is there any m-Government services you would like to see happening?** *
Mark only one oval.

- (0) No
- (1) Yes

30. **If Yes, what?**

m-Government Services Offered at Department of Health (DoH)

This section collects data related to m-Government systems and applications for public service delivery.

Mom-connect

Mom-connect is an initiative established by the Department of Education aspiring to support maternal health through the use of mobile based technologies integrated into maternal and child health services.

31. **Have you used mom-connect offered by DoH?** *
Mark only one oval.

- (0) No
- (1) Yes

32. **For what purpose do you use mom-connect?**

33. **Are you benefiting from using mom-connect?** *
Mark only one oval.

- (0) No
- (1) Yes

34. **Please explain** *

35. **Is there any feature you would like to be incorporated on mom-connect?** *
Mark only one oval.

- (0) No
- (Yes) Yes

36. **If yes, what?**

37. **Rate satisfaction with mom-connect?** *
Mark only one oval.

	1	2	3	4	5	6	7	8	9	10	
Not satisfied at all											Very Satisfied

Measuring the Level of Satisfaction with m-Government Services

This section collects data based on individual inclination regarding mom-connect which is mobile based application developed for the community at large.

38. **Performance Expectancy** *
Mark only one oval per row.

	SD	D	N	A	SA
I find mom-connect provided by the department of health useful for my Child's health					
The use of mom-connect assist me to accomplish health related tasks quickly					
Using mom-connect provided by the department of health increase my productivity as a mother					
Mom-connect provided by the department of health address all my maternal issues					

39. **Effort Expectancy** *
Mark only one oval per row.

	SD	D	N	A	SA
I find it easy to develop the skills needed to use mom-connect					
My interaction with mom-connect is clear and understandable					
I find mom-connect easy to use					
I find it easy to learn how to operate mom-connect					

40. **Social Influence** *
Mark only one oval per row.

	SD	D	N	A	SA
People who influence my behaviour think that I should use mom-connect					
Mothers who have used mom-connect think that I should use it					
People who are important to me encourage me to use mom-connect					
Government has support for mom-connect					

41. **Facilitating Conditions** *
Mark only one oval per row.

	SD	D	N	A	SA
I have basic resources to use mom-connect					
I have the necessary knowledge to use mom-connect					
Using mom-connect fits well with my life style					
Government provide all the resources needed to use mom-connect and they are available to everyone					

42. **Behavioural Intention** *
Mark only one oval per row.

	SD	D	N	A	SA
I aim to use mom-connect regularly					
I intend to use mom-connect in the next 3 months					
I predict that I would use mom-connect in the next 3 months					
I plan to use mom-connect in future					

m-Government Services Offered at Department of Health (DoH)

Aita Health

Aita health is a mobile application used by community health workers aimed at delivering preventative care services to communities at a home-base level by supporting both administration and clinical decision making in real-time another initiative developed by the Department of Health.

43. **Have you used Aita health offered by DoH?** *
Mark only one oval.

- (0) No
- (1) Yes

44. **For what purpose do you use Aita health?**

45. **Are you benefiting from using Aita health?** *
Mark only one oval.

- (0) No
- (1) Yes

46. **Please explain** *

47. **Would you like any feature to be incorporated on Aita health?** *
Mark only one oval.

- (0) No
- (1) Yes

48. **If Yes, what?**

49. **Rate satisfaction with Aita health?** *
Mark only one oval.

	1	2	3	4	5	
Not Satisfied at all						Very Satisfied

50. **Are you aware of other mobile based applications or systems offered by DoH?** *
Mark only one oval.

- (0) No
- (1) Yes

51. **If yes list**

_____

_____

_____

_____

_____

Measuring the Level of Satisfaction with m-Government Services

This section collects data based on individual perception regarding Aita health.

52. **Performance Expectancy** *
Mark only one oval per row.

	SD	D	N	A	SA
I find Aita health useful for health check-up					
The use of Aita health assist me to accomplish health related tasks quickly					
Using Aita health provided by the Department of Health increase my productivity as a citizen					
The use of Aita health enhances my effectiveness					

53. **Effort Expectancy** *
Mark only one oval per row.

	SD	D	N	A	SA
I find Aita health easy to use					
Health workers make it easy for me to use Aita health					
Aita health save me time and money					
My interaction with Aita health is clear and understandable					

54. **Social Influence** *

Mark only one oval per row.

	SD	D	N	A	SA
People who influence my behaviour think that I should use					
People who are important to me think that I should use Aita health					
Government has support for Aita health					
Heath workers in my community encourage me to use Aita health					

55. **Facilitating Conditions** *

Mark only one oval per row.

	SD	D	N	A	SA
I have basic resources to use Aita health					
I have the necessary knowledge to use Aita health					
Using Aita health fits well with my life style					
Government provide assistance to deal with Aita health functions					

56. **Behavioural Intention** *

Mark only one oval per row.

	SD	D	N	A	SA
I aim to use Aita health regularly					
I intend to use Aita health in the next 3 months					
I would use Aita health in the next 3 months					
I plan to use Aita health in future					

APPENDIX F: Ethics Approval Document CUT

Central University of Technology, Free State

FACULTY RESEARCH AND INNOVATION COMMITTEE

RESEARCH ETHICS APPROVAL LETTER

Date: 24 July 2017

This is to confirm that:

Applicant's Name	D Dlamini
Supervisor Name for Student Project (where applicable)	Dr N. Mpekoa
Level of Qualification for Student Project (where applicable)	Masters in Information Technology
Tittle of research project	An evaluation of m-Government service proliferation in South Africa.

Ethical clearance has been provided by the Faculty Research and Innovation Committee **04 May 2017** in view of the CUT Research Ethics and Integrity Framework, 2016 with reference number FEIT 05/17- 6.6/04-05-2017

The following special conditions were set:

[X] None

[ ] Specific conditions

The following specific conditions apply:

1. _____

We wish you success with your research project.

FRIC Chairperson: Prof HJ Vermaak