University of Cape Town

Department of Information Systems

Mobile Government Readiness in Africa: The Case of Malawi

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By

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Dedication

Mum!!! Anusiata Mandevu Mtingwi, may your soul rest in peace. I dedicate this thesis to you. I still hear your sweet and lovely encouraging voice, "Aim high in your education and do more". You were and you will remain my inspiration.

I thank you mum for giving me the gift of this earthly life.

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My God, I thank you, praise you, and honour you for so many good things you have done for me. I commit my life to You, my God, always through my Saviour Jesus Christ. Send forth your Spirit onto me always.

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Acronyms

2G	Second Generation
3G	Third Generations
ACL	Access Limited
CDMA	Code Division Multiple Access
CHAM	Christian Health Association of Malawi
CHW	Community Health Workers
DISTMS	Department Of Information System And Technology Management Services
EDGE	Enhanced Data GSM Environment
ERAM	E-government Readiness Assessment Model
EV-DO	Evolution-Data Optimised
G2B	Government to Business
G2C	Government to Citizens
G2E	Government to Employees
G2G	Government to Government
GPRS	Global Packet Radio Service
GPS	Global Positioning System
GSM	Global System for Mobile
GWAN	Government Wide Area Network
HSDPA	High-Speed Downlink Packet Access
HTML	Hyper Text Mark Language
ICT	Information Communication Technology
ICT4D	ICT for Development
ICTs	Information Communication Technologies
ID	Individualism
IDI	ICT Development Index
IDT	Innovation Diffusion Theory
ILO	International Labour Organisation

IMR	Integrative M-Government Readiness
INFSS	Integrated Nutrition and Food Security Surveillance
IS	Information Systems
IT	Information Technology
ITU	International Telecommunication Union
LDCs	Least Developed Countries
LTO	Long-Term Orientation
MA	Masculinity
MACRA	Malawi Communication Regulatory Authority
MACRO	Malawi Aids Counselling and Resource Organisation
mG2B	Mobile Government to Business
mG2C	Mobile Government to Citizens
mG2E	Mobile Government to Employees
mG2G	Mobile Government to Government
MGDS	Malawi Growth Development Strategy
MM	Motivational Model
MMS	Multimedia Message Services
MNP	Mobile Network Penetration
MP	Member of Parliament
MRI	Mobile Readiness Index
MT	Mobile Technology
MTL	Malawi Telecommunication Limited
MTs	Mobile Technologies
NGO	Non-Governmental Organisations
NRI	Networked Readiness Index
OECD	Organisation for Economic Co-operation and Development
PC	Personal Computer
PD	Power Distance
PDA	Personal Digital Assistants

PLWHA	People Living with HIV and Aids
QDA	Qualitative Data Analysis
SCT	Social Cognitive Theory
SIM	Subscriber Identity Module
SMS	Short Message Services
TAM	Technology Acceptance Model
TNM	Telecom Networks Malawi
TOE	Technology Organisation Environment
TPB	Theory of Planned Behaviour
TR	Technology Readiness
TTF	Tasks Technology Fit
UA	Uncertainty Avoidance
UNCTAD	United Nations Conference on Trade and Development
UNESCO	United Nations Educational and Scientific Culture Organisation
UNICEF	United Nations Children's Fund
UTAUT	Theory of Acceptance and Use of Technology
VoIP	Voice over Internet Protocol
WAP	Wireless Application Protocol
Wi-Fi	Wireless Fidelity
WiMax	Worldwide Interoperability for Microwave Access
WLAN	Wireless Local Area Network
WWAN	Wireless Wide Area Network
UNDESA	United Nations Department of Economic and Social Affairs

Abstract

Information Communication Technologies (ICTs) are applied to government processes of the least developed countries (LDCs), in order to improve efficiency. Many of these countries have the desire to reach the citizenry through an e-government. E-government infrastructure implementation in these countries is proving problematic, or sometimes it does not even get the ground, because of cost implications and the countries' impassable terrains. The advent of mobile technologies through mobile network deployment is proving to be the most suitable solution in reaching remote rural areas. Government can use an alternative method called mobile government within the e-government. Mobile government can use the potential of mobile technologies to leapfrog e-government in some LDCs where e-government has failed to achieve the anticipated benefits because of lacking fixed communications infrastructure penetration and citizen access. Mobile government is defined as government delivery of services to all stakeholders by using mobile technologies.

The research problem is: *To what extent are governments of least developed countries ready to realise mobile government?* Malawi as a least developed country was the sample used as case study.

The objective was to assess the extent of government preparedness to realise mobile government in Malawi. To assess the government readiness for m-government, a study was conducted to find out the availability of factors that would support m-government and mobile services in Malawi.

The motivation of the study was that there is scanty/no m-government readiness research that has been conducted before for LDCs. Concentration is not on the individual dimension such as technology, but rather the focus is on an overall m-government readiness, which includes the high level dimensions (themes) of technology, organisation, environment and tasks.

The research used qualitative approach to collect data by interviewing over twenty key government and non-government participants and to analyse the data. It also used descriptive and explanatory approaches to analyse the data and discussion and to report research outcomes.

The findings of the research show that important factors are available that would enable LDCs to implement m-government. For instance, Malawi is, to a large extent, ready to embrace mobile government. Nevertheless, other LDCs can also take advantage of the factors and themes which were discovered and determine mobile readiness. Outcomes are also evident that comprise both benefits and challenges of mobile technologies.

The significance of the research is as follows: The outcomes could guide the policy makers and implementers to make the right decisions when considering m-government development. It could also provide theoretical and practical appreciation of mobile readiness processes to attain the goals of establishing m-government. The Information Systems (IS) communities would be offered along with a holistic approach to assessing m-government readiness in LDCs. The results would contribute to the body of knowledge in IS, as the outcomes would be the foundation for comparison

with similar IS researches that have or will be conducted in similar environmental settings. The academic and practitioners' world would benefit by the benefits and challenges of m-readiness for m-government in such a unique environmental context of Africa.

Key terms: e-government, m-government, mobile technologies, culture, security, Malawi

Chapter 1 Introduction

This chapter presents the background of the research, problem statement, research questions, and objectives of the research, the importance of the research, mode of inquiry, researcher's role and the research approaches. At the end of this chapter, the dissertation outline is provided.

1.1 Background

Information Systems (IS) and Information Communication Technologies (ICTs) have become core operational and managerial elements of public administrative reforms (Reimer, 2001; Kreizman & Fraga, 2003). Electronic-government (E-government) plays a central role in good management and socio-economic development. E-government can help to narrow the digital gap. The government institutions need appropriate information to formulate effective strategies to make comprehensive developmental decisions.

Since the emergence of e-government, IS' and ICTs' focus in government institutions have been given high preference to sustain government operations. Governments in least developed countries (LDCs) have adopted ICTs to enhance good governance to effectively achieve national government initiatives. As a result, any research in e-government is important for the following reasons:

- ICTs can be used for socio-economic development and e-government, as ICTs should be implemented across government institutions for service delivery.
- ICTs are government expenditure items of the total national budget that are not properly planned.
- E-government deployment in LDCs should be undertaken through partnerships between development partners and government, because development partners' funds constitute the largest component of technology investments (Gichoya, 2005).

There is a need for regular improvement of competencies of operations in government institutions through the use of ICTs, to reduce manual transactions. Governments are aware that e-government is a core processing mechanism for organisational restructuring in countries, for good governance and social economic growth (Kraemer & King, 2003).

However, e-government is proving to be problematic to implement in LDCs. The main problems are high costs of infrastructure development and lack of skilled human resources. Mobile government (M-government) is a promising vehicle to uplift e-government implementation through the use of mobile technologies (MTs).

The current e-government setup in LDCs does not offer integrated mechanisms to link with stakeholders (citizens, business, employees and government agencies) and government. The intention of ICTs is to improve and accelerate the ease of access to information, in order to ensure transparency as well as accountability (Ndou, 2004). This research was conducted in Malawi as a case study representing African LDCs. Malawi is classified as one of the LDCs in the world and is

landlocked (ITU, 2011b). The motivation of the research is that mobile network coverage is over 85% in Malawi and there is an ever increasing number of cellular subscriptions, with 29% penetration in Malawi (ITU, 2009b). This network coverage and penetration can influence the leadership to consider m-government services. There is scant research that has been conducted on m-government readiness for a least developed country in Africa and which has covered African culture, opportunities and constraints.

1.2 Problem statement and intention

E-government brings competence and success of government service delivery to stakeholders. E-government transforms the government business through the application of ICTs to government processes. Various public organisations are undertaking E-government initiatives. These initiatives are planned and implemented in a generic way in Malawi to address their needs. Early reports of e-government undertakings from LDCs and developing countries were unsuccessful e-government projects because of lack of both physical network and human infrastructures to support the base of service infrastructures (United Nations, 2012; Munganda & Van Belle, 2010). Another observation that leads to e-government failures in African is the direct transfer of developed countries' e-government concepts to LDCs and developing countries (Schuppan, 2009). Schuppan (2009) argued that the conditions of infrastructures in African countries contribute to length periods of e-government deployment. M-government is an alternative method for elevating the e-government service quality and delivery. M-government can also leapfrog (jump) some areas of e-government. The research problem is: *To assess governments of least developed countries readiness to embark on mobile government.* The research intention is to assess the government's readiness for m-government. The research intends to assess m-government readiness by means of a case study in Malawi. Studying user acceptance attitudes, the availability of factors which support MTs, m-government and mobile services can facilitate m-government in LDCs such as Malawi.

1.3 Research questions

The main research question is: "To what extent is a government of a least developed country ready to embark on m-government?" Secondly, the supporting research questions are:

- What factors influence user readiness of m-government?
- What mobile services influence user utilisation of m-government?
- What enabling factors influence m-government readiness?
- What awareness levels influence mobile technology usage?

1.4 Research objectives

The broad research objective is to assess the extent of LDCs' governments' preparedness to embark on m-government. The specific objectives are:

- To assess the enabling factors for m-government readiness,
- To assess the factors that may encourage user readiness for m-government,
- To determine the mobile services that m-government may offer and
- To propose factors that will stimulate m-government readiness awareness.

1.5 The Importance of the research

Public and private organisations have embraced E-government in order to obtain benefits of utilising current information and communication technologies (Heeks, 2006). As the majority of LDCs are adopting e-government, the research focused on government readiness for m-government, to assist in the improvement of government operations to deliver service to society. The research outcome will be the basis for government organisations seeking to embark on an e-government strategy. The research lays down the foundations for advocating and promoting m-government as a significant instrument for government service provision.

The results of the research will help government top leadership, in consultation with civil societies, to consider implementing m-government in their countries. The providers of mobile/wireless infrastructure and services could realise the business advantages of m-government prospects. Other IS researchers who are conducting m-government studies in LDCs may use some of the findings in their research. The expectation is that the outcomes of the research would contribute to the formation of ICT laws in LDCs. The purpose of the research is to make a contribution towards the utilisation of MTs in government to provide services through m-government.

1.6 Mode of inquiry

This research employed interactive qualitative research and a postpositivist philosophical approach to gather and analyse the data. The proposed theoretical framework was used as theoretical lens to guide the researcher to properly investigate the research questions and objectives (Walsham, 2006; Creswell, 2009). Analysis focused initially on the transcribed data to get themes and extraction of quotes relating to the themes. As the process of analysis was iterative, themes that were discovered were referenced to the theoretical framework constructs for verification. The constructs of the framework would not be quantitatively or statistically measured.

1.7 Research approach

The research approach is as follows:

- The setting of the research was Malawi because it is classified as a least developed country in Africa (UNCTAD, 2006; ITU, 2011b). This country was selected as a case study in order to assess the factors that would influence m-government readiness in LDCs in Africa.
- The philosophical paradigm for the research is postpositivist, where worldviews are socially constructed through consensus agreement (Creswell, 2009).

- The approach to the research was qualitative research; face to face interactive interviews were conducted to collect the primary (original) data and documents were reviewed (Creswell, 2009; Myers, 2009). A case study was used which was consistent with the qualitative research approach (Yin, 2003).
- Mobile/technology readiness models that were examined during the literature review focused on quantitative measurement of the constructs. This research used some of the constructs to develop the research theoretical framework. However, the proposed theoretical framework was used as theoretical lens to guide the researcher to properly develop the research design, to gather and analyse the data (Miles & Huberman, 1994; Creswell, 2009; Walsham, 1995; Walsham, 2006).

1.8 The researcher's role

Postpositivist research is basically qualitative research in nature; in it a researcher is in direct contact with participants and needs to preserve the integrity of the participants throughout the research process (Locke et al., 2007). In any research, the role of the researcher affects the interpretation of the gathered data (Creswell, 2009; Peshkin, 1988). The qualities of the researcher could influence the understanding, sorting, transforming, interpreting and misunderstanding of what develops from the onset of the research to the end of the report (Peshkin, 1988, p. 17). If the researcher is aware of these qualities, he/she could reveal the details of these to the reader, together with a probable effect on the paper. The researcher directs the way of identifying the participants of the research. The researcher's abilities influence decision making during the period of the research. It is imperative for a researcher to identify his roles and how the roles impact on decision making pertaining to the research, such as research setting, interpretation of the phenomena and participants selection (Creswell, 2009).

This researcher has been working in the field of ICT in government for 26 years. He has analysed systems, developed software applications, maintained existing systems and managed software development projects. He has worked and interacted with some of the research participants. The researcher has had no prior experience of m-government. The researcher had knowledge of e-government only because the Malawian government was in the process of establishing it. The researcher had interviewing skills gained through feasibility studies of new systems and from interviewing people for employment and promotions. The researcher was a master's degree student while he was conducting the research. The roles the researcher played had an influence on the participant answers, understanding, interpretations and relationship between the researcher and participants. Divulging the researcher's personal details, illustrates an act of researcher's honesty to participants and the readers. He verified gathered data from the participants of the research through member checks to ensure that their responses were not distorted. These member checks acted as a triangulation of the data, serving to enhance the validation of value of the research, known in positivist quantitative research as internal validity (Lincoln & Guba, 1985). The

researcher also obtained the ethical approval from the University of Cape Town to proceed with the research. He received permission from the Office of the President and Cabinet in Malawi to collect data from both government and private organisations. More details on ethical issues are described in sub-section 4.12.

Contrary to Creswell (2008), concerns of "back yard research" lead to compromises in the researcher's capacity to reveal information and point out difficult issues. If indeed what Creswell (2008) is saying is true, then it defeats the principle of purposeful sampling, where a researcher selects participants who would give the required information for the research.

1.9 Dissertation outline

The following is the dissertation outline: the literature review covers definition of key terms, e-government context, m-government context, MTs, and the Malawi context, enabling environments, importance of user involvement and impact of culture on ICTs. Next is a research theoretical model which covers mobile/technology readiness assessment, an adoption model and a proposed theoretical model. Next are research methodology, the concepts of the research, research approach and research paradigm, methods for data gathering, interview design, and quality and integrity of data used in the research. Following this, the data analysis and interpretation is presented. Finally, the research presents conclusion, recommendation, limitations and future research areas.

In the next chapter, the literature review discusses the in-depth reviews of e-government, m-government and related technologies.

Chapter 2 Research literature review

This chapter presents a comprehensive literature review to address the research questions and research objectives. The review summarises the context of e-government, m-government, MTs and the Malawi context. The chapter also discusses the enabling environments, importance of user involvement, benefits/opportunities and challenges. The gaps identified from literature are also presented.

2.1 Introduction

The literature review was on m-government readiness assessment in the context of a least developed country. The literature review focused on readiness for m-government in developed and developing countries, because there is scant m-government literature in LDCs in Africa. The capability of MTs and their services are precursors towards generating a variety of government business transactional prospects (Rao & Troshani, 2007). MTs have made information communication easy, because of interoperable technologies and the portability of mobile devices. The literature review examined key issues of electronic government (e-government), which is an essential infrastructure for electronic service delivery and for m-government. M-government is a recent method under e-government, to deliver services. A discussion is provided for the main concepts of e-government and m-government. M-government provides government service delivery to the people. A discourse is given on the utilisation of modern mobile applications which have been operational in Malawi. The review also examined different readiness models, acceptance models, MTs, mobile or wireless networks, benefits and challenges. Important knowledge gaps that were identified are presented. Then the conceptual model was proposed. The key research question for m-readiness assessment is: To what extent are governments of least developed countries ready to realise m-government?

M-government is a new undertaking of government for service provision; it needs a critical assessment before any government decides to implement it. Information Systems research has numerous technology readiness/acceptance models that are employed to assess the organisational readiness to adopt a new technology. The models are applied differently, depending on the context of the area of research under investigation. Utilising a suitable technology readiness model is critical for m-readiness to broaden the researchers' and policy makers in LDCs' understanding of m-government.

The outline of the rest of chapter is as follows: the definitions of key terminologies, then an account of background of e-government and m-government. This is followed by a discussion of the applications for m-government and MTs. Economic, social and political factors of m-government are also discussed. Next is a discussion on MTs in the Malawian context of e-government and m-government. Then follow enabling environments for m-government and user involvement in m-

government undertakings. Readiness assessment models, literature gaps and a summary are presented.

2.2 Definition of key terms

This section describes the key terms which are frequently used in the course of readiness assessment of m-government under e-government.

2.2.1 Information systems (IS)

IS as a discipline examines more than just the technological system and social system, but additionally investigates the phenomenon that emerges when the two interact (Lee, 2001, p. iii). This definition was used to distinguish IS from other disciplines without narrowing its view. This definition expresses the IS research aspects and a differentiating subject of academic field of IS from other research disciplines (Lee, 2001, p. iii).

2.2.2 Information and communication technologies (ICTs)

ICTs refer to the wide range of computerised information and communication technologies. These technologies include products and services such as desktop computers, laptops, handheld devices, wired or wireless intranets, business productivity software such as text editors and spreadsheets, enterprise software, data storage and security, network security and others (Ashrafi & Murtaza, 2008). ICTs are differently viewed; the views are as follows:

- Nominal view which means there is an absence of technology,
- Computational view which refers to technology as composition of algorithms and models,
- Tool view and many others (Orlikowski & Iacono, 2001).

However, in this research, ICTs are viewed as tools for labour substitution, production, social relations and information processing (Orlikowski & Iacono, 2001).

2.2.3 Electronic government (E-government)

E-government is described as a method entrenched in the application of ICTs through wired or wireless networks, the Internet and mobile technology computing, in order to have access to government information. Access to information improves effectiveness and efficiency in government services delivery. E-government ensures that the governments are transparent and accountable to stakeholders (citizens, businesses, government employees and other governments) (Patelis, Petropoulos, Nikolopoulos, Lin & Assimakopoulos, 2005; Im & Seo 2005). E-government can be a 24 hours a day and 7 days a week online delivery of information and services, depending on the government business and government entities, via the Internet and other electronic channels, for instance, community kiosks.

2.2.4 Electronic services (E-services)

E-services are various integrated ICTs which provide customer support to process transactions and other services to be delivered electronically (Park & Cho, 2007). The Internet and information networks enable e-services to enhance the effectiveness and efficiency of processes of internal government organisations. Some of the tools which are employed are value-added networks, personal computers, laptops and Internet.

2.2.5 Mobile government (M-government)

M-government is a mode through which government provides service delivery to stakeholders, under the umbrella of an e-government framework, using mobile devices and mobile or wireless connectivity. It is also defined as a "strategy whose implementation involves the utilisation of all kinds of wireless and MTs. It provides services to improve the benefits of the parties involved in e-government, such as citizens, businesses and all government units" (Kushchu & Kuscu, 2003). M-government expands the e-government functions into wireless or mobile communication media for delivery of quality service.

2.2.6 Mobile Services (M-services)

M-services are the services which users access with their mobile devices, such as cell phones, smart phones, tablet personal computer (PC), Blackberry, and personal digital assistants (PDAs). M-services are an extension of e-services to mobile devices through wireless connectivity (Park & Cho, 2007).

2.2.7 Mobile readiness (M-readiness) assessment

M-readiness assessment is an activity to determine whether government organisations, businesses and customers are able and ready to exploit the ICTs, especially MTs, to improve managerial roles for service provision (Keoduangsine & Goodwin, 2009). M-readiness assessment enables people to know the latest status of ICT factors, such as communication network infrastructure advances, laws and regulating frameworks, availability of ICT tools (hardware or software), levels of human resources competencies and the core obstacles countrywide. Assessment outcomes make it possible to produce policies and work plans for developing human skills capabilities, institutional structures, and technological infrastructure and are tailored for convenience to access the services and efficient processes (Gichoya, 2005).

2.2.8 Digital divide

Digital divide is referred to as access and knowledge segregation of ICTs in least developed, developed and developing countries, which causes extensive disparity between those with and those without ICT access and knowledge. The marginalised communities do not use the technology because the Internet is not present in their areas. The e-government appears unworkable to reduce digital divide between those who have and those who have no technologies (Basu, 2004). This is a

general persistent e-government challenge and hence the needs for m-government development in the LDCs. Digital divide (inequalities in access to technology) studies help to assess e-readiness and m-readiness at country level (Dada, 2006).

2.2.9 Mobility

Within the perspective of m-government, mobility means availability of people anywhere with mobile devices at any time. The mobile devices enable people to interact with their organisational systems anywhere anytime to provide quality service to the users/stakeholders (Kakihara & Sørensen, 2001; Roggenkamp, 2004).

The core of m-government functionality is the mobility of people with mobile devices and accessibility to services (Roggenkamp, 2007). Roggenkamp (2007) identified seven types of mobility which are categorised into technological and sociological perspectives. Technological perspectives on mobility are summarised as follows:

- Device mobility, which is the ability to access services with a mobile device continuously from any location;
- User mobility, which is location independent and device independent to access service through the use of mobile phone networks;
- Service mobility, which is the capacity to deliver services despite device and user surroundings;
- Session mobility, which is the ability of starting, pausing, and restarting a user session while changing between devices or services.

Sociological perspectives on mobility are summarised as follows:

- Physical aspects, which concern people in terms of geographical movement;
- Social aspects, include macro-level which describe the permeability of a society between pre-defined societal levels and micro-level and which include the ability of individuals to change roles in reaction to external influences and contexts;
- Virtual aspects, which are the untying of physical location and the range of activities of the involved people.

2.3 E-government context

This sub-section presents e-government development, key stakeholders, systems or applications, opportunities and constraints.

2.3.1 E-government blocks

The advances in ICTs since the early 1990s prompted many governments to start providing public services using ICTs. Internet technology with compatible protocols enhanced the development and

use of the World Wide Web (WWW) in government institutions, to provide public services, policies and citizens' political participation (Moon & Bretschneider, 2002). The introduction and intensification of ICTs in government organisations resulted in an e-government creation through explicit programs to build innovative aspects of social and economic advancement (Banerjee & Chau, 2004). E-government was created to deliver services to citizenry, various government departments and employees. It entails computerisation of manually documented processes that result in innovative approaches to management (Carroll, 2005). E-government has four major stakeholders: citizens, businesses, governments, and employees. Electronic business transactions between government and stakeholders represent the e-government network of associations (Ndou, 2004). Figure 2.1 shows the four key structural e-government blocks.

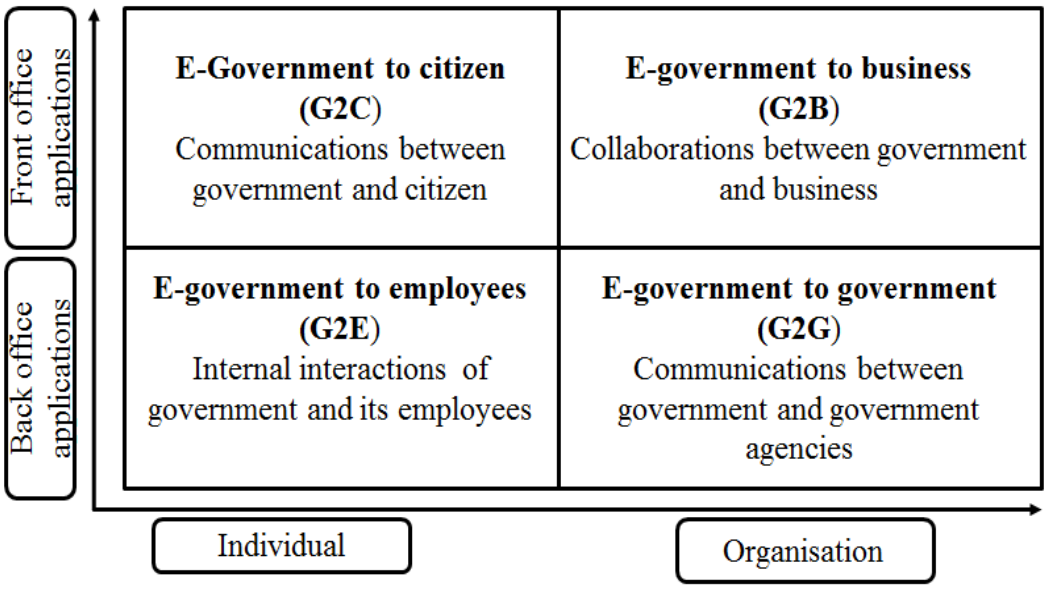


Figure 2.1: E-government interactions (source: Ndou, 2004)

The stakeholders or the four key building blocks are explained as follows:

Government to (its) citizen (G2C) aims at facilitating the collaborative communication between government and citizens. E-government lets government organisations interact with its citizens in an accountable, democratic, and transparent manner to provide quality of service provision. G2C gives citizens permission to access government information and other services as needed, using any available methods such as personal computers, Web-TV, cell phones or wireless laptops.

Government to businesses (G2B) concentrates on the interaction that exists between governments and business partners to transact business electronically. G2B is cost effective to both parties. With on-line business transactions, time is saved; there is also simplified application of rules, which enable fair business completion. This requires a single integrated platform for government service delivery. The integrated platform enables business firms and government to establish a website cheaply and quickly.

Government to government (G2G) concerns the integration of central government ministries, departments with local government and state owned companies. For example, such integrations are between judiciary, parliament and central government departments, or external government agencies. Governments require other functional structures of government administration to process the needed assigned tasks to deliver services successfully (Riley, 2009). It is critical to ensure that there is one entry zone to share the government resources for efficient and effective government productivity.

Government to employees (G2E) relates to relationships existing between governments and their workforce. G2E brings employees together with the aim of sharing ideas to enhance e-learning among them. Workers have the right to access important information such as civil rights laws, policies, trainings and others. G2E provides strategic and tactical means for employees to implement government goals and programs (Ndou, 2004).

2.3.2 E-government developmental phases

E-government has a progressive development cycle; consequently e-government projects should be developed and executed according to the needs of an organisation. The research put forward four phases of the e-government growth model which are, in their developmental sequence: (a) cataloguing, (b) transaction, (c) vertical integration, and (d) horizontal integration (Layne & Lee, 2001). Each phase is explained below:

Cataloguing is concerned with the primary attempts to put government presence online for users to access government information. Government creates portals to handle demands from the media houses, ICT knowledgeable employees and other stakeholders, to acquire information through the Internet. In this phase, government embarks on projects of a small size, because it has limited Internet skills and aims to reduce the risks.

Transaction is the phase whereby e-government programs concentrate on linking government in-house database systems to online interfacing, to enable citizens to transact with government electronically. For instance, people could renew or process various licenses and pay taxes online.

Vertical integration is the interactive communication of government systems with each other at different levels, such as at municipal, provincial and national levels, for various services of government. An illustration of vertical integration is a vehicle licence registration system – the district motor registration office could be connected to a national vehicle database for verification purposes.

Horizontal integration is the interactive communication of government systems across various organisational functions and services. An illustration would be a banking institution recruiting an employee – it should be able to log into government systems such as the national population register and national criminal database, to check the eligibility of the person, e.g. if that person is a

valid citizen with no criminal record. The four phases of the government growth model explained above are illustrated in Figure 2.2.

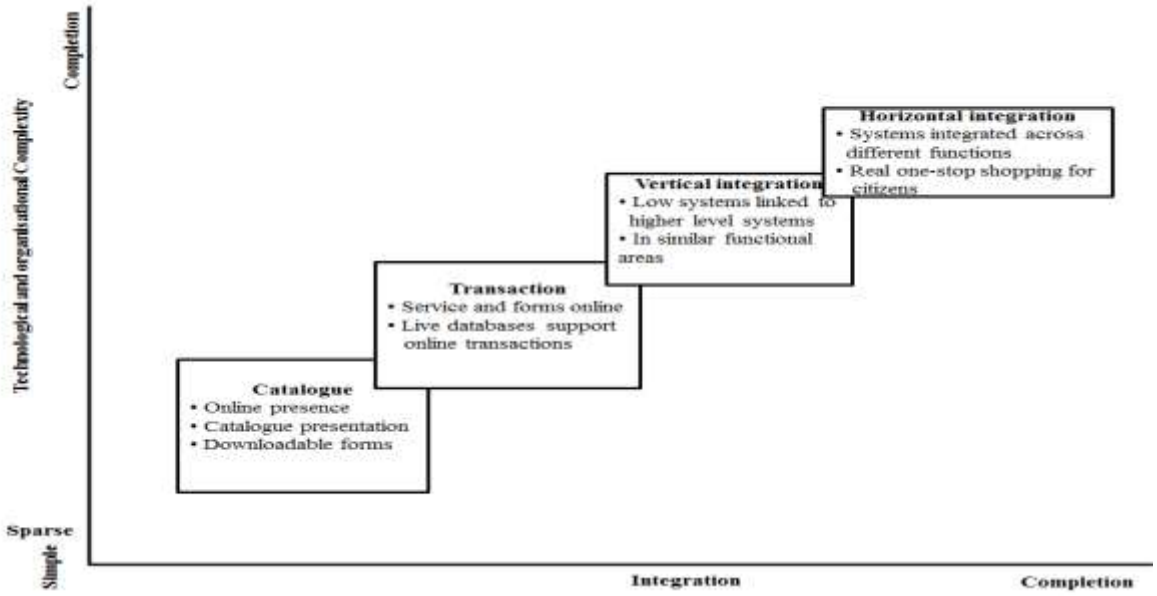


Figure 2.2: E-government developmental phases (source: Layne & Lee, 2001)

2.3.3 E-government applications

E-government covers the utilisation of Internet and linked ICTs for four distinct but unified categories of government applications: e-democracy, e-service, e-commerce and e-administration (European Commission, 2007). Next is the discussion of each type of governmental application.

E-democracy involves the upholding of political contribution through facilitation of public enabled online debate of policy issues amongst citizens, as well as e-consultations between citizens and government officials. E-government applications also assist electronic election voting.

E-service is concerned with the ability to provide information electronically for meaningful services to the public.

E-commerce is the connecting of government organisations with business firms for supplies and services. For instance, government can procure materials or hire scarce services from business firms.

E-administration is the utilisation of ICTs for aiding "back office" organisational processes, for example procurement, budgeting, accounting and human resources.

2.3.4 E-government benefits

In least developed African countries, e-government is an essential invention for improving good governance and reinforcing the democratisation processes. E-government can enable access to government information, productivity growth and social inclusion, freedom of expression,

efficiency and greater equity. E-government also encourages transformation of public administration and service delivery processes, thereby improving efficiency of governments; empowerment and participation of citizens that contribute to consolidating democratic processes; stimulating usage of ICT applications in various developmental sectors of economies such as in health, agriculture and education (ITU, 2006). Additionally, e-government can reduce corruption, enhance transparency in government transactions, ensure income growth in government revenue collection, ensure reduced expenditure in the sense that there is less paper work, enhance service provision to citizenry, improve interfaces with business entities and provide the populace with the right to use information (Gichoya, 2005; OECD, 2003). Figure 2.3 gives a summation of some benefits of e-government to African countries.

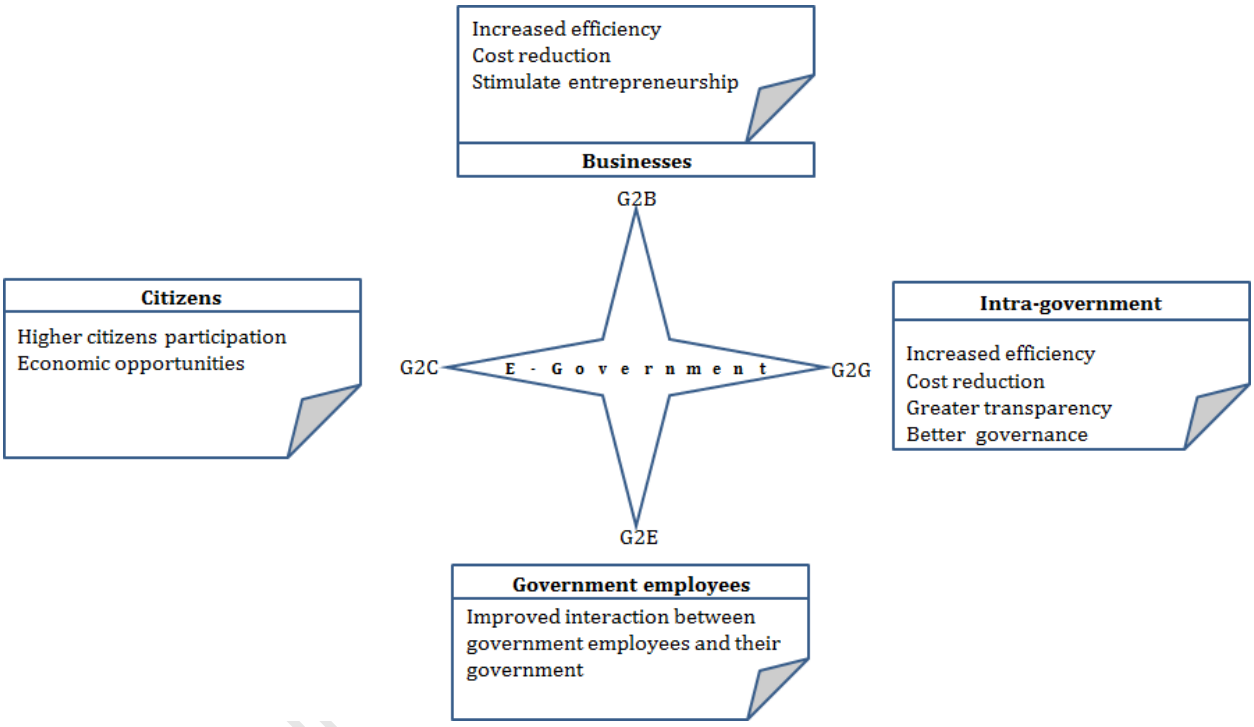


Figure 2.3: E-government service delivery models and benefits among stakeholders (source: ITU, 2006)

2.3.5 E-government implementation challenges

There are various challenges to the advancement of e-government which affects m-readiness, acceptance and exploitation of electronic services. These challenges are distinguished from diverse views and applications; some of the challenges are legislative, administrative, technological, user-culture and social (Fadi, 2006). They are explained as follows:

Legislative barriers refer to the absence of suitable laws, regulations and decrees that assist in the utilisation of electronic services;

Administrative barriers refer to lack of suitable leadership, business models, justifiable costs, skilled human resources and organisational reforms;

Technological barriers constitute lack of appropriate tools, standards, infrastructure development and deployment of electronic services*;*

User-culture barriers are obstacles related to user cultural practices; and

Social barriers are hindrances that are directly associated with the customer's social status, such as fear of status deprivation and losing one's job (Rakhmanov, 2009).

2.4 M-government context

M-government is a delivery mechanism under e-government (Lallana, 2008). Government management sets up m-government to use mobile devices to deliver information and services to stakeholders such as society, employees and various government agencies (Lee, Tan & Trimi 2006). M-government is established on the foundation of three interconnected inventions of: (1) developments in mobile and wireless technologies, (2) the broader acceptance of the technologies by the public and (3) the advancements of government mobile applications and services (Kushchu & Borucki, 2004).

MTs eliminate such constraints as fixed devices, time and space, by providing entry to vital information anywhere anytime (Varshney & Vetter, 2000; Davis, 2002). MTs facilities reduce ICT illiteracy by eliminating infrastructure development limitations in countries with poor or no ICT infrastructure. Many people are able to acquire mobile devices to access the Internet, because the cost is lower than that of procuring computers. This assists in reducing the gap of societal information access. Mobile and wireless technologies create a government which is ubiquitous and with real-time information processing. Figure 2.4 illustrates El-Kiki & Lawrence's (2006) additional stage 6 to e-government developmental stages of Moon (2002) framework, called "Ubiquity (present everywhere)" to cater for MTs utilisation in government.

Ubiquity is an outcome of implementing mobile and wireless technologies to have real-time ubiquitous government in countries where e-government is at an advanced stage of implementation (El-Kiki & Lawrence, 2006). M-government produces ubiquity for governmental organisations and other stakeholders to have real-time access to government services (El-Kiki & Lawrence, 2006).

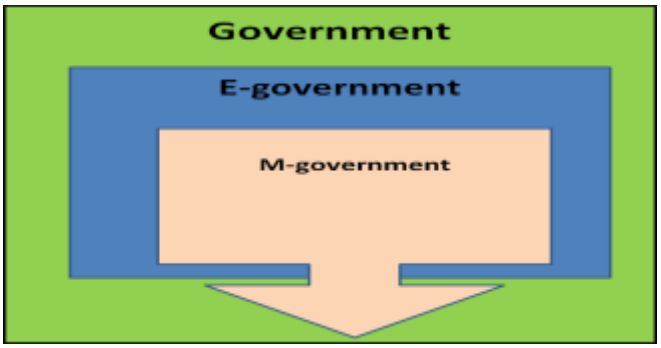


Figure 2.4: M-government flows throughout to government stakeholders (source: El-Kiki & Lawrence, 2006)

It should be noted that ubiquity in Figure 2.4 was modelled in the context of a well-developed e-government infrastructure, where ubiquity was emphasised. The ubiquitous government stage was modelled to make government services available to all government stakeholders through MTs.

2.4.1 M-government: A least developed country context

LDCs are encountering extraordinary challenges. The first challenge is to find ways to generate adequate investment, for the extension of the present fixed networks, to cover the entire country. The second challenge is to find ways to get enough resources for current mobile/wireless network improvement and for investing in new mobile/wireless networks (ITU, 2011b).

M-government uses the e-government backbone to provide ubiquitous government to stakeholders in real-time access to government services (El-Kiki & Lawrence, 2006). There is no known relevant m-government design for LDCs. In order to devise a proper research design regarding mobile readiness for m-government in LDCs, as a useful delivery mechanism under e-government (Lallana, 2008), this research considers the El-Kiki & Lawrence (2006) ubiquity stage of e-government as a starting point of m-government readiness assessment.

2.4.1.1 Leapfrogging to m-government

Many people in LDCs are acquiring mobile technology devices, especially cellular phones, to have access to the basic services such as voice, short message services (SMS), multimedia message services (MMS) and Internet communications, because of the lower costs than those of procuring computers. MMS is a means of sending messages which includes multimedia content from and to mobile phones. MTs minimise the gap of societal information access which fixed phone line operators fail to bridge. The gap is being bridged through deployment of mobile and wireless technologies. The deployment of MTs could create m-government and eventually provide ubiquitous government and information could be processed in real-time.

MTs may permit LDCs to leapfrog in implementing new technologies (Ghyasi & Kushchu, 2004; El-Kiki et al., 2006). Leapfrogging is the capability to forego the planned investment procedures in a particular setting, such as the adherence to traditional e-government procedures in a given time frame, or as cost cutting measures of development (ILO, 2001). The process of leapfrogging ensures that all essential requirements are preserved. Leapfrogging is very significant to the growth of communication in LDCs. Figure 2.4 was designed for a well-developed e-government in developed countries. It may not be suitable for m-government in LDCs, because e-government structures here are not developed. Figure 2.5 is a modification of Figure 2.4, which could be appropriate for m-government implementation in LDCs. Figure 2.5 illustrates leapfrogging of m-government which can be implemented, without necessarily depending on the existence of an e-government backbone. Government can directly employ MTs to service citizens, businesses, government organisations, other governments and employees. M-government can be developed, by either relying on an e-government framework, or by starting from scratch while the e-government infrastructure can be developed later.

It should be appreciated that there were no ubiquitous governments as a result of leapfrogging at the time of the study in LDCs (ILO, 2001). However, it is important to present the leapfrogging m-government in Figure 2.5 with ubiquity, to make sure that LDCs focus on attaining ubiquitous government to efficiently service the stakeholders with MTs.

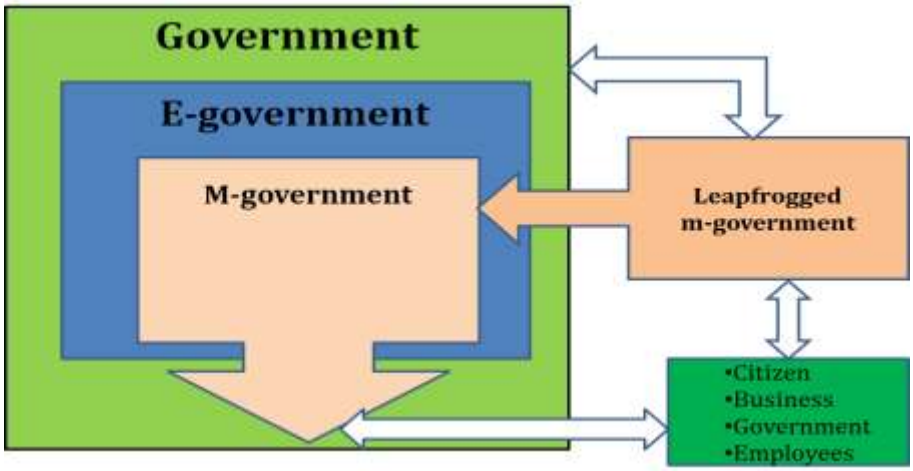


Figure 2.5: M-government flows throughout government extended to show leapfrogging (source: El-Kiki & Lawrence, 2006)

2.4.2 M-government interactions

M-government works on four key levels of interactions, similar to the four e-government blocks, as follows: m-government to citizens (mG2C), m-government to businesses (mG2B), m-government to employees (mG2E) and m-government to governments (mG2G), as illustrated in Figure 2.6 (Mengistu, Zo, & Rho, 2009).

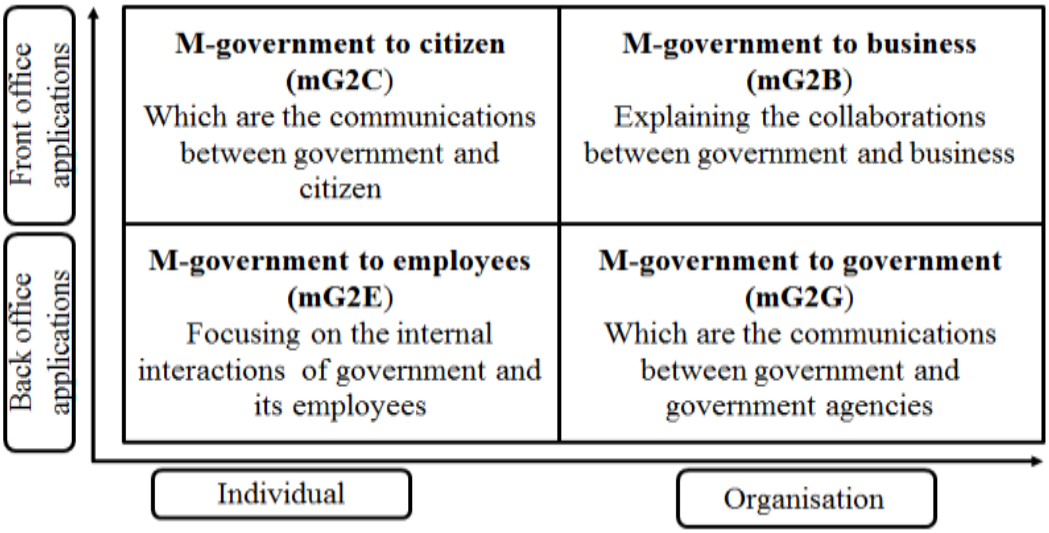


Figure 2.6: M-government interaction (source: Mengistu et al., 2009)

M-government interactions are based on four blocks of e-government (see figure 2.1), but these are transformed to mobile structural blocks while presenting the same stakeholders (citizens, business, government and employees), to conform to MTs utilisation in government service provision. The transformation requires realignment in the government business operations towards m-government.

M-government is grouped into two domains: back-office and front-office applications, with four interactions or collaborations, as illustrated in Figure 2.6. Back office applications deal with the utilisation of MTs in government interactions (mG2E, mG2G) for the advancement of government efficiency. This is a cost saving measure on the part of government. Front office applications deal with the utilisation of mobile/wireless technologies for ensuring that information provision and required services are available to citizenry and business firms (mG2C, mG2B) (Mengistu et al., 2009).

2.4.3 M-government development phases

M-government has four phases of development, as in e-government. The phases are classified into: information, interaction, transaction and transformation phases (Tozsa & Budai, 2005). The explanations of the phases are as follows:

The information phase is information relating to the action of the office in sending out messages via SMS to citizens and, if possible, for citizens to communicate their views.

The interaction phase is when collaborations are established for timely and instant responses to requests via SMS.

The transaction phase refers to the actual business of performing tasks with the aid of mobile devices, for example, to authorise an official discussion between officials and users at any place and time (e.g. paying of tax using mobile phones).

The transformation phase is dependent on the back office modernisation to take on m-administration services. The four phases of m-government growth explained above are illustrated in Figure 2.7.

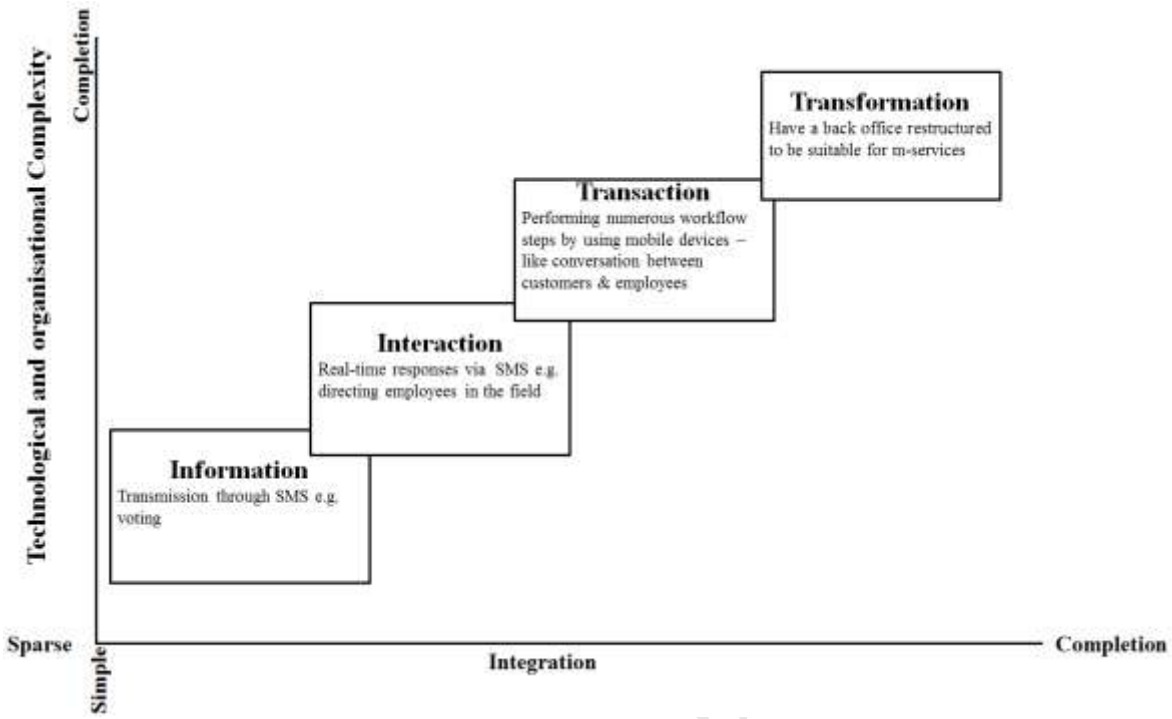


Figure 2.7: M-government developmental phases (source: Tozsa & Budai, 2005)

2.4.3.1 Comparison between E-government and M-government phases

Layne and Lee's (2001) four-staged model (Figure 2.2) is a popular e-government maturity model (Almarabech & AbulAli, 2010). The model is developed on technical, organisational and managerial feasibility. E-government is considered to be an evolving phenomenon (Layne & Lee, 2001). The model stages use internal networks and creation of e-mail systems, enable inter-government departmental and public access to information, allow dual communication, allow exchange of valuable documents, digital democracy and network public organisations. Tozsa and Budai (2005) used the Gartner group (Baum & Di Maio, 2000) four-stage model (Figure 2.7) for their m-government development stages and renamed web presence as information stage.

Catalogue is a static website where government posts information for public knowledge, whereas information stage in m-government is used to send messages via SMS technologies to mobile devices and, in some cases, people are required to respond.

Transaction development phase activities of e-government are comparable to the activities of interaction and transaction development phases of m-government. There is use of search capabilities, e-mails, form filling, downloading, performing complete transactions and making online payments. The activities of vertical and horizontal integrations of e-government are comparable to the transformation development phase activities of m-government, to integrate systems at different levels and across organisations, both internally and externally, to government. Table 2.1 summarises the developmental phases of e-government and m-government.

Table 2.1: Comparison of developmental phases of electronic & mobile government

E-Government developmental phases	M-Government developmental phases
Catalogue is the publication of government information on portal for citizens' consumption via internet connection and there is no chance to respond	***Information phase*** is the sending of information to the intended recipient via SMS technology which is available on mobile devices through mobile network and recipients can respond
Transaction is when citizens transact with government electronically between the servers and desktops or laptops through the wired network	***Interaction phase*** is the collaborative type of transactions with instant responses using mobile technology via SMS or MMS technologies ***Transaction*** refers to the processing of various stages of a transaction using mobile devices through mobile network
Vertical integration refers to the collaboration of government systems or applications at various levels of government administration using connected network infrastructure ***Horizontal integration*** refers to systems integration across the government agencies that offer interactive communication through connected networks	***Transformation*** refers to function that has back office to carry out mobile administrative services which are dependent on mobile devices through mobile network

Source: Layne and Lee, 2001 Source: Tozsa and Budai, 2005

2.4.4 M-government functions

M-government expands e-government functions to mobile innovative platforms. Their purpose is to use mobile devices and functions for providing governmental services to general communities, businesses and the workforce within government. The applications which form part of m-government are categorised as stakeholders involved and types of transactions that are performed. Stakeholders who are involved and who deal with m-government practices focus on four kinds: government to employees (G2E); government to governments (G2G); government to businesses (G2B) and government to citizens (G2C). Transactions consist of the following functions: informational, transactional, operational and managerial (Norris & Moon, 2005; Gebauer & Shaw, 2002). These functions are explained as follows:

Informational functions deal with information publishing, updating and providing awareness messages. Either government can broadcast government alerts to the public proactively, or routinely via e-mails and SMS.

Transactional functions permit customers to transact business online, for instance, renewal of permits or licences and voter registration, using mobile devices. Transactional functions that have witnessed speedy progress are agriculture, law enforcement, fire fighting, (Easton, 2002), emergency medical services, education, health and transportation (Zalesak, 2002, 2003).

Operational functions are government internal processes. Employees in government at any level can successfully access and transmit information across government organisations, while away

from their physical offices. For instance, a police officer may be able to search a suspect's details stored on databases, while wirelessly connected to notebook.

Managerial functions are tasks which are sustained with ICTs and production devices, to improve the agility and coordination, to support the internal and external links in an organisation. For example, use of MTs for monitoring internal and external occurrences of events and for initiating organisational transformation (Gebauer & Shaw, 2002).

The co-existence of e-government and m-government applications relies on each country's circumstances, because mobile devices cannot process all applications. The ICT infrastructure of each country is a major factor in deciding the appropriate applications (Kumar & Sinha, 2007). M-government needs to meet the expectations of the stakeholders' requirements and guidelines were developed for m-government (Kumar & Sinha, 2007). The suggested guidelines are as follows:

- Prudent decision on m-government applications: choose only important and easy applications for implementation.
- User-friendly applications: information needs should have a sense of balance for the comfort of the user for utilisation of MTs.
- Users should access the exact acclaimed m-government services which must be delivered at the right time and place.
- Appropriate back-office systems should be implemented to deliver m-government services.

2.4.5 M-government modes

M-government is established for four core modes: m-services, m-communication, m-administration and m-democracy in the public sectors (Zalesak, 2003); these are explained as follows:

M-communication: government and citizens (G2C, C2G) need reliable communication infrastructure for information provision between them, to encourage citizen participation to make informed choices. Promotion of transparency and accountability requires reliable information through effective communication.

M-services: Mobile devices enable transactions to be conducted between government and citizens such as m-payments and m-transactions.

M-democracy: citizens utilise mobile devices for contribution to social, political, economic, decision making and voting, in order to improve democratic governance.

M-administration: this offers prospects of improving and accelerating the internal processes of government organisations.

2.4.5.1 Comparison between E-government and M-government applications (modes)

E-government services mostly use web based functionality such as e-mail, voice over Internet protocol (VoIP) on desktops and laptops, whereas m-government services depend on SMS, MMS

and voice technologies, but have extended these to web based and e-mail functionalities, using mobile devices such as mobile phones, tablets and laptops with wireless capabilities. Applications of e-government and m-government are compared as follows:

E-services deliver information to stakeholders online 24 hours a day and 7 days a week. It emphasises the activities at front office which means provision of services to the public. The challenge is to deliver services of good quality and of convenience. M-services involve transactions between government and citizens and business such as m-payments, m-commerce and m-transactions. So e-services and e-commerce are transformed into m-services. Both e-democracy and m-democracy aim at promoting the citizens' participation in government policy formulation, to achieve the social and economic growth, through either e-voting or m-voting. E-administration and m-administration provide the same functionality of supporting internal processes of government and public organisations. M-communication ensures that there is reliable infrastructure for communication of information, regardless of people's location, while E-government does not emphasise this aspect, because it is not as easy to deploy as mobile devices and wireless network. Table 2.2 compares e-government and m-government applications.

Table 2.2: Comparison of applications of E-government and M-government

E-Government Applications	M-Government Applications
E-service is concerned with the ability of providing information for meaningful services to the public electronically. **E-commerce** is the connecting of government organisations with business firms for supplies and services. For instance, government could procure materials or hire scarce services from business firms.	**M-services** refer mobile devices enable transactions which are conducted between government and citizen such as m-payments and m-transactions, m-commerce.
E-democracy allows citizens to contribute political and economic issues through public enabled online debate, election voting and e-consultations between citizens and government officials for policy formulation.	**M-democracy** citizens utilises mobile devices for contribution to social, political, economic, decision making and voting to improve democratic governance.
E-administration is the utilisation of ICTs for assisting government processes to be effective and efficient.	**M-administration** offers improved and accelerated the internal processes of government through mobile technologies.
	M-communication refers to reliable mobile communication infrastructure for interaction between government and stakeholders.

Source: European commission, 2007

Source: Zalesak, 2003

2.4.6 M-government benefits

M-government provides benefits, if well planned and implemented. Sheng & Trimi (2008) and Mengistu et al. (2009) identified the following benefits:

- An enhanced degree of providing government agencies' services and information to the public,
- Enhanced competence and efficacy of government workers,
- Encouraging democratic participation of citizens in decision and law making,
- Easy infrastructure setup because networks for mobile devices can be implemented in countries wherever connected network infrastructure is problematic,
- Ease of learning because mobile tools are simple to utilise to access information and
- An improvement to e-government effort because m-government enhances and compliments e-government efforts.

The advantages of m-government over e-government are: the ability to reach a large number of people through the utilisation of mobile tools, m-government is easy and cheap to deploy, it reaches difficult to reach areas, it provides privacy to individual users because any information is targeted to a specific user, it is available anytime and anywhere, it does not require extensive skills for users to use the mobile devices and it helps reduce the ICT knowledge gap between people of different classes (Lallana, 2008).

2.4.7 M-government challenges

The challenges are problematic issues to the effective deployment of applications on m-government infrastructure (Sharma & Gupta, 2004). Since signals on connectionless network are transmitted through unrestricted air space, they are likely to be susceptible to interception and hacking. Other m-government challenges are:

Privacy and security: These are regarded as core difficulties to e-government development (Norris & Moon, 2005). Users are concerned about their privacy and data security on m-government. The key fears could be that cellular phone numbers can be tracked whenever they contribute suggestions to government. People need assurance of their privacy and that their data will not be utilised before their consent (Antovski & Gusev, 2003). Security prevents data theft during transmissions from the network to mobile devices; it foils unauthorised access to information stored in mobile devices and makes sure that viruses are not transmitted to unprotected mobile devices (Tsai, 2003).

Accessibility: The mobile/wireless networks in some countries have partial penetration rates. Government organisations should map the way for providing accessibility to government information and services, through texting to mobile devices. Public offices should ensure that stakeholders can easily access information through the websites on mobile communication technologies (Sharma & Gupta, 2004).

Usability: Mobile devices contain a variety of inbuilt constraints such as: (a) small screens and key pads, (b) weak manipulative ability, (c) a short battery span, (d) difficult text input methods, (e)

operational errors, (f) inferior presentation resolution, (g) poor web traversing facility, and (h) low data storage (Siau & Shen, 2003; AlShaali & Varshney, 2005).

Infrastructure for applications: There are two challenges: (1) operational applications of e-government are the foundations of operational applications in m-government functionality; (2) divergent platforms for surfers (browsers) for connected and connectionless Internet accessibility. M-government needs solid e-government structures for its installation to manipulate the mobile devices with compatible platforms and standards, for ultimate government service delivery. For instance, access to websites using mobile devices and PCs has to have both hypertext markup language version 5 (HTML5) and wireless application protocol (WAP) technically developed.

Legal matters: Most countries have not yet formulated or adopted the law for mobile information codes of practices. The present legislative law does not identify documentation and business on mobile devices (Kushchu & Kuscu, 2003).

Compatibility and interoperability: These two technical issues may constrain the integration of existing e-government systems or legacy systems with mobile systems. Employing open standard systems is the best way to avoid such technical problems (Kushchu & Kuscu, 2003).

People's readiness: M-government requires people's acceptance and strong feelings towards it. In LDCs, many individuals have not yet grasped the importance of e-government and m-government. This entails intensive awareness of mobile technology services for people (Mengistu et al., 2009).

2.5 Mobile technologies

Mobile Technologies' (MTs) presence in developing countries is a critical factor to be considered in carrying out a readiness assessment of m-government. MTs play a very important role, because they are the transmission agents of government services through m-government to citizenry (Varshney & Vetter, 2000).

MTs consist of connectivity infrastructure for Wireless Wide Area Network (WWAN), Wireless Local Area Network (WLAN) together with devices mobile in nature, such as pagers, tablets, smart and cellular phones, Personal Digital Assistants (PDAs) and laptops. MTs remain an important undertaking in ICT innovations (Varshney & Vetter, 2000). Governments want to employ MTs in providing services because of advanced capabilities of MTs and their increased use in government departments and public organisations. Government agencies utilise MTs to support speedy information exchange within and across government organisations and among governments, citizenry and businesses (Moon, 2004).

2.5.1 Mobile devices

MT devices are convenient and are always ready for use by users. These devices include:

- Mobile phones for SMS and MMS

- Smart phones which are a mixture of mobile phones and PDAs and are used for e-mails, web surfing, map services, video and music downloading, and global positioning system (GPS)
- Personal Digital Assistants (PDAs) which offer entrenched e-mail, calendar details and memo particulars
- Tablet PC which assists consumers to write with normal handwriting with a digital pen; and Blackberry which offers wireless e-mailing functionalities (Sheng & Trimi, 2008).

2.5.2 Mobile network and Internet penetration

This section discusses mobile and/or wireless network penetration and users' cellular subscriptions globally.

2.5.2.1 Mobile Network Penetration (MNP)

Mobile devices have a critical role in everyday business processes. The growth in MNP is impressive worldwide, particularly in Europe, as a result of the telecommunication deregulation and implementation of Global System for Mobile (GSM) communication tools (Sadeh, 2002). Mobile handsets are not only voice communication tools, but also link to the Internet, transfer data and make business transactions on a small scale.

The growth in telecommunication and ICT infrastructure development has accelerated continuously, together with their utilisation. A significant landmark was that, in late 2008, more than 4 billion mobile cellular phone subscriptions across the world (presenting mobile cellular subscription of 78%) were attained in the pursuit of ICT development (ITU, 2011a). In the same period, about one quarter of 6.7 billion of the population in world was on the Internet.

Increasing mobile device services and other technologies have made immense efforts to link isolated areas. The growth is mainly noteworthy in least developed and developing countries. Between 2000 and 2010, subscriptions for mobile cellular infiltration attained 70% in developing countries, as shown in Figure 2.8, and an increase of 29% for LDCs, as illustrated in Figure 2.9.

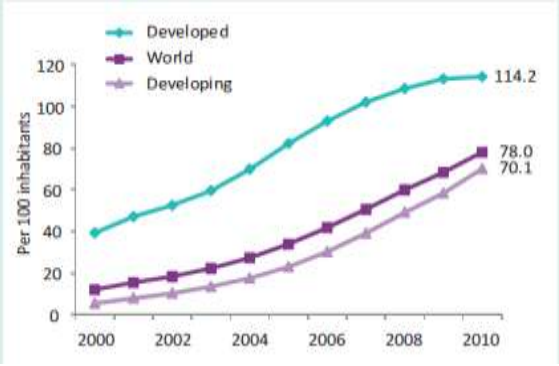


Figure 2.8: Mobile-cellular subscriptions, 2000-2010, world and by level of development (source: ITU, 2011a)

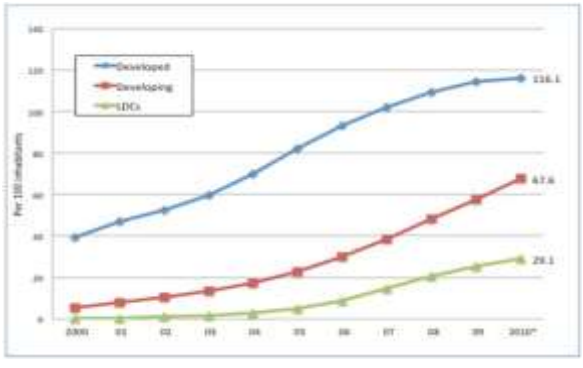


Figure 2.9: Mobile cellular subscriptions (source: ITU, 2011b)

In 2010, annual growth in developing countries for mobile subscriptions was still at 20% of the worldwide mobile subscriptions, as seen in Figure 2.10. There have been positive outcomes in terms of population mobile/wireless coverage in LDCs. LDCs have effectively improved mobile services' accessibility outside urban areas. By the end of 2010, 62% of the population in LDCs was exposed to mobile cellular signals, as seen in Figure 2.11.

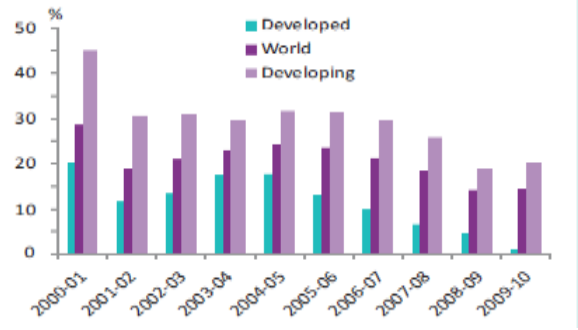


Figure 2.10: Mobile cellular subscriptions worldwide annual growth (source: ITU, 2011a

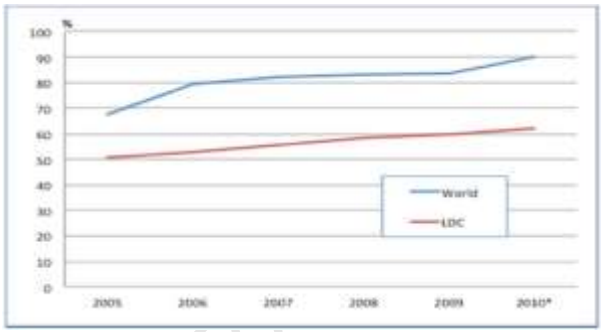


Figure 2.11: % of the population covered by a mobile cellular signal, LDCs (source: ITU, 2011b)

Africa maintains increased mobile expansion at the rate of 32% among the developing areas. Africa has mobile penetration of 28% compared to 38%, 72%, 79% and 111% in Asia, Americas, Oceania, and Europe respectively, which is encouraging (ITU, 2009a). Figure 2.12 shows the mobile cellular subscriptions in all the regions by the close of 2011. As growth penetration rates persist in being strongest in disadvantages areas, the mobile phone divide is likely to be drastically narrowed, sooner or later. In 2010, the African region remained with the lowest ICT Development Index (IDI) values. The IDI values increased for all African nations during the period between 2008 and 2010. Furthermore, many African nations have improved their mobile penetration rate by an average of 30% (ITU, 2009a).

Mobile cellular subscriptions	(millions)							Per 100 inhabitants						
	2005	2006	2007	2008	2009	2010	2011*	2005	2006	2007	2008	2009	2010	2011*
Africa	87	129	174	246	296	360	433	12.4	17.9	23.5	32.4	38.0	45.2	53.0
Arab States	85	126	175	214	264	310	349	27.1	39.3	53.0	63.4	76.5	87.9	96.7
Asia & Pacific	834	1'074	1'398	1'773	2'161	2'690	2'897	22.6	28.8	37.1	46.6	56.2	69.2	73.9
CIS	166	227	267	313	357	376	399	59.7	81.8	96.1	112.5	128.0	134.8	143.0
Europe	550	610	677	717	725	724	741	91.7	101.2	111.7	117.7	118.4	117.7	119.5
The Americas	459	553	649	741	814	878	969	52.1	62.0	72.1	81.5	88.5	94.5	103.3

Figure 2.12: Mobile cellular subscriptions by region (source: ITU, 2011a)

The increased number of mobile devices penetration in both urban and remote areas is putting persistent demands on governments to implement m-government, in order to cover vast areas. Users would like services that fit the mobile technology environment to be accessible and delivered anytime and at any place.

2.5.2.2 Internet penetration

There is a rapid growth of Internet users worldwide. There are more than two billion users of the Internet worldwide. There was an improved growth of 14% of Internet users between 2009 and 2010 in developing countries. By the close of 2010, about 30% of the world's population was online – which presented an increase from about 6% to 12% between 2000 and 2003, as shown in Figure 2.13. The digital gap between LDCs and developing and developed countries concerning Internet usage continues to be wide. There were merely 3 out of 100 people by the close of 2010 in LDCs who were online, as shown in Figure 2.14.

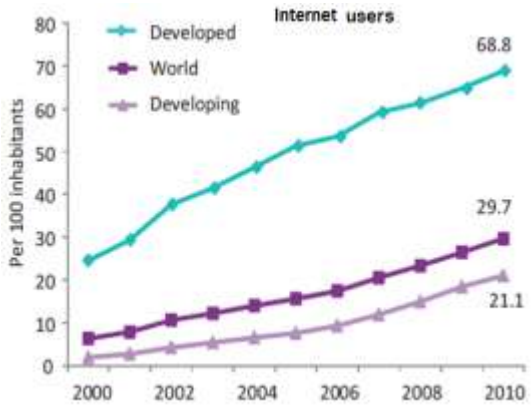


Figure 2.13: Internet users by worldwide (source: ITU, 2011a)

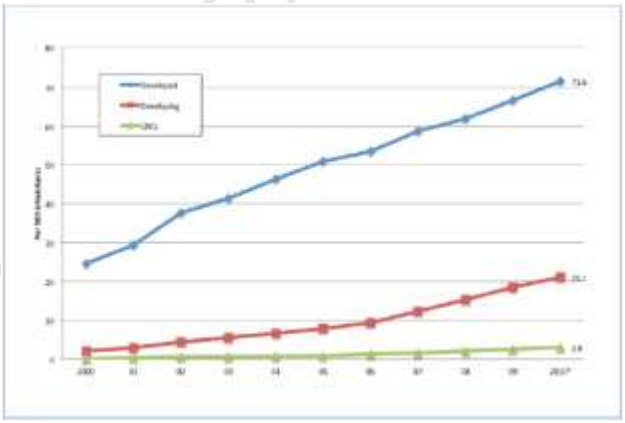


Figure 2.14: Internet users per 100 inhabitants, (source: ITU, 2011b)

There were about 12,8% of Internet users in Africa by late 2011, which means it still lags behind. Figure 2.15 shows the growth of Internet users per region between 2005 and 2011. Applications and services that can promote development are accessible via high-speed Internet connection, for instance, m-government, m-commerce, or m-banking can function properly with high-speed Internet connectivity.

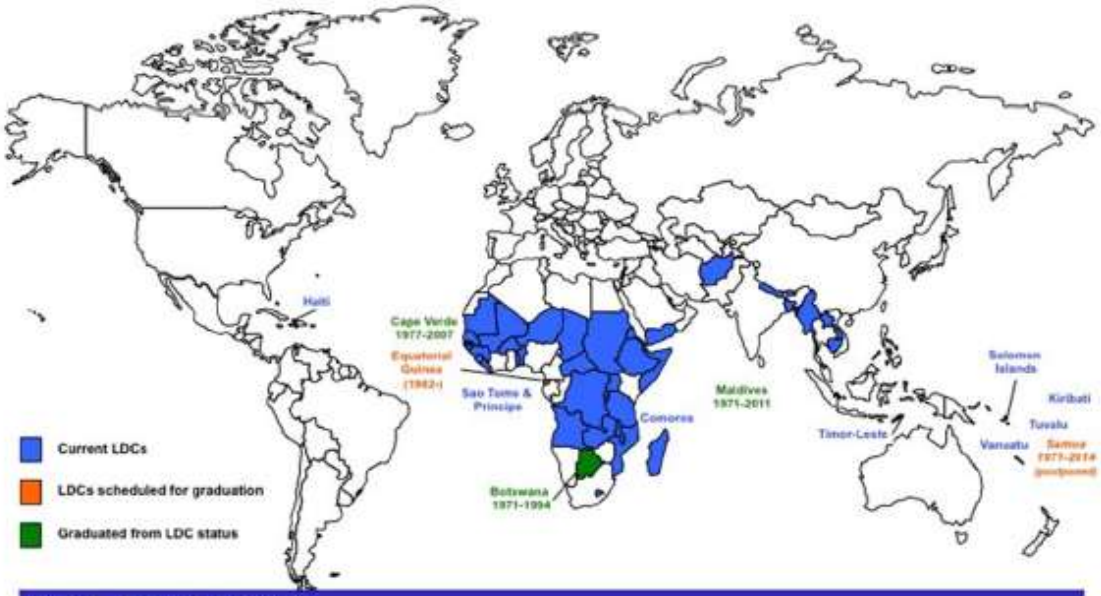
Africa continued to make great advancement in global Internet connectivity over the period from 2008 to 2010, though still trailing. During the same time, many African countries doubled or tripled their international bandwidth capabilities and supplemented these by operating policy measures that ensured inexpensive access to the available bandwidth.

	(millions)							Per 100 inhabitants						
Internet users	2005	2006	2007	2008	2009	2010	2011*	2005	2006	2007	2008	2009	2010	2011*
Africa	17	24	29	48	74	90	105	2.4	3.3	4.0	6.4	9.5	11.3	12.8
Arab States	25	35	46	59	73	85	105	8.1	10.9	14.0	17.6	21.2	24.1	29.1
Asia & Pacific	344	395	508	627	741	875	1'066	9.3	10.6	13.5	16.5	19.3	22.5	27.2
CIS	28	35	47	60	74	106	133	10.2	12.6	16.8	21.4	26.5	38.2	47.6
Europe	278	300	340	367	387	412	461	46.3	49.8	56.1	60.2	63.2	66.9	74.4
The Americas	316	346	385	402	424	462	529	35.9	38.8	42.7	44.2	46.1	49.7	56.3

Figure 2.15: Internet users by region (source: ITU, 2011a)

2.6 The Malawian context

Malawi is assessed as a least developed country internationally, because of low-income levels, low status of human capital and vulnerable economy, see Figure 2.16 (UNCTAD, 2006; ITU, 2011b). The country is landlocked and that might contributed to its vulnerable economy, low human capital and low-income levels. Malawian telecommunication infrastructure is not adequate and provides 1.07 fixed telephone lines for every 100 persons (UN, 2012). Communication infrastructure in certain areas of Malawi is reliable and is supported by mobile/wireless network penetration, which covers almost the entire country (Saidi, 2009).



Region	Total LDCs	Countries
Africa	33	Angola, Benin, Burkina Faso, Burundi, Central African Republic, Chad, Comoros, Democratic Republic of Congo, Djibouti, Equatorial Guinea, Eritrea, Ethiopia, Gambia, Guinea, Guinea-Bissau, Lesotho, Liberia, Madagascar, Malawi, Mali, Mauritania, Mozambique, Niger, Rwanda, Sao Tome & Principe, Senegal, Sierra Leone, Somalia, Sudan, Togo, Uganda, United Republic of Tanzania, Zambia (+ Botswana, Cape Verde - already graduated).
America	1	Haiti
Asia and Pacific	14	Afghanistan, Bangladesh, Bhutan, Cambodia, Kiribati, Lao People's Democratic Rep., Myanmar, Nepal, Samoa, Solomon Islands, Timor-Leste, Tuvalu, Vanuatu, Yemen. (+ Maldives – graduated January 2011)

Figure 2.16: Least developed countries (source: ITU, 2011b)

This section discusses Malawi's ICT development, e-government, m-government, mobile and wireless service providers, mobile applications, opportunities, and challenges of both e-government and m-government. *ICT in Malawi has few peer reviewed articles for referencing; as a result some references that are not peer reviewed are used in this paper.*

2.6.1 ICT development in Malawi

ICTs have progressively developed into one of the leading factors affecting each socio-economic aspect of development in Malawi. The important ICTs' advances are being developed and continue to impact on socio-economic processes at different levels of development in Malawian society. Business procedures have improved due to ICT advances at organisational, individual and community levels. Organisations in Malawi are spending additional resources on the development and utilisation of ICTs, so that they are efficient, effective and competitive in their functionalities to meet the constantly changing trends. The Malawian government has developed ICT policies for ICT usage in civil service through the Department of Information Systems and Technology Management Services (DISTMS). The Malawian government has implemented network infrastructure to connect all government buildings at Capital Hill, City Centre and the Lilongwe Old Town, forming a network that provides Internet and e-mail services as well as a highway for information sharing and online transactions, within government (DISTMS, 2011).

The Malawian government has defined nine priority areas that require direct administrative reforms, by engaging ICT tools to achieve the national economic development growth. Malawian social, economic and ICT Policy Integrated Planning Development Framework provided observations of the functions of ICTs to sustain the social-economic growth processes (Dzidonu, 2003). Detailed observations of the responsibility of ICTs to sustain the social and economic developmental processes are critical (Kanjo, 2008). These useful observations and recommendations have not been executed. This signifies that e-government development in Malawi is encountering challenges. Several highlighted challenges are:

- Firstly, public organisations are unwilling to perform their tasks under rules governing "information openness, accessibility and transparency to citizens and private sectors", because there is no committed state champion to guide the ICT expansion course (e-government medium) in Malawi. Senior management in Malawi does not embrace ICTs at the required speed and there is less top leadership awareness (Bichler, 2008).
- Secondly, there are no useful systems to support ICT/IS utilisation in socially related real-life undertakings, because of a number of infrastructure bottle necks, especially in rural areas. There is a lack of suitable technologies and communication tools to sustain the growth, deployment and utilisation of ICTs in all spheres of society, for example, there are infrastructure bottle necks in telecommunication and power supply (Bichler, 2008).

- Thirdly, there is a lack of commitment and tangible discourse amongst government and private-sector on preference for e-government execution (Kanjo, 2008). Malawi has developed two ICT policies, namely, the ICT for Development Policy (ICT4D) and the Universal Access Policy, to guide the utilisation of ICT tools (ITU, 2011c).

Any major development in e-government infrastructure is crucial for Malawi's socio-economic development. It is important that government put extensive effort into the formulation of strategies, aimed at the deployment and utilisation of advanced ICT tools, for information systems flow. The leadership of the Malawian government supports the e-government implementation, as insinuated by the country's leadership (MGDS, 2010).

2.6.2 E-government status in Malawi

The implementation of e-government in Malawi started in government ministries, departments and government owned companies in the late 1990s (Kanjo, 2008). Since then, the leadership of the country decided that the Malawian government should start utilising ICTs to sustain democratic management through e-government. The momentum for ICTs to enhance e-government businesses in Malawi at nationwide level started in 2004, with the need of ICTs in the nine priority areas of social and economic development, in areas of health, agriculture, transport and communication infrastructure, tourism, postal services, education, banking and e-commerce (MGDS, 2010).

The Ministry of Information is in charge of the laying out of ICT infrastructure in the telecommunications sector, for the successful exploitation of ICTs in all sectors of economic growth, to obtain better results. The ministry is also responsible for enacting enabling frameworks. Government plans to undertake the following: rolling out Government Wide Area Network (GWAN) to Blantyre, Mzuzu and Zomba, constructing multipurpose telecenters in some districts and creating a data centre for the entire public administration. The government, through its ministries or departments, has many application systems which are not integrated (DISTMS, 2011).

2.6.3 Malawi e-government benefits

A fully implemented e-government in Malawi would produce the following benefits: costs for government operations would be low, there would be increased effectiveness, there would be excellent service provision to stakeholders, there would be transparent and accountable transactions, government capability would be enhanced, network and community telecenters would be created, there would be valuable decision making and advanced ICT usage in all areas of the country (Kanjo, 2008).

2.6.4 E-government challenges in Malawi

E-government is not fully implemented because of the following challenges: there is no appropriate ICT infrastructure, there are no proper policies and laws, there are no proper human skills developments, there are problems of managing changes, there is no well-established corporation between stakeholders such as government and the private sector, there is donor dependency, there

is lack of confidence in locally initiated solutions, there are poor or no strategies and no clear headship roles (Bichler, 2008; Kanjo, 2008).

2.6.5 Why focus on m-government in Malawi

Malawian e-government implementation is in its early stages. In Malawi, as in many LDCs, traditional e-government is believed to widen the gap between "those who have and those who do not have", since the poor and marginalised usually have no access to fixed Internet (Cupido & Van Belle, 2012). Malawi has two reliable mobile phone network operators/providers namely, Telecom Network Malawi (TNM) and Airtel Malawi, whose mobile network penetration of the country is over 85% (ITU, 2011b). The mobile network is a suitable backbone infrastructure for m-government implementation. There are also a total of 18 operational wireless Internet Service Providers that enable those with laptops with wireless capabilities to access Internet anywhere (MACRA, 2012). Another factor is that affordable mobile phones for voice and SMS are available in every village. M-government would encourage participation of stakeholders (including those who are considered side-lined) through the use of MTs (Chigona, Valley, Beukers & Tanner, 2009). Chigona et al. (2009) emphasised that mobile Internet is vital to solve exclusion from social participation. Further justifications for using mobile phones in Malawi are: accessibility has been enabled due to mobile phones' characteristics of mobility, anyplace and anytime; mobile devices make communication possible in places where other ICT infrastructure cannot be implemented; adoption of mobile phones is part of people's daily life and mobile devices make duplex dialogue possible (Hellström, 2008). A study of 92 countries revealed that mobile devices, especially mobile phones, have an important role in social and economic growth in developing countries, in comparison to developed countries (Waverman, Meloria & Melvyn, 2005). Mobile phones are valuable computers which are always with people and are not for voice and SMS communications only (Prensky, 2004).

2.6.6 M-government's political, economic, social and technology factors

M-government readiness assessment should embrace the four different factors in as far as mobile technology usage is concerned (Roggenkamp, 2007). These factors are (a) technological factors, which focus on the production and enhancement of new MTs and their appropriate applications for different business models and user behaviours; (b) economic factors that focus on services and business models to sustain business processes and development of mobile devices; (c) sociological factors that focus on social requirements for adopting MTs and analysing social implications of MTs and (d) political factors that are concerned with the employment of MTs in government, which comprise organisation political systems, processes and actors for good governance.

2.6.7 Mobile/wireless network penetration

Malawi accesses Internet through Wi-Fi, WiMax, third generation (3G) routers, satellite dishes and broadband. Most of the service providers lease bandwidth from Malawi Telecommunication Limited (MTL). Malawi has two mobile operators, namely TNM Limited and Airtel Malawi Limited. Recently, government, through MACRA, has given a licence to a third operator. Malawi has 18 operational Internet service providers.

Numerous Internet service providers implement WiMax and Wi-Fi wireless broadband networks and the Evolution-Data Optimised (EV-DO) technology and Code Division Multiple Access (CDMA) 2000 of MTL and Access Limited (ACL) networks that support broadband speeds (Research & Markets, 2011).

TNM and Airtel have Global System for Mobile Communications (GSM) and 3G technology. 3G is live on only 77 of the 360 towers, but the corporations planned to continue to increase the 3G coverage to reach the entire network before the end of 2010. Seventy seven towers with 3G technologies are located in major cities and towns of the country; these are Blantyre, Lilongwe, Mzuzu, Zomba, Mangochi, Kasungu and Karonga (BIZCOMMUNITY, 2010).

Airtel has a high quality 3G with High-Speed Downlink Packet Access (HSDPA+), Enhanced Data GSM Environment (EDGE) and Airtel also uses the Global Packet Radio Service (GPRS) network that use Huawei B970b 3G router with Wi-Fi to access Internet. Airtel's 3G provides such facilities as instant messages, e-mails, social networks and blogs, browsing, Internet engine searching, localisation services, banking and entertainments (Airtel Malawi, 2011).

Telekom Networks Malawi (TNM) has 3,5G with Wideband-CDMA/HSDPA network, which enables subscribers to access video calling services, mobile TV and high-speed Internet at download speeds of 3,6 Mbps (TNM, 2011).

Burco Electronic Systems Ltd uses the Aptilo WiMax CSN System™ for WiMax service. This is the first WiMax 16e-based broadband Internet service in Malawi. This service is installed both in suburban and business premises in all major cities of Mzuzu, Lilongwe, Zomba and Blantyre, while the services are also installed on requests in other districts (Burco, 2010).

Mobile network coverage for the Airtel Malawi and TNM was at 85% as of December 2010. Airtel is at present the leading operator with a large market share. The mobile subscription rate is at 65% and 35% for Airtel and TNM respectively (ITU, 2009b; MACRA, 2012). The period between 2000 and 2009 was reported to ITU and the period between 2010 and 2011 is yet to be incorporated into ITU statistics. Figure 2.17 shows the ever increasing number of mobile subscribers in Malawi by the end of 2011.

Malawi has two fixed lines operators, namely Malawi Telecommunications Limited (MTL) and Access Limited. MTL has a Code Division Multiple Access (CDMA) fixed network in major towns of the country. Access Limited is also implementing a CDMA network.

Malawi has created 20 telecenters through a government program called Universal Access Policy, with the objective to bridge the digital segregation that prevails between the privileged and under-served communities. Telecenters act as centres to access information and learning of ICTs in the rural areas. In telecenters, students access books and farmers access agro-information through the Internet.

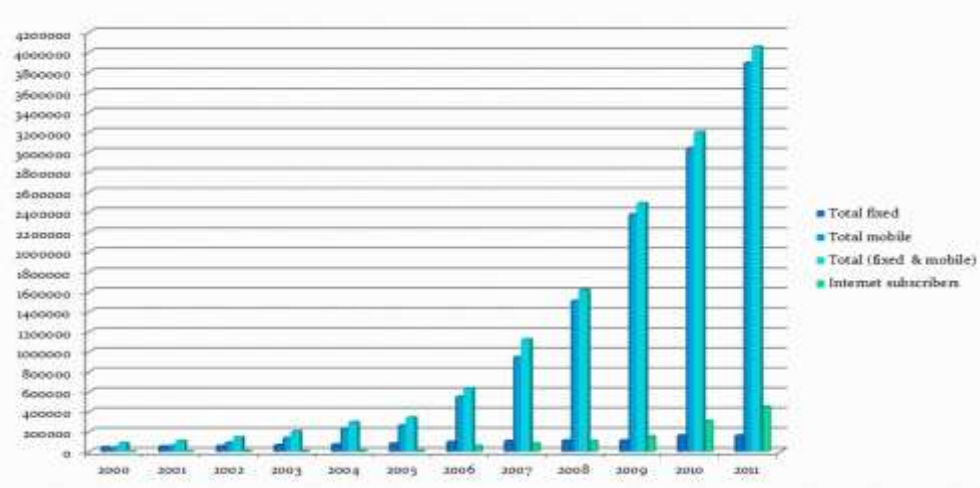


Figure 2.17: Mobile subscriber growth in Malawi (source: ITU, 2009; MACRA, 2012)

2.6.8 Mobile applications in Malawi

This sub-section discusses some mobile applications in various sectors. The application in the agriculture sector is Esoko application, which provides a market information system via SMS. The applications in the health sector are RapidSMS, VillageReach and FrontlineSMS, which provide information on health status. The banking sector has applications such as Banki Mmanja, Bank Ponseponse and M0626, which help mobile banking transactions. The applications in agriculture and health sectors are in the pilot phase.

2.6.8.1 Agriculture sector application

Esoko is mobile technology software that enables agribusiness farmers and others to utilise cell phones, to exchange and obtain tailored, instant market information, such as prices and bids, using text messages (Carana, 2010). Esoko is comprised of web and SMS tools that any government or business can employ for quick information sharing with users. Figure 2.18 shows some outputs of Esoko.

Figure 2.18: SMS marketing agribusiness information (source: Carana, 2010)

2.6.8.2 Health sector applications

RapidSMS is a mobile technology application installed by UNICEF Malawi in some pilot centres in Kasungu, to resolve the low rate of transferring information on nutrition status to the country's "Integrated Nutrition and Food Security Surveillance" (INFSS) database, in time. RapidSMS provides data entry on real-time basis, with transmission speeds of two minutes. It offers a two way information flow between information senders from remote areas and the analysts at the Ministry of Health. The quality of data has improved, because the application has reduced data transmission errors (UNICEF Malawi, 2009).

VillageReach (vrMIS) is a health support system in rural areas which reduces reliance on an unreliable infrastructure. It uses the Internet and wireless networks for maximum reach to remote areas. It uses various mobile devices for communication. The data gathered from remote areas is quickly processed. For instance, at Kwitanda Community Health, VillageReach is strengthening health systems in rural areas, through SMS communication applications, to enhance communication between community health workers and health centres (VillageReach Malawi, 2008).

FrontlineSMS is utilised to link Community Health Workers (CHWs) and St. Gabriel Mission Hospital in Lilongwe. FrontlineSMS is open source software, which is installed on a laptop and communicates with mobile phones in remote communities. CHWs are able to SMS to hospitals about their TB and HIV drugs, after monitoring patients' adherence to drugs. The volunteers who are responsible for home-based care use SMSs to report to hospital the patients' status and names, for routine follow up. It is also used for communicating meeting times and places for "People Living with HIV and Aids" (PLWHA) support group leaders (Banks, Nesbit & IDG News Service, 2008). FrontlineSMS has the following components: mobile phones, laptops and mobile networks. The laptop keeps phone numbers and incoming and outgoing messages. Data is stored on the laptop and

it can be used anywhere in the world. Messages can be broadcast to individuals or groups (FrontlineSMS, 2008). The hospital pays the service providers for SMS.

2.6.8.3 Banking sector applications

Mobile Banking is the ability of customers to transact with banks, while away from banking institutions, using mobile devices. Some of the banks that are offering mobile services and banking applications in Malawi are "Banki Mmanja" for Opportunity International Bank of Malawi, "Bank Ponseponse" for IndeBank, "Cell phone banking" for Standard Bank and "M0626" for the National Bank of Malawi (Institute of Bankers in Malawi, 2011). The banking applications offer these features: checking balances and statements, utility payments and making payments to third parties. Applications offer the benefits of convenience, flexibility, and portability.

2.7 Enabling environments

In assessing the country's m-government readiness, the following summarised criteria are considered as enabling environments which need to be explored (Peters, 2005): the legal and regulatory environment for ICTs' utilisation; suitability of ICTs; low cost of ICTs in the local perspective; ICT competence and skills training; relevant local content availability; exploitation of ICTs in business; ICT integration into peoples' social lives; physical access to ICT; socio-cultural factors in ICT use; data security and peoples' confidence in ICTs; the economic situation affecting ICT usage; accessibility to MTs and availability of mobile/wireless network providers and government's responsibility in influencing mobile readiness. The strong emphasis should be on infrastructure backbone, technology, customers, human skill levels, accessibility and connectivity for m-government (Peters, 2005).

2.8 Importance of user involvement in m-government

Users (government organisations, businesses and citizens) in LDCs should be considered in m-government readiness assessment, in order to understand their requirements. Users are critical in getting new technology accepted and in achieving a high degree of m-government utilisation. Users of mobile devices need to be involved to achieve a suitable design and accomplishment of government services provision. Services ought to be provided in modes which are familiar to users and the services should also be familiar to them (Al Thunibat, Zin & Sahari, 2011). An example is the successful mCity project in the city of Stockholm, where users participated and provided essential inputs to the ICT industry and management (Hallin & Lundevall, 2007). M-government needs strong commitment of all government organisations, businesses and citizens (users) for successful service delivery, because these government organisations, businesses and citizens depend on each other (Carroll, 2006).

The contents are required to be short and pertinent for distinct users, because mobile handsets are for speedy and concise communications anywhere and at any time. The accessibility to information and content, and provision of information, improves the individual's quality of life (Van De Kar &

Verbraeck, 2008). User involvement assists in personalisation and localisation of services that are tailored to suit user requirements (Jørstad & Thanh, 2006).

2.9 Impact of ICT adoption on culture

The countrywide culture of a country affects the approval of ICTs in that particular country. Cultural factors offer differences in perceptions of approval rates for ICTs in a country. Culture affects individual and organisational behaviours. Various attitudes and values affect people's interacting methods with their environment (Hofstede, 1984, 2001; Trompenaars, 1993). This paper has used the cultural framework of Hofstede (1984, 2001), that has great support from scholars such as Van Everdingen & Waarts (2003) and Lee & Peterson (2000) for ICT approval across countries. Here the special interest is for the LDCs in Africa. Malawi and South Africa (the latter is not a least developed country) are countries in sub-Saharan Africa which have many similarities in their cultural values, so the framework details on South Africa can be generalised to Malawi. Since Malawi was not included in the Hofstede framework, both South African datasets of Hofstede's framework in Table 2.3 are used here to illustrate the impact of culture on ICTs' adoption which includes MTs in a particular country. Erumban & De Jong (2006) measured the ICTs' adoption rates of countries, using ICTs' expenditures against their gross domestic products, using data from Pohjola (2003). The results were compared with Hofstede (2001) as shown in Table 2.3 and they remained the same as their results.

Table 2.3: Hofstede cultural dimensions

Country	Dataset1	Dataset2	PD	UA	ID	MA	LTO	Dummy
Arab world	-	1	80	68	38	52	-	1
Argentina	1	2	49	86	46	56	-	1
South Africa	**33**	**39**	**49**	**49**	**65**	**63**	**-**	**0**
South Korea	-	40	60	85	18	39	75	1
Total Countries	42	49	52	52	52	52	22	52
Low-Income Countries	8(19%)	15(31%)	16(31%)	16(31%)	16(31%)	16(31%)	7(32%)	16(31%)

Extracted from: Hofstede, 2001

Dummy: 0 = low-income country, 1= high-income country

Hofstede's framework has five cultural dimensions:

- *Power Distance (**PD**)* refers to the distribution disparity of power in a particular nation. The hierarchy reflects organisational distribution of power.
- *Individualism (**ID**)* deals with relationships amongst the individuals and the groups the individuals associate with. Persons who live in individualistic states are motivated to make

adoptions their own and those in collective states are eager to follow the standards of the groups.

- *Uncertainty Avoidance (**UA**)* – Hofstede (1984, p. 83) states that uncertainty avoidance is the degree of uncomfortable feelings of societal members such as uncertainty and vagueness. Approval of new technologies consists of risks and uncertainties.
- *Masculinity (**MA**)* is characterised by ambition, competition and an emphasis on capability and material issues. Cultures of females are categorised thorough such things as solidarity, consensus agreement, equality and social associative concerns.
- *Long-Term Orientation (**LTO**)* refers to cultural aspects that deal with the extent of culture values, in line with the traditions and in relation to the past, present and future.

South Africa has a lower PD, higher ID, lower UA and higher MA, as indicated in Table 2.3; their ICT adoption rate is also high. In Table 2.3, South Africa has no LTO. This paper views South Africa as placing less emphasis on traditional culture as South Africa is open to new technological ideas, so the adoption of ICT is expected to be high. Figure 2.19 depicts South African dimensions of culture. South Africa scored well in all dimensions of the Hofstede model and the analysis for South Africa illustrates the emphasis on individualism. So the findings of South African culture can easily be generalised to the Malawian cultural environment regarding ICT uptake.

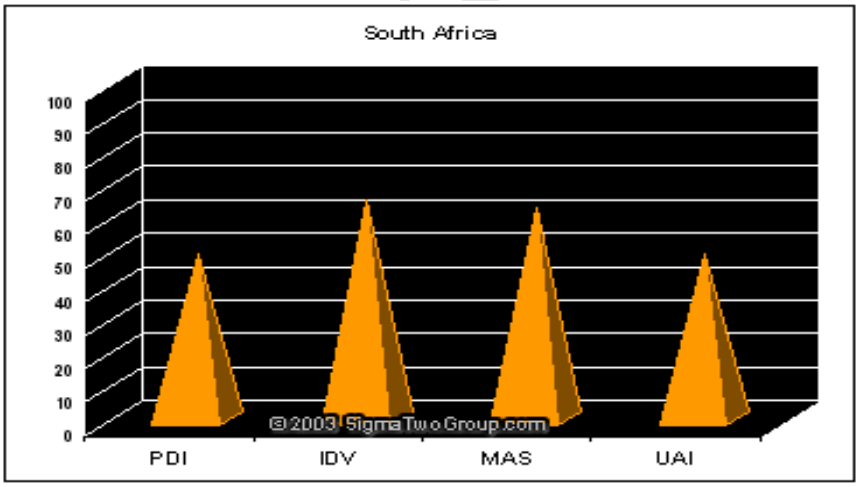


Figure 2.19: South African cultural dimensions (source: Hofstede, 2009)

2.10 Discovered literature gaps

Many studies on mobile technology readiness have been investigated and were not specific for LDCs. Some of these gaps were assessed to find out if they were relevant to m-readiness to realise m-government. The literature review identified the gaps, such as problems to sustain mobile/wireless service providers, limited user participation in LDCs and non-integrated

applications which run on mobile devices in LDCs. It is prudent to engage each identified gap as a special research area. The gaps are as follows:

- M-government depends on mobile/wireless network providers – how to sustain these providers in LDCs is a challenge, especially when business conditions are not favourable and when investors are normally from developed countries (Parasuraman, 2000). For instance, Airtel Malawi is now under its third owner. The companies or individuals have more than one operator, so that they can be accessible any time because they have no trust in one operator (Liljander, Gillberg, Gummerus & Van Riel, 2006). There will be problems to users of that network if no one wants to take over.
- User participation in LDCs is limited when deciding the type of applications to deploy; users are always at the receiving end of utilising the applications after formal or informal training (Carroll, 2006; Sheng & Trimi, 2008; McLeod, MacDonell & Doolin, 2007).
- Most of the services on mobile devices in LDCs are not integrated with other systems, therefore there is no information sharing (Hellström, 2008).
- There must be a possibility of developing MTs that are easier to implement at lower cost, considering the digital divide and discrepancies in economies between developed and LDCs, for example, simple mobile/wireless network connectivity tools (Misuraca, 2009).
- Privacy and security are highlighted as areas of serious concern in m-government. Privacy and security in m-government require a separate research (Misuraca, 2009; Liljander et al., 2006).

If governments in LDCs are to embark on successful and trustworthy m-government, there is need to ensure the sustainability of mobile providers, participation of users in deciding the types of applications to deploy on mobile devices. The integration of existing systems, privacy and security should be considered in the course of deploying services on mobile devices. LDCs' governments should in initiate research for MTs developments which are suitable for LDCs at low cost of implementation.

2.11 Summary

The advance in ICT has pressurised governments, both in developed and LDCs, to employ ICT tools in their business transactions at different levels, to deliver services to stakeholders.

E-government utilises ICTs to provide services using connected and/or connectionless networks through Internet, websites and mobile/wireless devices. Opportunities and challenges of e-governments, both in developed and LDCs, have been outlined. LDCs encounter difficulties in implementing e-government, because of poor infrastructure, finances, legal framework, lack of human skills and leadership commitment.

M-government utilises mobile/wireless technologies to provide services and it is part and parcel of e-government. It uses mobile devices such as cell phones, smart phones, tablets, laptops, PDAs and pagers to provide services. Opportunities and challenges of m-government have been outlined.

Mobile/wireless penetration and subscriptions are increasing globally; this is very important for LDCs where the digital divide is huge. In Malawi, mobile/wireless penetration is 29%, while there is over 85% of network coverage. It is therefore important to measure governments' readiness if they could embark on m-government to communicate with all their stakeholders.

Several applications can be transacted, using mobile devices such as law enforcement, health, voting, agriculture and emergency. Mobile applications in Malawi that are functioning are mobile banking for banking services, mobile health for information processing and messages in hospitals and mobile agriculture for market information for agribusiness farmers and other users.

In the next chapter, the research theoretical model discusses the in-depth reviews of mobile readiness, formulation of a proposed research theoretical model and the gaps identified in the literature.

Chapter 3 Research theoretical model

This chapter discusses the research theoretical model background. The conceptual theoretical framework is discussed. The propositions of research theoretical model are presented. The chapter summary is then presented.

3.1 Introduction

Theory is defined as an abstraction of entities that describes, explains, and improves understanding of the worldview and provides predictions of the future and their interventions and actions (Gregor, 2006). Gregor (2006) further says that, at the centre of a theory definition, are the phenomenon generalisation, causation and interactions. In qualitative research, theory is a lens that is used as an advocacy to explain phenomena under inquiry, and to guide the researcher on processes of gathering data and analysis (Cresswell, 2009). In this research, proposed theoretical framework was used as an advocacy lens and as a tool for describing and explaining the research.

3.2 M-readiness assessment theoretical frameworks

Numerous theoretical models for technology innovation readiness, acceptance and adoption in the Information Systems field have been used to assess users' (individuals, government organisations, businesses and country) readiness, acceptance and adoption to utilise technologies. Readiness models are used to holistically determine the organisational preparedness to embrace the new technologies. Technology innovation readiness models are adopted in the Information Systems field; each focuses and assesses different perspectives to enhance technology readiness assessment. The majority of theoretical models explain how and why technological innovations are accepted and determine the acceptance and adoption levels. Some models concentrate on individual and societal level acceptance and adoption of technology innovation (Compeau & Higgins, 1995; Davis, Bagozzi & Warshaw, 1989). Some concentrate on adoption at an organisational level (Leonard-Barton & Deschamps, 1988).

Theoretical models that focus on innovation technology acceptance and adoption from social psychology are Motivational Model (MM), Theory of Reasoned Action (TRA) and Theory of Planned Behaviour (TPB); Innovation Diffusion Theory (IDT) and Social Cognitive Theory (SCT) are from sociology. Other models are Technology Acceptance Model (TAM), Theory of Acceptance and Use of Technology (UTAUT) Model (Alawahdi and Morris, 2008), Tasks/Technology Fit (TTF) Model (Goodhue and Thompson, 1995), Mobile Readiness Index (MRI) Model (Jazic and Lundevall, 2003), Network Readiness Index Model (NRI), and Technology-Organisation-Environments (TOE) Model (Tornatzky & Fleischer, 1990). Many researches were conducted, using the above theoretical models, to assess user readiness to accept and adopt new technology. Whilst each model makes a distinctive contribution to literature as much as technology acceptance and adoption is concerned, several models theorise behaviour of users as the main reliable variable in clarifying adoption of

ICTs. Behaviour use is a motivating factor to measure willingness of consumers' behavioural levels (Ajzen, 1991).

The aim of this research is not to measure the acceptance and adoption levels of new technologies, but to assess government readiness to use m-government. The acceptance and adoption would be other areas of research for LDCs. It is important to have an appreciation of new technological impact on the entire organisation. The appreciation aims at finding out if the organisations are prepared to use the innovative technologies (Basole, 2004). The eight theoretical models that were employed to assess readiness to use new technologies are discussed next.

3.2.1 Innovation Diffusion Theory (IDT)

The IDT assesses how technology innovations spread in a specific context where technology is planned for adoption. IDT has two directly linked processes: diffusion processes and adoption processes (Rogers, 2003). Diffusion processes are major courses of action which distribute innovations from the source to the communities. Adoption processes are minor courses of action which look at the phases that assist individuals to decide whether to acknowledge or refuse innovations. The total adoption processes are consequently times that the functions have taken to adopt the processes. The whole process revolves around the following aspects: innovations' perceived attributes, personal attitudes and values, communications passed to citizenry from societal environments. IDT has the following features relating to the innovation: relative advantages, complexity, trialability, observability and compatibility, which are vital in persuading peoples' acceptance of inventions (Rogers, 2002). The innovation diffusion theory was utilised, for instance, to give an explanation of Internet service adoption. The processes of innovation in the diffusion theory of technology are knowledge, persuasion, decision, implementation and confirmation.

Knowledge refers to the ability to understand the functionalities of technology.

Persuasion refers to the factor which influences the determination of attitude towards the new technology.

Decision refers to an action to be taken on whether to accept and adopt, or refuse, the new technology.

Implementation refers to the actual deployment of the new technology into operation.

Confirmation refers to the evaluation of the outcomes, after the utilisation of the new technology (Rogers, 2003). IDT processes are shown in Figure 3.1.

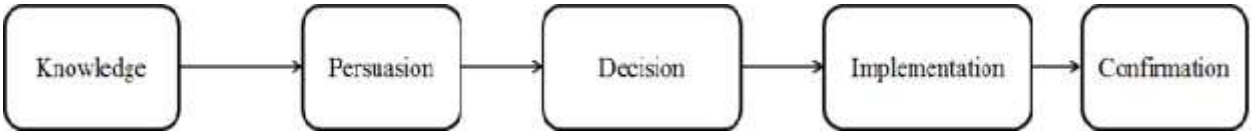


Figure 3.1: Innovation diffusion process (source: Rogers, 2003)

Adopters of innovations are categorised into: innovators, early adopters, early majority, late majority and laggards (Rogers, 1995). Rogers (1995) describe these adopters as follows:

Innovators are fascinated with new facts and have capabilities to know and apply multifaceted technological knowledge and to bring new innovations into the societal structures.

Early adopters lead to many systems' adoption opinions. They act as front runners in the social system. Early adopters reduce the uncertainty of new technology usage.

Early majority is the category that requires evidence first before adopting the innovation. However, the decision to adopt the innovation is obtained in later stages.

Late majority is a category that considers economic value and increasing network pressure before adoption.

Laggards are the last category to adopt the innovation, after considering past experiences; their decisions are rational and traditional. They need a stable environment and uncertainties are not considered.

3.2.2 Technology-Organisation-Environment (TOE) Framework

Tornatzky and Fleischer (1990) constructed the (TOE) framework to illustrate the organisational elements which influence the organisation's acceptance of technology. TOE gives a concise description of the theory to enable users to understand and accept new technological advances. Tornatzky and Fleischer's (1990) TOE framework states the three standard perspectives which are "technological, organisational, and environmental". These three elements present both drawbacks and prospects for technological innovations. The three elements influence the approach an organisation should consider to see the need for, search for and adopt new technology (Tornatzky & Fleisher, 1990, p. 154). Figure 3.2 depicts TOE schematic theory. TOE is useful for m-government readiness assessment, because it covers merits of the new technologies, organisational setup and the business environment, to influence the user to make decisions.

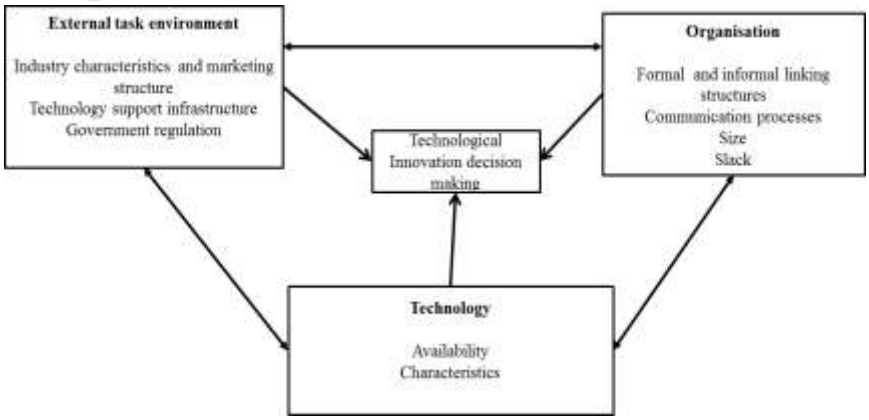


Figure 3.2: TOE schematic theory (source: Tornatzky & Fleisher, 1990)

TOE assists organisations to make better decisions before embracing new technologies. The technological perspective regards the available technologies which are significant to organisations, both internally and externally, to enhance organisational service provision. Technological perspectives might contain both equipment and procedures. The organisational perspective covers all resources available to support the acceptance of the innovation. These cover organisational size and scope; the centralisation, formalisation, interconnectedness and complexity of the managerial structure; the quality and availability of the firm's human resources. The environmental perspective represents the setting in which the organisation accomplishes its business, and persuades the organisation to access resources of service providers and interact with the government (Tornatzky & Fleisher, 1990).

3.2.3 Task Technology Fit (TTF) Theory

TTF is a relevant model to assess MTs for utilisation in government establishments. The application of TTF should consider the practicality of a wider range of mobile applications utilisation than purposefully constructed applications such as geographical information systems. TTF connects requirements of tasks, personal capabilities and technology functionalities.

Tasks are examined by considering the levels and other attributes, such as structures, recurrences, complexity of required methods, uncertainty and others. Tasks component covers informational tasks, managerial tasks and operational tasks. The main conditions to attain the incentives of m-government are to access mobile/wireless technology functionalities. Interactions with stakeholders who are far away from their sites rely on the presence of quality MTs' solutions (Gebauer & Shaw, 2002). TTF is relevant theory for readiness assessment of m-government, because it ensures that technology should be able to process the tasks as designed in line with the requirements of users. Figure 3.3, with expansions to the original theory of task technology fit, includes tasks, MTs, relationships and trade-off features (Gebauer & Shaw, 2002).

Figure 3.3: Theory of task/technology fit (source: Gebauer & Shaw, 2002)

The most important two attributes which are pertinent are connectivity and accessibility to mobile computing capabilities. The mobile technology component consists of three aspects: tools/devices, mobile/wireless network connection and systems/application software for proper functionality.

3.2.4 Mobile Readiness Index (MRI)

MRI assesses readiness for mobile services. MRI centres on the significant needs of the evolution towards the Information Society. MRI investigates the readiness of a community on three major attributes: the maturity of technologies, the capability of mobile service providers and levels of interest/attention amongst users (Jazic & Lundevall, 2003).

Maturity of technologies refers to the wider availability of technologies among the population. Technology maturity goes beyond the readiness of technologies to support some services. Technologies are considered fully mature and standardised when a significant number of users are using the technologies. Mature MTs which are on the market for users utilisation include WAP, GPRS, 3G, MMS, voice services and many more.

Consumer interest refers to the priority of interest of technology utilisation among the intended users of the services. For instance, users in developed countries normally use the Internet to access information, because it is cheap and they consider MTs which require rapid reactions for emergency communications only. However, in LDCs, because of inadequate access and exorbitant rates of the Internet, users are interested in employing MTs in most of their activities.

The abilities of service providers refer to service providers who consist of mobile network operators, those who offer mobile added value services and government institutions. The most important function for mobile communications providers is to make the mobile infrastructure and services available. Figure 3.4 shows the MRI.

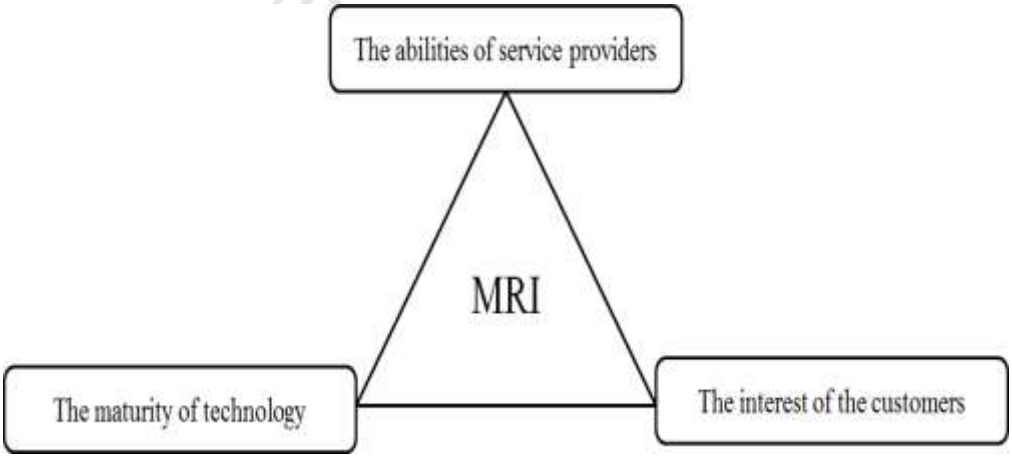


Figure 3.4: Mobile readiness index (source: Jazic & Lundevall, 2003)

3.2.5 Networked Readiness Index (NRI) Framework

The NRI is the extent of preparedness of a country to take part in, and benefit from, ICT innovations (Dutta & Jain, 2003). NRI combines three elements: the environment for ICT in a particular country, the readiness of the country's main users (individuals, companies and government offices) to utilise ICTs, and the usage of ICTs among users. NRI provides stakeholders an enhanced appreciation of a country's strengths and weaknesses regarding ICTs. A discussion of the elements in the NRI follows:

Environment is intended to assess market, political/regulatory status and infrastructure in a particular country that can facilitate the deployment and usage of ICTs.

Readiness appraises the potential of the primary users (citizens, businesses and governments) of a particular country to influence the possible use of ICTs.

Usage determines the impact that ICTs have on the primary users. The evaluations of usage comprise adjustments in behaviours and lifestyles, and the economic development brought about by the implementation of ICTs. Figure 3.5 depicts the NRI framework.

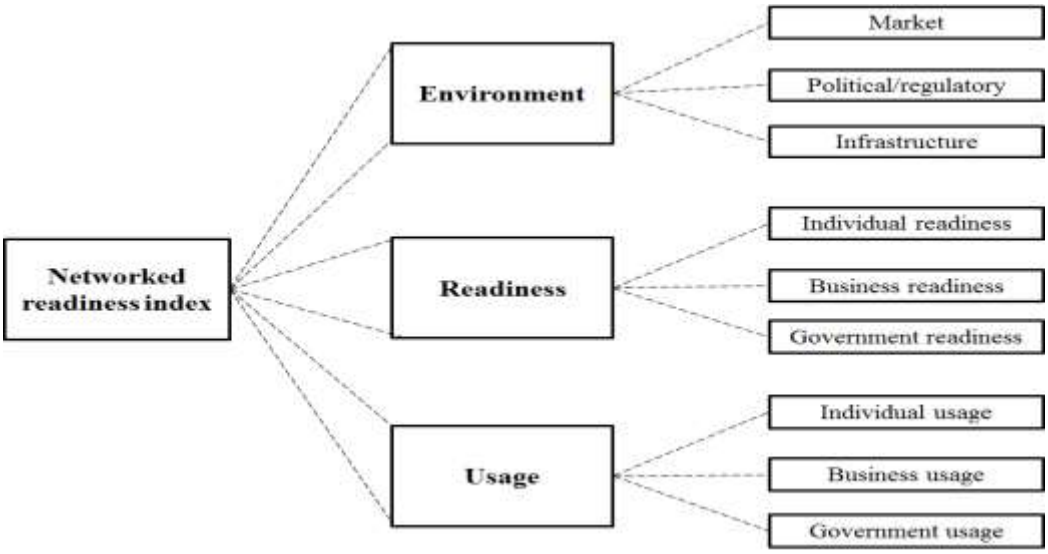


Figure 3.5: The Networked readiness index framework (source: Dutta & Jain, 2003)

3.2.6 Integrative M-government Readiness (IMR) Model

The IMR assessment has five dimensions as follows: technology, organisation, users, laws and policies and culture (Fasanghari, Amalnick & Khatibi, 2010). The relative factors of the dimensions are shown in Table 3.1.

Table 3.1: IMR model dimensions

No	Dimensions	Relative factors
1	Technology	1) Accessibility 2) Mobile communication network 3) Conformance with latest technologies 4) integration 5) security and privacy
2	Organization	1) General readiness 2) Process workflow maturity in m-services 3) Environmental support
3	Users	1) General knowledge in m-services 2) Accessibility to proficient staff 3) Senior management support
4	Law and policies	1) Budgeting and financial policies 2) Planning of strategic policies and standards 3) Collaboration with private sector 4) Legal and political support
5	Culture	1) Staff desirability on m-services 2) Innovation and change culture 3) Promotion policies for m-services

Source: Fasanghari, Amalnick & Khatibi, 2010

3.2.7 Technology Readiness (TR)

The TR concept is defined as people's propensity to accept and to utilise the new technologies for achieving the goals at household level and in the work place (Parasuraman, 2000). There are four dimensions of TR: optimism, innovativeness, discomfort and insecurity. Optimism and innovativeness are considered the drivers of technology readiness, while discomfort and insecurity are considered inhibitors of technology readiness.

Optimism is the optimistic interpretation of new technology which covers user/customer effectiveness, management of principles, suitability and ease of use (Parasuraman, 2000). It encourages customers to feel they are in control of new service technologies (Bateson, 2000; Dabholkar, 1996). Suitability or convenience is the most regarded reward of utilising new technologies to deliver services (Zeithaml, Parasuraman & Malhotra, 2000).

Innovativeness refers to an individual's propensity to become a forerunner of technological innovation (Parasuraman, 2000).

Discomfort refers to the apparent absence of control and having a sense of being overcome by new technologies (Parasuraman, 2000).

Insecurity refers to negative confidence in technology and its capacity to function appropriately (Parasuraman, 2000). For example, any absence of security in e-commerce has slowed the adoption of technology (Hoffman, Novak & Peralta, 1999).

3.2.8 E-government Readiness Assessment Model (ERAM)

The ERAM consists of the following six assessment factors: organisational readiness, leadership readiness, competency readiness, customer readiness, technological readiness and legal framework readiness (Al-Omari & Al-Omari, 2006).

Organisational readiness refers to government and private organisations top-down bureaucratic structures. This bureaucracy results in long processing delays, duplicate data and efforts, and processing redundancies. Users are forced to know the structure to acquire services.

Leadership readiness refers to leadership support from all levels of government for E-government accomplishment. Leadership coordinates and maintains set rules and standards of government organisations.

Customer readiness refers to e-government responsibility towards serving all citizens, employees, other governments and businesses.

Competency readiness refers to competence of existing qualified human resources in private and public sectors for managing the technologies and competence of the general public to use the technologies.

Technology readiness refers to the essential technologies, which include hardware, communication and networks infrastructure, software applications, and legacy systems, that would enable the e-government initiatives.

Legal readiness refers to an e-government legal instrument for regulating new processes of government accomplishments.

3.3 Discussion of the models

The eight different models on readiness have been studied to understand how each determines the preparedness of an entity to use new technologies. Each model looks at different aspects of technology diffusion in organisations, such as those summarised in Table 3.2 below. The m-readiness assesses a country's readiness or capacity to embrace MTs to participate in the inclusive digital economy. It seeks to evaluate if a country is mobile technology ready and particularly in LDCs which could enable businesses, governments and citizens to flourish in a networked global village.

Table 3.2: Summary of readiness variables /determinants of studied models

Theoretical Model	Organisation	Technology	Legal	Users	Culture	Environment	Competence	Leadership
MRI	NO	YES	NO	YES	NO	YES	NO	NO
NRI	YES	YES	YES	YES	NO	NO	NO	YES
IDT	NO	YES	NO	YES	YES	YES	YES	NO
TOE	YES	YES	YES	NO	NO	YES	NO	NO
TTF	YES	YES	NO	YES	NO	NO	NO	NO
IMR	YES	YES	YES	YES	YES	NO	NO	NO
TR	NO	NO	NO	YES	NO	NO	YES	NO
ERAM	YES	YES	YES	YES	NO	NO	YES	YES

MRI=Mobile Readiness Index **NRI**=Networked Readiness Index

IMR=Integrative M-government Readiness **IDT**=Innovation Diffusion Theory

TOE=Technology Organisation Environment **TTF**=Tasks Technology Fit

TR= Technology Readiness **ERAM**= E-government Readiness Assessment Model

Appendix B is a summary of other studies of readiness in e-government and m-government not discussed in this paper.

Models that were studied were not holistic in their approach to measure the preparedness of the specific area of interest, but were broad in the essential aspects of real life readiness of m-government for LDCs governments. The integration of constructs from MRI, NRI, IDT IMR, TOE, TTF, TR and ERAM formed the readiness assessment framework for m-government in LDCs. After a close examination, the following four dimensions were considered for a proposed research theoretical model that fits m-readiness research: technology readiness, organisation readiness, environment readiness and tasks (Figure 3.6 in Sub-section 3.4).

3.4 Proposed theoretical model and propositions

The various readiness models are used to understand and determine the preparedness of an entity to utilise different technologies. A model examines different aspects of mobile technology diffusion in an organisation. Previous research models were not all-inclusive in their approach to measure the m-government readiness and there are scant mobile readiness models for LDCs' governments such as the Malawian government, hence the construction of the dimensions (see Figure 3.6). Each of the four dimensions has its factors that formed the propositions of the research. The flow of arrows from the four dimensions of the proposed theoretical model determined the readiness and task fit opportunity to produce m-government readiness. The proposed theoretical model consists of constructs such as culture readiness, leadership readiness, user/customer readiness, competency readiness, technology readiness, tasks, legal readiness and partnership (Al-Omari & Al-Omari, 2006; Fasanghari et al., 2010; Tornatzky & Fleisher, 1990; Gebauer et al., 2002). Country

factor in Figure 3.6 is an independent factor to control some factors that were indirectly evaluating the country readiness though not explicitly included in the proposed framework.

Readiness is a dependent construct relying on the availability of assessed and approved factors in the three dimensions of technology, organisation and environment. Readiness means nothing without having the opportunity to use the tasks. Readiness is therefore mapped to tasks through task fit opportunity, see Figure 3.6. The idea is not to formalise the concept of task fit opportunities, but to rather focus on readiness elements and map tasks to measure the level of m-government readiness. The focus of this research is only to assess m-government readiness for the Malawian government and not on the variables of intention to use, initial adoption and continued use (see Figure 3.6 for the boundary of research). After m-government readiness has been ascertained, the following processes could be initiated: intention to use, initial adoption and continued use. The measurement of readiness was not quantitatively measured but qualitatively measured, in consideration of the occurrences of the participants' referenced readiness factors. The proposed theoretical model was used as a lens to guide the researcher during the research process (Creswell, 2009).

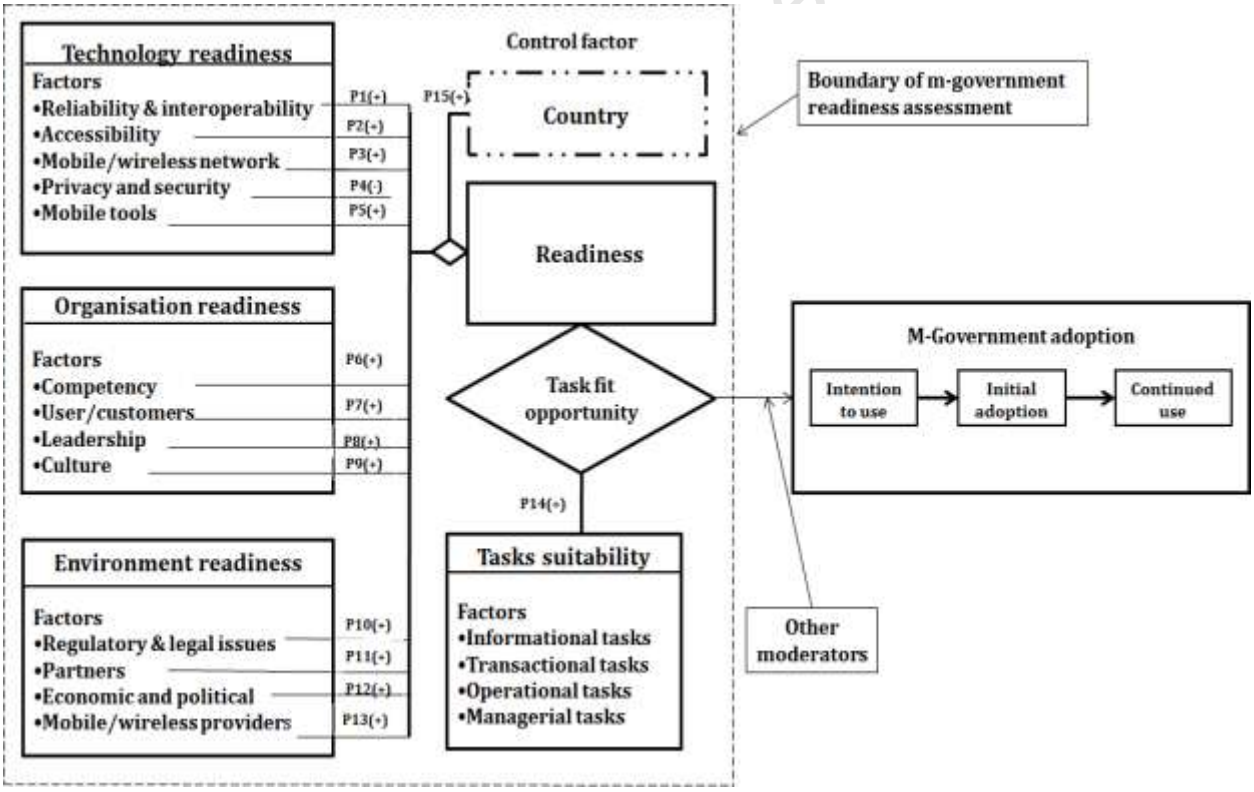


Figure 3.6: Proposed research theoretical model

The Task Fit opportunity in Figure 3.6 is defined as "ideal profiles composed of an internally consistent set of task contingencies and other related elements that affect group performance" (Zigurs & Buckland, 1998, p. 323). Task fit emphasises the interface and functionality of MTs,

organisation and environment for a particular task. The theoretical model represents the extent to which MTs, organisation, environment assist employees and other people to perform actions on tasks to produce services. This performance influences the success of mobile readiness if individual tasks are processed, using MTs and in compliance with all other factors in the three dimensions of technology, organisation and environment.

In this research, m-readiness of government is the capacity to utilise MTs, in relation to organisational objectives, to migrate from traditional routine government business to new methodologies to conduct its business. It is a combination of technology, organisational systems and processes, structures, culture, leadership and governance, which enhance organisational competence (capability) (Meyer, 2010; Hernandez & Noruzi, 2011). The m-readiness capacity is a key concept, because it can be an indicator of how a country can perform in using new technological tools (Shapiro & Varian, 1999). M-readiness assessment would offer policy makers comprehensive information of their economic competitiveness and environmental aspects. M-readiness indicators allow policy analysts to identify areas of strengths and weaknesses in guiding a country through the digital transformation with workable perspectives.

Theoretical model construction is dependent on a number of ICT mobile readiness models, including the Mobile Readiness Index (MRI) Model, which was developed to assess the readiness for mobile services for all countries (Jazic & Lundevall, 2003). The proposed research m-readiness model, Figure 3.6, classified the prospective readiness determinants, which had established the three dimensions of technology, organisation and environment, for m-readiness and tasks. Applying general inductive (deductive) thinking, the key readiness factors in the model are, as follows:

3.4.1 Technology readiness

Technology readiness (TR) refers to all essential technologies which influence the m-government readiness; these include hardware and software, communication devices, mobile/wireless and Internet networks, network infrastructure, application software, legacy systems, present technology and any electronic systems (Fasanghari et al., 2010; Gebauer et al., 2002; Tornatzky & Fleisher, 1990; Al-Omari & Al-Omari, 2006).

TR is concerned with the applications or tools of new technology utilisation. TR has five factors for assessing m-readiness: interoperability, accessibility, mobile/wireless network, privacy and security, and mobile tools. These factors are based on existing research (Seng & Trimi, 2008). The internal technology resources (infrastructure, technical skills) are important for successful ICT readiness (Kuan & Chau, 2001; Zhu, Kraemer & Xu, 2003). Lack of established standards is an issue in the assessment of m-government. The reliability and interoperability of technologies can influence m-government readiness (Sheng & Trimi, 2008; Tornatzky & Fleischer, 1990). The accessibility to technologies and services can influence m-readiness of m-government (Tornatzky & Fleischer, 1990; ITU, 2009b). The prevalent connectivity of mobile devices has the potential to influence m-government readiness (Malladi & Agrawal, 2002; Chen & Nath, 2004). The privacy and

security uncertainties of technology services can inhibit m-government readiness (Shah & Murtaza, 2005). The availability of innovative mobile tools would promote m-government readiness (Moon, 2004; Varshney & Vetter, 2000; Tornatzky & Fleischer, 1990). Due to lack of comprehensive established standards for assessing m-government readiness, the following propositions were formulated:

Proposition 1(P1): The interoperability of technologies increases m-government readiness.

Proposition 2(P2): The accessibility of the services improves m-government readiness.

Proposition 3(P3): The perceived connectivity of mobile tools and services increases m-government readiness.

Proposition 4(P4): The privacy and security fears of mobile technology services negative affects m-government readiness.

Proposition 5(P5): The perceived mobile tools availability improves m-government readiness.

3.4.2 Organisational readiness

Organisational readiness refers to factors that are critical to m-government readiness for organisations to make decisions to use their applications on MTs. The technology competency readiness can influence m-government readiness approval (Al-Omari & Al-Omari, 2006). The organisation in this paper includes government ministries, departments, statutory bodies and private organisations.

Competency readiness is the availability of qualified human resources in government and the private sector, who would be responsible for the management of MTs (Al-Omari & Al-Omari, 2006). The following proposition was proposed:

Proposition 6(P6): The technology competency readiness improves m-government readiness.

User readiness refers to citizens, businesses and employees who are the m-government services' targets. Customers' concerns such as trust in new technology need to be addressed (Al-Omari & Al-Omari, 2006; Rao & Troshani, 2007). User's/customer's mobile technology readiness contributes to m-government readiness (Fasanghari et al., 2010).

The user readiness factor in the organisation dimension was considered in broad terms to get the general feelings of the participants. User readiness alone has several constructs that require special assessment to perceive users' behaviours towards mobiles and m-government in LDCs. User readiness requires separate research that uses other theoretical models. Appendix E illustrates other models that were used in assessing user behaviour towards mobile technology adoption in other research contexts. The following proposition was proposed:

Proposition 7(P7): The users/customers mobile technology readiness increases m-government readiness.

Leadership readiness is required to provide full support to mobile technology usage for government service delivery. Leadership also coordinates and sustains the rules and standards of the implementation of ICTs (Al-Omari & Al-Omari, 2006). Readiness of leadership towards MTs influences m-government readiness (Al-Omari & Al-Omari, 2006). The following proposition was proposed:

Proposition 8(P8): The leadership readiness increases m-government readiness.

Cultural readiness refers to the general behaviour, embedded in government organisational processes, which can promote m-readiness. The organisational user culture, if embedded into MTs, would facilitate m-government readiness (Fasanghari et al., 2010). The following proposition was proposed:

Proposition 9(P9): The readiness of culture on MTs improves m-government readiness.

3.4.3 Environmental Readiness

Legal readiness refers to laws that regulate the usage of technologies in government and society. Laws for MTs are important because they would safeguard government information during processing and transmitting through MTs. Some legal issues are: how to conduct business electronically; electronic exchange of documents; electronic payments and verifying identities; signatures and electronic authentication (Fasanghari et al., 2010; Al-Omari & Al-Omari, 2006).

Regulatory organisations need to adapt to particular approved standards, so that organisations meet the essential objectives. Organisations' non-compliance with environmental regulations could produce potential legal consequences (Delmas, 2002). Governments can inspire mobile readiness in the organisations, by providing deliberate incentives (Xu, Zhu & Gibbs, 2004).

Regulation is essential to regulate the usage of technologies because, for example, many mobile users participate in a number of activities, such as reporting corrupt activities, participating in competitions, distributing pictures and disseminating different news events (Vincent & Harris, 2008). Mobile phones have proved to be operative tools which contribute to a better awareness and attention to politics and facilitate sharing knowledge and information among members with common interests in a very short time (Hermanns, 2008, p. 79). Mobile phones have created new innovative means for citizens' participation in government activities and could deliver services that address the needs of the population (Nyalunga, 2006, p. 5). The next proposition was proposed:

Proposition 10(P10): The favourable regulatory and legal framework has positive influence on m-government readiness.

Partners' readiness is concerned with the mobile readiness participation of all players in supporting m-government. These partners include private and public sectors, donors and central governments (Zhu et al., 2003; Tornatzky & Fleischer, 1990). Partners' readiness in MTs is an important factor in m-government readiness (Zhu et al., 2003). Some partners are prepared to accept and embrace new technological innovations in their organisations and, as a result,

technology infiltration in a society can increase (Zhu et al., 2003). The following proposition was proposed:

Proposition 11(P11): The dependence on partners influences m-government readiness.

Economic and political readiness refers to a favourable environment to enable m-government readiness (Tornatzky & Fleisher, 1990). Competitive economic and political pressure to embrace innovative technologies motivates organisations to be m-ready (Crook & Kumar, 1998). Competitive pressure and new technology readiness can apply to m-government readiness. The research suggested the next proposition:

Proposition 12(P12): The economic and political factors influence m-government readiness.

Mobile/wireless readiness refers to the availability of reliable mobile network providers to support mobile readiness and the establishment of m-government (Fasanghari et al., 2010). Mobile/wireless providers should provide users with stable confidence in their operations to meet the average levels of mobile technology services that are predictable and reliable (Jazic & Lundevall, 2003). The proposed proposition was:

Proposition 13(P13): The confidence of mobile providers influence m-government readiness.

3.4.4 Task readiness

Government organisations exist to perform tasks in order to produce services. Employees and other users need to understand the tasks to be performed and their impact on the environment. It is important that there must be a match between the tasks and the technologies that support the processing of tasks and what the users need to perform within and outside the government organisations (Keil, Beranek, & Konsynski, 1995). Information systems are intended to assist users in executing tasks effectively and professionally. Task readiness refers to the readiness of appropriate tasks to run on mobile devices and that the tasks are relevant to the organisations and environment, in accordance with m-government framework (Gebauer & Shaw, 2002; Tornatzky & Fleischer, 1990). The match of tasks into technologies, organisations and environment would produce positive impacts on the performance of individuals and organisations (Irick, 2008).The types of tasks, context of use and their performance effect on MTs, need an assessment, in order to measure the impact of m-government readiness (Gebauer et al., 2010; Fasanghari et al., 2010). The next proposition was formulated:

Proposition 14(P14): The tasks workflow process maturity readiness improves m-government readiness.

3.4.5 Control factor

Country factor (Figure 3.6, above) is an independent factor to control theme variations that could not be easily captured in the proposed framework. Some factors were indirectly assessing the

country readiness though not explicitly included in the proposed framework. These included competency, access, awareness, culture and affordability at national level.

Proposition 15(P15): Various factors influence each other and affect each other nationwide.

3.5 Summary

There are different models for assessing readiness, acceptance and adoption. Readiness is dependent on the ability of the country to embrace new technology and all its aspects. Discussions on different models have been presented in Sub-section 3.2.

M-government readiness assessment required understanding of many factors. These included technological, organisational, environmental and tasks factors. The proposed theoretical model and propositions were appropriate for the mobile readiness assessment of m-government, taking into consideration the countries' status in the context of LDCs.

In the next chapter, the research methodology discusses the in-depth research methods, paradigms, data gathering, analysis and trustworthiness.

Chapter 4 Research methodology

This chapter revisits the research question. It presents the research paradigm and methods, the significance of employing a qualitative method and utilising the case study approach. The chapter also presents the justification for data collection techniques, research instruments and data gathering processes. Data analysis tools used in this research are presented, followed by the research ethics and summary.

4.1 Introduction

The research design is for m-government readiness assessment, in the context of LDCs. The research focused on the Malawian government mobile readiness assessment for the m-government process. The Department of Economic and Social Affairs, which is a division of the United Nations, categorised Malawi as a least developed country in its study (UNDESA, 2011). The key research question for m-readiness assessment is: To what extent are governments of LDCs ready to realise m-government?

M-government, as a new method under e-government, requires a thoughtful assessment before government agrees to its deployment, to determine the enabling and inhibiting factors and opportunities and challenges. Information Systems research has various research methodologies that are utilised to assess organisational readiness to accept new technologies. Literature has revealed that the methodologies are employed differently, depending on the context of the area of research (Myers, 2009). Employing a proper research methodology is critical for m-readiness to enhance the researchers and policy makers with an understanding of the m-government in LDCs.

To properly assess m-government readiness, a discussion of approaches to information systems research is necessary. The research approach in this research refers to the philosophical paradigm and the conceptual theoretical assumptions chosen to conduct the research (Myers, 2009). The appropriate approach offers a better investigative lens to acquire data that can be viewed and analysed (Creswell, 2009). A research paradigm is central to this process. A paradigm presents the ontology and epistemology based on the nature of worldviews and that knowledge is socially constructed (Orlikowski & Baroudi, 1991). The investigative lenses used are:

- Qualitative research which was used during data collection and data analysis (Myers, 2009),
- Postpositivist epistemology which assumes that reality requires the capacity to assess the wider picture and to take a distanced view (Ryan, 2006, Creswell, 2009),
- Descriptive and explanatory approaches were utilised for in-depth description/explanation of the results,
- A deductive approach was used and guided by the theoretical framework and the research objectives (Creswell, 2003; Creswell, 2009), while

- A case study was employed to collect empirical data from the participants (Cavana, Delahaye, & Sekaran, 2001; Yin, 2003).

4.2 Research paradigm

In Information Systems, specific philosophical paradigms guide researchers when they are conducting research. The frequently used paradigms are those that relate to epistemological assumptions about obtaining knowledge (Myers, 2009). A researcher chooses the epistemology which has an appropriate assumption for a particular research undertaking (Myers, 1997). Four most recommended categories of paradigms for research are positivist, interpretive and critical (Orlikowski & Baroudi, 1991; Myers, 2009) and postpositivism (Creswell, 2009). These are summarised as follows:

Positivist epistemological assumption is of the view that reality is objectively true. A positivist stance is that the properties can be measurable and these properties are not directly connected to the instruments of the researchers. Positivist research aims are to validate theories, in order to enhance the understanding surrounding a phenomenon (Myers, 2009; Myers, 1997).

Critical epistemology assumes that there is historic social reality, which is produced and can be reproduced, as required. A critical paradigm socially scrutinises all assumptions that current conditions socially prevent emancipation, freedom, enlightenment and justice (Myers, 2009).

Interpretive epistemology assumes that reality is subjective and that reality is attained through socially constructed means, which include common agreement, realisation, instruments and languages (Myers, 2009). In interpretive inquiry, a researcher makes interpretations and understands transcribed data, documents and notes collected during the investigation (Creswell, 2009).

Postpositivism

Postpositivism challenges the concept of positivism and proposes that a researcher cannot be definite about assertions of knowledge when investigating the behaviours and actions of human beings (Creswell, 2009). The postpositivist researcher identifies limitations within the positivism stance. This entails that the researcher should understand the worldview and the assumptions about knowledge that he brings to the research. The researcher investigates the epistemology and understands the effect. During investigation, the researcher understands how people socially construct and sustain insights of the world (Ryan, 2006; Creswell, 2009). Postpositivism assists the researcher to see the full picture, not depend on facts only, but rather to understand the context of the source of the facts (Ryan, 2006). This means that postpositivism take into account a bigger picture while continuing to focus on reductionism in a traditional positivist approach.

Postpositivism considers that truth is constructed through a discourse of contradictory interpretations amongst the members of a society. The purpose of gathering data is to understand

the issues and the reactions which participants raise and to develop an understanding of the relationship of the raised issues (Richie & Rigano, 2001, in Ryan, 2006).

The postpositivist philosophical paradigm was considered suitable for the investigation because the research objectives and the worldview of the researcher guided the research. This is consistent with the postpositivist stance of starting a research with a theoretical model (Creswell, 2009). The researcher identified a priori factors which were appropriate and which formed the theoretical lens to guide research. The choice of a postpositivist paradigm is also supported through the examination and analysis of the research findings, which enable the researcher to deduce the role of prior factors within the particular context (Creswell, 2003). The selection of a postpositivist approach to conduct research using qualitative research method is supported, because the phenomenon was too complex to measure quantitatively and qualitative research has no instrument for measuring (Yin, 2003).

The postpositivist worldview emphasises the importance of recognising the context in developing meanings and understandings of a rich picture of a setting, not simply considering only prior factors (Eagleton, 2003, in Ryan, 2006). The integration of prior factors and the context in which they are investigated forms the foundation of the research findings. It provides a better model, showing complexity and richness at the end (Ryan, 2006). The observed patterns of the research would help to draw implications that can be generalised to any research population (Orlikowski & Baroudi, 1991).

4.3 Research method

The main methodologies appropriate to the postpositivist paradigm in IS research are the qualitative and quantitative research methods (Creswell, 2009; Myers, 2009). A researcher chooses an approach which is suitable for the research problem, research questions and objectives, types of data collection and analysis to get answers (Neuman, 2006). Quantitative research methods are used to investigate natural phenomena, such as experiments in a laboratory (Myers, 2009). Qualitative research refers to the utilisation of qualitative data from interviews, organisations, documents and participant observation data, in order to gain an understanding and describe social phenomena (Neuman, 2006; Myers, 2009). This research adopted the qualitative research method during data collection and analysis. Qualitative research was adopted because it provides a strong basis for analysis and interpretation in the social environment, because ideas are naturally contributed and subjectively constructed (Hussey & Hussey, 2003). The qualitative methods aid researchers to understand people, and their societal and traditional backgrounds.

4.4 Research purpose

Research purpose of government readiness for m-government could be carried out as exploratory, explanatory and descriptive in nature (Cavana et al., 2001; Yin, 1993; Yin, 1994; Yin, 2003).

In the exploratory approach, data collection can be done before the formulation of the research questions and propositions. It informs the creation of the assessment questions, design, measures and a strategy for analysis (Yin, 1993; Yin, 1994; Yin, 2003).

The explanatory approach is appropriate for conducting causal research. It focuses on developing a cause and effect relationship, to determine which cause produces which effect. This approach describes events in one or more sites and requires the formulation of propositions (Yin, 1993; Yin, 1994; Yin, 2003).

The descriptive approach needs the researcher to begin with an in-depth scope of descriptive theory. In this approach, a description of what is happening, and why, is outlined to show the exact situation. What it means is that the researcher needs to formulate the propositions and the cause-effect relations (Yin, 1993; Yin, 1994; Yin, 2003). To have a proper understanding of the findings, descriptive research and explanatory research (triangulation) were considered suitable for this research and were used.

4.5 Approach to theory

The two popular approaches to theory reasoning in the acquisition of new information or knowledge are inductive analysis and deductive analysis (Hyde, 2000).

Inductive analysis is concerned with the methodologies that use mainly in-depth understandings of gathered data to develop themes, concepts or a theory, through the researcher's interpretations of raw data (Thomas, 2006; Hyde, 2000). The understanding is that the researcher starts with the research topic, then empirical data, allowing the theory to develop from the data through iterative analysis (Strauss & Corbin, 1998, p. 12).

Deductive analysis refers to the researcher's analysis of gathered data to test the data, consistent with prior identified theories or propositions (Thomas, 2006; Hyde, 2000). Thomas (2006) further states that many research studies utilise both deductive and inductive analysis modes.

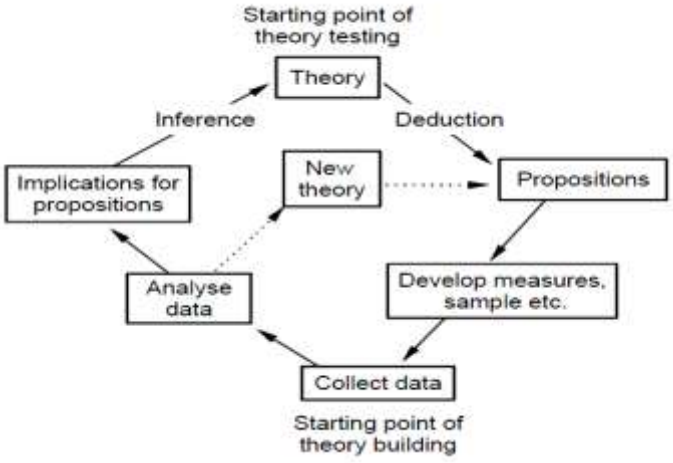


Figure 4.1: Theory testing and theory developing process (source: De Vaus, 2001)

Thomas (2006) supports De Vaus (2001) who argues that theory testing and theory developing should be part of an on-going process, though they are usually portrayed as alternative approaches of research (Figure 4.1). This researcher agrees with the two that theory building requires systematic tests with collected data to specifically assess the worthiness of the explanations it holds, in order to withstand falsification.

In this research a deductive approach to theory was employed whereby the theoretical framework and research objectives guided the data analysis (Thomas, 2006; Miles & Huberman, 1994; Creswell, 2009).

4.6 Strategy to research

The postpositivist researcher employs one of four typical research guided methods: action research, ethnography, grounded theory and case study (Creswell, 2009; Myers, 2009). Myers (2009) describes the methods as follows.

The action research method intends to solve the real-world problems while contributing to academic knowledge; *the ethnography method* requires the participant to be in the field to observe what is taking place to understand people's social situation and context; *grounded theory* aims to generate a theory from the data which has been collected and analysed and *case study* aims to explore or explain the contemporary real-life situation, specifically when the boundaries of contexts and phenomenon are not clear (Yin, 2003; Ghauri & Grønhaug, 2005; Sekaran, 2003).

In this research, case study research was employed, because it utilised empirical facts from actual people in genuine organisations, in order to create a relevant contribution to knowledge. A case study can also use the propositions of the theoretical model which guide gathering of data and analysis (Yin, 2003). It is a suitable approach for collecting data from multiple sources – triangulation. A case study is qualitative in practice and acts as a tool for decision making by managers (Cavana et al., 2001). The case study is convenient for generating and testing of propositions (Flyvbjerg, 2006). A case study has the advantage that it could go in-depth into real-life circumstances and directly test the views relative to the phenomena as they emerge in practice (Flyvbjerg, 2006).

4.7 Research population/sampling

The research targeted the population of government employees, regulatory institutions, mobile/wireless service providers, consumers and academics in Malawi. The non-probability sampling technique was used, which focused on participants who could easily be accessed and selected as potential subjects of the research (Cavana et al., 2001; Sekaran, 2003). Purposive sampling within the non-probability technique was used to get specific categories of participants who could give the relevant data, either because they possessed the information or they met certain criteria formulated by the investigator. Judgement sampling was applied in the process of choosing the participants of the research, because it was convenient, fast and cost effective (Cavana et al.,

2001). Judgement sampling allowed the researcher to choose a sample population which was in the best position to provide information (Sekaran, 2003). The non-ICT participants were interviewed to avoid bias from the ICT experts.

4.7.1 Sampling criteria

The criteria for selecting the interview participants were that the participants were staff members of an organisation, had mobile technology knowledge and experience and that each organisation was important in assessing the m-government readiness. Purposeful sampling was also used to choose the organisations, as there were many eligible organisations. The research used a selection criteria adopted from Miles and Huberman (1994) to identify the case and participants. The criteria were based on two categories which consisted of participants and research dimensions. The participants' category consisted of six types of participants: government ICT employees, government non-ICT employees, politicians, private ICT employees, private non-ICT employees and ordinary people, against the four areas of research focus: technology, organisation, environment and task suitability. The next are criteria which are used to assess quality of samples (Miles & Huberman, 1994):

1. The research sampling approach should be *relevant* to a conceptual theoretical framework, questions and objectives of the research.

2. The research sample should be able to *produce rich data* of phenomena of research questions.

3. The research sample should *promote the generalisability* of the findings to other boundaries.

4. The research sample should *generate plausible descriptions* and *interpretations*.

5. The research sample should meet *ethical issues*.

6 .The research samples should be *practical or feasible*.

Table 4.1 presents the criteria that were employed in choosing the two categories of criteria.

Table 4.1: Sample of participants selection criteria

Criteria of participants	Dimensions			
	Technology	**Organisation**	**Environment**	**Task suitability**
Government ICT employees	To assess knowledge mobile technologies and skills for mobile applications development and ICT's competences	What organisation mobile ICT needs are required and challenges	What are ICT laws, and to assess mobile providers status	To advise on technical issues on tasks
Government Non-ICT employees	To assess their understanding of mobile technologies	To provide opinions on leadership, policies, culture, challenges and competences	Provide opinions of affordability, political will and partnership	To decide the necessary tasks
Politicians	To assess whether they support the use of mobile technologies	To assess political influence on ICTs utilisation in organisations	Assessing political, economic, social, cultural, legal and partnerships status	To provide direction on tasks for m-government
Private ICT employees	To assess what mobile technologies provide and technological compatibility	Do they have well established mobile technology, mobile system in use and challenges	Affordability, laws, partnerships, security and political support	To assist in deploying tasks on mobile technologies
Private Non-ICT employees	To assess their perception of mobile technologies	To assess policies, competences, cultures, mobile systems and challenges	To assess economic, political, laws and partnership	To assess the tasks in use
Ordinary people	To assess the general positions of mobile technologies, competences and security	Assess their relationship with organisations	To assess the knowledge of laws, affordability, political and culture	To assess if they have any tasks that could be provided to them

The initial plan was to conduct fourteen interviews as follows: six interviews with government organisations, two interviews with regulatory organisations, three interviews with mobile/wireless providers, two interviews with consumers and one interview with an academic institution. Table 4.2 lists the targeted participants of the research. However, after obtaining a letter of permission from Department of E-Government Management in the Office of the President and Cabinet, the researcher decided to increase the number of participants from the planned 14 interviews to 22 interviews to widen the scope of data collection. Table 4.3 indicates the actual government organisations, private organisations, focus group of ordinary people that presented the general population and Member of Parliament.

Table 4.2: Targeted research population in Malawi

Categories	Organisations	Participant	No. of interviews
Government	Ministry of Information	Director of Information	6
	Office of the President & Cabinet	PS for E-government	
	DISTMS	Head ICT & Senior non-ICT	
	Ministry of Health	Head ICT & Senior non-ICT	
	Ministry Agriculture	Head ICT & Senior non-ICT	
	Ministry of Education	Head ICT & Senior non-ICT	
	Disaster Preparedness	Head ICT & Senior non-ICT	
Regulatory	MACRA	Head ICT & Senior non-ICT	2
	MERA	Head ICT & Senior non-ICT	
	Law Commission of Malawi	Chief Legal Officer	
Service Providers	TNM	Head ICT & Senior non-ICT	3
	Airtel	Head ICT & Senior non-ICT	
	Burco	Head ICT & Senior non-ICT	
	MTL	Head ICT & Senior non-ICT	
	Malawi Internet Service Providers	National Coordinator	
Consumers	CAMA, Youth group, a group of villagers	Mobile technology users	2
	MBS	Head of Standards	
Academics	University of Malawi	Head of Research	1

Participants comprised of twelve ICT officers and thirteen non-ICT officers from government and the private sector, such as administrators, nurses, marketing officials, religious sisters and ordinary citizens. The ordinary citizens comprised of an elderly person, a secondary school student and University of Malawi students, this group formed the only focus group that participated in the research investigation. Thirteen male and eleven female participants took part in the interviews. The participants had the following qualifications: eight participants had Master's Degrees, eleven participants had Bachelor's Degrees, two participants had diplomas and four participants had qualifications below diploma level. The professional and work experiences were as follows: ICT officers had an average of fifteen years of experience, non-ICT officers had an average of eleven

years, politicians had an average of seven and half years and the focus group members had no formal work experience. The age group for interviewed working participants ranged from 30 to 50 years old and members of the focus group ranged from 17 to 44 years. Table 4.3 shows the government ministries and departments, private institutions and others that participated in the research on m-government readiness in Malawi. Appendix D represents demographic information concerning the research participants.

Table 4.3: Participating government and private organisations and others

Government organisations	Private organisations & others
• National Registration Bureau • Ministry of Agriculture • Department of Information Systems and Technology Management Services (DISTMS) • Ministry of Education • Ministry of Health • Ministry of Information • Department of E-Government Management • Ministry of Local Government • Parliament (National Assembly) • Office of the President and Cabinet • Department of Information • Ministry of Tourism • Malawi Communication Regulatory Authority (MACRA)	• Airtel Malawi • Telecomm Malawi Network (TNM) • Malawi Telecommunications Limited (MTL) • United Nations Children's Fund (UNICEF) • Association of Religious Women in Malawi (ARIMA) • Baobab Health • St. Gabriel Mission Hospital • Constituency Member of Parliament • Focus Group

4.8 Data collection process

This section details the processes of data collection. It covers the development of data collection instruments which covered semi-structured open-ended interview question designs. It further discusses validation of data collection instruments and actual data collection.

4.8.1 Interview questions design

The interviews used semi-structured questions to gather data. The semi-structured approach of interviewing provided a relaxed atmosphere, which enabled the participants to respond freely. The advantages were that semi-structured interview questions allowed the researcher to gather data from the practical experiences of participants. The interview helped the researcher to concentrate on the research area. The interviews were conducted in the participants' language of choice (Myers, 2009). The interviews were conducted mostly in English and in very exceptional cases in Chichewa (the local language in Malawi). The questions were grouped into two categories of either general nature or specific to participants, for example, specific questions for service providers and

regulators were asked, while general questions were asked of all participants. Appendix J shows the steps which were used to conduct interviews (Creswell, 2008). The questions are in Appendix A2.

4.8.2 Validation of instruments

The researcher first sent the interview questions to his supervisor for validation. Finally, the Faculty of Commerce Ethics Committee approved the interview questions. The pilot interviews were conducted to test the questions and the procedure for conducting the interviews. The pilot interviews helped the researcher to identify and improve the weaknesses of the interviewing process.

4.8.3 Actual data collection

Data gathering consisted of three methods: (a) face-to-face interviews (b) focus group interviews and (c) collection of documents. The primary research data was gathered from individual participants and one focus group through interviews. Myers (2009) categorised the interviews into three major types of interviews: (a) structured interviews which utilise predesigned questions which guide the conduct of the interview with regard to time or order of questioning, (b) unstructured interviews which use either a few predesigned questions (if any) with no set time limit, (c) Semi-structured interviews which use predesigned questions but the researcher is not restricted to adhere to the questions. This researcher employed semi-structured interviews composed of semi-structured questions. A focus group interview was conducted in order to get collective views of the group. The focus group was included for the following reasons:

- With a focus group, a researcher is able to gather a lot of data in a short time and reach consensus conclusions to questions (Stewart, Shamdasani & Rook, 2007).
- The importance of a focus group is its interaction, which brings out hidden insights and emerging data (O'hEocha, Wang & Conboy, 2012).
- Focus group interaction and discussion is vital, as participants not familiar with research topic may be stimulated and then start contributing to the research topic (Kidd & Parshall, 2000; Morgan, 1997; Kitzinger, 1994).
- The researcher is allowed to facilitate group discussion (Kitzinger, 1994).
- Finally, a focus group is appropriate for evaluating programme enrichment (Patton, 1990).

The key elements which guided the interviews were individual participant knowledge on the research topic, the environment of the interview place and the language used (Alvesson, 2003). Interviews were scheduled in accordance with the participants' preferences and were face to face interviews.

Twenty-one interviews were conducted, from January to February 2012. The researcher selected the research participants. The interviews were conducted on the participant premises. Twenty one individual participants and one focus group were asked open-ended questions during interviews.

The researcher carried out the interviews. The interviews were audio recorded, using a digital voice recorder and cell phone as a backup. During the course of the interviews, the researcher took several issues into consideration to fully grasp the responses from the participants. These issues included facial expressions, changing of tone when emphasising a point and other reactions when responding to the questions. Participants from government who comprised ICT and non-ICT officers were asked the same questions (refer to Appendix A2 5A & B). The participants from mobile providers were asked other questions specific to them as an industry (refer to Appendix A2 & 5C) and the participants from the pilot mobile systems had their own additional questions (refer to Appendix A2 & 5D). In the course of the discussion or interviews, additional questions apart from the prepared questions were asked, to get clear explanations from the participants.

It should be noted that the prepared questions were simply guiding tools and, depending on the situation during the discussion, the questions were rephrased but maintained the original focus of the questions. The researcher had a chance to identify the emerging factors of the research area, and users were aware of the MTs, applications and current infrastructures. This is a benefit of the interview procedure because it provides the opportunity to enter the participants' inner world for a short period of time through the proper direction of the interviews (Patton, 2002).

Mindful of some limitations of the interviews, (such as distorted answers due to participant biases, lack of knowledge of the participants and politics involved which could affect the quality of data), the researcher focused on the reactions and self-serving answers of some participants to discern clues (Patton, 2002). At the end of each interview, the researcher summarised the interview process for each participant's comments. Secondary data was collected through documents from some of the research participants on the day of the interview. The documents included draft strategic plans, annual reports and ICT plans and policies. Finally, the researcher thanked the participant for his/her valuable time and support as a contribution towards the research. The interviews each lasted for twenty-eight to fifty minutes.

4.9 Constructs operationalisation

Constructs were operationalised as emerging factors from transcribed data. The *intent was to assess mobile readiness* holistically in the country. A number of institutions were used as a proxy for *organisations.* A number of employees and ordinary citizens were used to measure *people's readiness*. *Economic, political, regulation and law, partnership and mobile operators* were used to evaluate the environment. *Competence* was modelled to determine users' technological and task knowledge. Accessibility, reliability and interoperability were used to assess if people are able to get technologies and whether they are dependable and compatible to various systems. *Mobile/wireless network* served to appraise network coverage and penetration in Malawi. *Culture, security and privacy* served to examine their impacts on acquisition and usage of mobile technologies. Task suitability factors were operationalised as obligatory constructs.

4.10 Analysis of data

The data was qualitatively analysed using tools such as word-processing, spreadsheets and express transcription software. Initially, the recorded interviews were transcribed using the Express Scribe software v.5.48 (NCH Software, 2012). This research employed Malawi as a "case" representing the LDCs. The individual participants and a focus group were the units of analysis.

Information Systems discipline has a number of modes of data analysis for qualitative research. Some of these modes are as follows:

- Semiotics is mainly concerned with the analysis of symbols and signs and their respective meanings in culture, art, rituals images and languages.
- Narrative analysis is a method of understanding peoples' actions, the organisational events turning into a significant whole and the consequences of activities.
- Hermeneutics is treated as both an underlying philosophy and a specific mode of analysis. It is a philosophical approach to human understanding, it offers a philosophical foundation for postpositivism and it has the capabilities of helping to interpret and understand data in textual format (Myers, 2009).
- The thematic mode (Braun & Clarke, 2006) is another mode to analyse data. This research employed thematic methods to analyse the gathered data. The thematic mode of analysis is explained next.

Thematic analysis: The transcribed data was analysed utilising thematic analysis, a qualitative method used for "identifying, analysing and reporting themes within data" (Braun & Clarke, 2006; Attride-Stirling, 2001; DeCuir-Gunby, Marshall & McCulloch, 2011). The following stages were adhered to during the analysis of transcripts: data familiarisation, formulation of codes, themes searching process, review process of themes, the process of naming and defining themes and report production (Braun & Clarke, 2006). In addition, Braun and Clarke (2006) suggest steps for analysing the data and the construction of thematic networks were also employed (Attride-Stirling, 2001). The descriptions of thematic stages are illustrated in Table 4.4.

Table 4.4: Stages for doing thematic analysis

Stages	Descriptions
Data familiarisation	Which involved data transcribing of the recorded twenty interviews
Formulation of codes	This was the coding scheme across the whole data set, to organise the data relevant to each code
Themes' searching process	This to organise the codes against their likely themes and getting data necessary for each of the themes
Review process of themes	This is the validation of the themes if they are in relation to the extracted data in line with the data set and in generating the thematic maps
The process of naming and defining themes	This is the iterative process of redefining some specifics of themes which should depict the story being analysed
Report production	This marks the end of analysis whereby the selected data extracted are included to relate to the research questions, objectives and the studied literature

Source: Braun & Clarke, 2006

The theoretical framework guided the development of the codes, whereby three critical steps were followed:

- Generating the codes from theory that managed the research,
- Reviewing and revising the codes in the perspective of data and
- Determining the codes and the coders' reliability for a better data interpretation (Boyatzis, 1998; DeCuir-Gunby et al., 2011; Patton, 2002; Creswell, 2009).

Figure 4.2 demonstrates theory driven codes development.

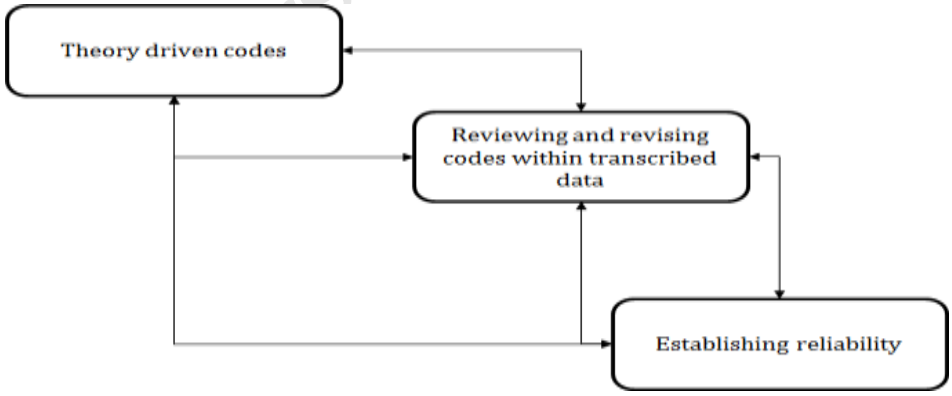


Figure 4.2: Iterative theory driven codes development (source: DeCuir-Gunby et al., 2011)

For the analysis of every interview, a suitable coding structure was formulated (Braun & Clarke, 2006; Attride-Stirling, 2001). The data was analysed in an iterative reading and interpreting of the transcribed data. The research findings emerged from the analysed transcribed data and not from the model, but the model and the objectives were saved as a guide to the research activities (Thomas, 2006; Creswell, 2009). The themes were developed in accordance with research

theoretical framework, to analyse the factors that would influence the m-government readiness in LDCs, such as the Malawian government, in its readiness to implement m-government. The findings are organised in relation to the core themes which emerged from the transcribed interviews. Chapter 5 reports on the thematic analysis findings.

4.11 Research validity

Lincoln and Guba (1985) encourage the use of the lens of rigor to appraise qualitative research, to make sure that the research findings' interpretations are credible and authentic. Trustworthiness in qualitative research is drawn from the dependability of sense making of the results, in relation to the area of research (Silverman, 2001). The trustworthiness of the research outcomes depended on many issues that were addressed through preparation, assessment, data analysis and discussion of the findings. There are four documented criteria for the research quality which were performed to assess trustworthiness (Guba, 1981; Lincoln & Guba, 1985). Trustworthiness in qualitative research demands four aspects: credibility, transferability, dependability and confirmability. These are explained as follows:

- **Credibility** is an assessment of the research findings to see if they reflect the validity of theoretical interpretations of the participants' transcribed data (Lincoln & Guba, 1985, p. 296).
- **Transferability** refers to the degree to transfer findings beyond the research boundaries (generalisation of research outcomes).
- **Dependability** refers to the assessment of the quality of the procedures for data gathering, data analysis and research theoretical framework validation.
- **Confirmability** refers to the extent the gathered data supports (audit trail) the research findings (Lincoln & Guba, 1985).

The section describes how the research was conducted to ensure trustworthiness of collecting the data and data analysis.

An in-depth review of published literature revealed a broad range of theoretical framework factors within the phenomenon of the research (Yin, 1994). The number of participants, their representativeness, interview strategy, participant ages, focus group size, sample selection, interview recording process, transcription procedure, coding method and analysis tools were quite adaptable (Lincoln & Guba, 1985). Mindfulness of some of qualitative research constraints served as pre-empts to mitigate any unnecessary influence on the trustworthiness of the research results.

Participants were drawn from private and government organisations. Because of the use of employees from government and private sector and ordinary citizens, the research presented the chance to collect data from the lived experiences of twenty-four participants. Therefore, by studying the ideas of m-government readiness held by the participants and within the specific

context of the MTs, it enabled conceptual generalisations rather than statistical generalisations, as a result of noting the occurrences of conceptions amidst the research participants (Creswell, 2009; Yin, 2003).

The researcher was an experienced interviewer who was able to plan the interview design, starting with interview guiding questions (Patton, 2002). Then the following aspects were considered. Initially the researcher familiarised himself with the culture of the organisations that participated in the research. Interviews were conducted in the premises of the participants to create a comfortable physical environment, which created a better emotional environment for participants (Erlandson, Harris, Skipper & Allen, 1993). Secondly, an assurance was made through careful introductory remarks on the research topic and the aims of the research, to make participants focus on the research discussion (Patton, 2002). Finally, care was taken with the management of the interview process, such that participants were motivated and felt comfortable to share the insights of the research area (see Appendix J).

The research participants were available within the sampled population. There has been criticism of the ability of individual researchers to analyse the audio collected and transcribed data through qualitative methods (Patton, 2002). The trustworthiness of the interpretations made depended on the knowledge of the researcher of his own subjectivity and prejudices (Patton, 2002). Postpositivist awareness was adhered to through data analysis and interpretation, to ensure the reliability of qualitative outcomes (Creswell, 2009). The researcher continually moderated the data analysis process by asking questions such as (Patton, 2002): Which interviews have I listened to most? Which transcribed data have I referred to many times? How often have I referenced the research theoretical framework? In what way would the readers interpret the phenomena? What data gathering techniques have I not used that could add more insights?

In responding to the questions, the preparations, the design of the data collection instruments and data analysis all involved the guidance of an experienced supervisor. The researcher's interpretations were checked against the process of code development steps, use of codes against the transcribed data and the coded data was constantly checked by the research supervisor. The findings and interpretations of the researcher were checked against the research framework and the transcribed data. The researcher achieved the inter-subjective agreement by allocating extracted phrases to the themes. Any deviations were resolved by exploring the extracted phrases and themes with respect to the transcribed data. The purpose of qualitative research is to identify the conceptions held among the participants within the context of the research. The transferability of the outcomes of research is discernible through comparison of the context in which the research was undertaken. The research dissertation has described several factors that influence the trustworthiness of the outcomes. The trustworthiness of the research was enhanced through the criteria detailed in Table 4.5.

Table 4.5: Trustworthiness criteria for qualitative research

Criteria for quality	Activities carried by the researcher
Credibility	1. Developed a research model from the constructs of the existing models, see subsections 3.2 – 3.4 2. Familiarising with the culture of organisations that participated in the study before interviews 3. Used purposeful sampling of the participants as research informants 4. Triangulation through individuals, focus group interviews and documents 5. Developed a favourable relationship with each participant before, during and after interviews 6. The researcher is over 45 years old, has two Bachelor's degrees with Honours, has 26 years of work experience, conducted many interviews at different levels and has analysed and developed ICT systems 7. Member checks through verifying with each participant at end of data collection process – interviews 8. The phenomenon of the study was comprehensively described 9. Conducted literature review of m-government to validate findings.
Transferability	1. 20 organisations, one focus group and one Member of Parliament participated in the study 2. Participants included senior ICT and non-ICT employees, politicians and ordinary citizen in focus group 3. Face to face interviews were used to collect the data 4. Twenty one interviews were conducted and interviewing process took 27 to 50 minutes 5. The data gathering took a period of two months.
Dependability	1. Conceptual research framework and data collection instrument were developed; the Faculty of Commerce Ethics Committee approved the research, the Malawi government gave a permission to conduct interviews in various organisations both in government and private sector 2. Interviews were transcribed using Express Scribe software, used thematic analysis tools.
Confirmability	1. Triangulation was used as follows: data was collected from ICT professionals, non-ICT professionals and ordinary people to reduce biases. The analysis used thematic analysis tool 2. Thematic network maps, thematic tables were produced during analysis and tables summarising the participants' responses on each factor as audit trails 3. Each method used was properly described

Source: Guba, 1981

4.12 Ethical issues

Ethical issues are moral responsibilities to respect and protect the rights of people involved in the research activities (Payne & Payne, 2004, p. 66). The participants who were taking part in interviews were assured that they would remain anonymous. The collected data was treated with exceptional confidentiality. The data stored on computer was kept secure with password access. The researcher adhered to all research ethics to avoid potential problems related with the research. Four ethical principles were adhered to: truthfulness which ensures no elements of lying and deceiving; thoroughness that emphasises following acceptable methodological approaches and refraining from taking shortcuts; objectivity which discourages putting in the researcher's own values or biases and relevance that emphasises that anything included should be of relevance to the research problem (McNabb, 2002). Research ethical aspects are numerous, such as getting informed consent from participants, telling participants the purposes of the research and the data usage, voluntary participation and data protection (Myers, 2009).

Ethical approval was received from the Faculty of Commerce Research Ethics Committee of the University of Cape Town in November 2011 to proceed with research (see Appendix G). The researcher also got permission from the Department of E-government Management in the Office of the President and Cabinet in Malawi, to interview the selected participants in different government ministries and departments and private organisations (see Appendix C). The letter of introduction was attached to the letter of permission from the Department of E-government Management, which was sent to all participants (see Appendix A1). Participation in the research for each participant was wholly voluntary.

4.13 Summary

Postpositivist research and research questions were used, as well as qualitative methods, whereby the researcher interviewed twenty-five participants (twenty-one individuals and four participants of the focus group) from government organisations, the private sector, a religious organisation and ordinary citizens in Malawi. Figure 4.3 summarises the research methodology.

Research context	**Mobile government readiness assessment in Africa: The case of Malawi**			
Research purpose	Prescriptive	Predictive	Descriptive	Explanatory
Research paradigm	Positivist	Postpositivist	Interpretivist	Critical
Research underlying theories	Proposed research theoretical framework			
Research strategy	Action research	Ethnography	Grounded theory	Case study
Sampling techniques	Theoretical	Random	Purposeful - judgement	
Data gathering techniques	Quantitative	Qualitative		
Instruments	Surveys	Observations	Focus group	Interviews
Data analysis	Quantitative	Qualitative using thematic analysis		Unit of analysis: individuals and focus group
Research validity and reliability	Research trustworthiness			

Figure 4.3: The shaded areas present the research methodology

In the next chapter, the thematic analysis for the research findings analyses the responses from the research participants.

Chapter 5 Thematic analysis

This chapter gives an analysis of the twenty-two interviews which were transcribed. The findings attempt to respond to the research questions, and to address the research objectives through the research theoretical model.

5.1 Introduction

The thematic analysis approach was employed to analyse the qualitative data to identify themes in the transcribed data which were linked to the research objectives (Braun & Clarke, 2006). The recorded interviews produced a verbatim copy of the transcribed document of 117 pages. The participants had various descriptions of m-government readiness in Malawi. They responded to questions on MTs, organisational and national issues, the available tasks that could be suitable for m-government, environmental issues such as regulation and legislation aspects of MTs, leadership, and political positions on MTs and mobile readiness. After the transcribed data sets were cleaned and organised in the same format, the researcher carried out the analysis of data with careful iterative readings of the transcripts. The researcher developed specific themes during the analysis which, in the researcher's view, captured fundamental responses of the participants. The outcomes were conveyed as fundamental themes which captured primary participants' responses. The initial descriptive themes/categories with their codes and explanations/definitions were created from the transcribed data and are presented in Table 5.1.

The results, from the analysis of responses in relation to lived experiences among the research participants, established four global themes. The sub-sections that follow outline the global themes and sub-themes that emerged from the analysed transcribed interviews, while new themes were highlighted. The codes representing the participants are as follows: government ICT participant codes are ICT1, ICT3, ICT4, ICT5, ICT7, ICT9, ICT10 and ICT11. Government non-ICT participant codes are P1, P2, ADM1, ADM2, ADM3 and ADM4. Mobile service provider participant codes are ICT6, ICT12 and M1. Demonstrable mobile system participant codes are ICT2, ICT8 and N1. Ordinary citizens' participant codes are RS1, PM1, PM2, PM3 and PM4.

Table 5.1: Initial themes codes, descriptions and explanations/definitions

Themes code	Descriptive themes	Explanations/definitions
Tech01	Awareness of mobile technology/government	Peoples' familiarity with mobile technologies and mobile government
Tech02	Availability of mobile services/technologies	The presence of mobile technologies and services in the country and organisations
Tech03	Compare technologies developed nations	Comparing the current technologies in the country with developed countries
Tech04	Networking status	This is the overall mobile network coverage in the country
Tech05	Security and privacy aspects	How service provider and users are handling or perceiving security and privacy issues
Tech06	Individual registration	User's SIMcards registration issues
Task01	Suitable current application	Suitable tasks which are candidates for mobile government
Orgn01	System components	This is the structure of pilot mobile systems
Orgn02	Mobile phone usage	Referring to current uses of the mobile phones in the country
Orgn03	Champion of mobile technology/government	Need for someone to initiate mobile government or use mobile technologies for government service delivery
Orgn04	Customers stability	The ability of the mobile service providers to retain their customers
Orgn05	Managing risks	This refers to steps that need to take to control the risks of mobile government
Orgn06	Mobile government knowledge	Measuring people's knowledge of mobile government in the country
Orgn07	Skilful human resource	This refers to skills both in private and government organisations to properly administer mobile technologies at all levels
Orgn08	Traditional values	These are cultural issues in organisations, in the country and individuals
Orgn09	User knowledge mobile technology	This is the knowledge levels of people of mobile technologies
Orgn10	Leadership and political feelings	The position or views of leadership at organisational level and politicians of mobile government readiness
Oppo01	Activities in progress for the future	These are the planned activities to be carried in government or private sector in relation to mobile technologies or services
Oppo02	Benefits mobile government	What government and stakeholders would get as opportunities from mobile government
Oppo03	Benefits of mobile technology	The opportunities of using mobile technologies
Oppo04	Enablers	These are factors that would influence mobile government readiness
ExMS01	Existing mobile systems implementing	These are the current pilot mobile system and permanent systems
ExMS02	Functionality	The way the mobile systems operate
Envi01	Aspects of legislation and regulation	What are the existing laws of mobile technologies in the country
Envi02	Establishment of mobile technology	This is extent to which mobile technology industry is established in the country
Envi03	Providers services	Refer to the services the service providers would provide for mobile government readiness
Envi04	Socio-economic aspects	This looks at how people are interacting using mobile technology and their affordability to acquire and sustain mobile technologies
Envi05	Working relationship	Refers to the cooperation of all players in mobile technology industry
Chal01	Challenges of mobile technology	These are challenges encountered as result of mobile technologies usage
Chal02	Inhibitors and challenges	These are factors that could would make mobile government unachievable
Chal03	Mobile phone problems	Specific problems are encountered due utilisation of mobile phones

5.2 Technology

5.2.1 Reliability and interoperability

The technology in general is reliable and there is interoperability between the established mobile services providers, because people easily switch from one provider to another, if problems occur. Participants pointed out:

> **N1:** For FrontlineSMS, *we are using two service providers at the moment TNM and Airtel as backups to each other.*
>
> **ICT2:** *UNICEF RapidSMS is using Airtel and TNM for transmission.*

To substantiate the interoperability, some participants said that they often use open source software such as Linux operating systems and application software development platforms for the pilot mobile systems. The applications run correctly on various platforms. They all revealed that they easily communicate with customers on a different mobile provider through voice, SMS and MMS without bottlenecks.

5.2.2 Accessibility

The population of people which accesses mobile phones in Malawi is growing steadily. From the participants' reactions, it was evident that the majority of Malawians have difficulties using the technology to access government information or services, because there are no proper systems in place to address the difficulties. The only current available means to pass information to the public is through press releases in newspapers, on radios and on television. There is some improvement in the radio phone-in programmes where the public can participate through either sending SMS or voting using SMS, as one participant observed:

> **ADM4**: *For this to be effective, one of the factors is that government should ensure that a lot of people, especially in the rural areas, have got the devices to use in order for accessibility to be effective.*

5.2.3 Mobile/wireless network coverage and penetration

It was observed that mobile network coverage is in most areas of the country and that it is important to encourage the service providers to roll out network coverage of the whole country. One of the participants said:

> **P1:** *This is what we are emphasising with our service providers, be it Airtel, TNM, Access and MTL to be rolling to rural areas and making sure that we have the fibre connecting to international cables to the sea*.

The mobile technology infrastructure development exceeds 85% of network coverage of the country, according to government and other ordinary participants. The mobile provider participants indicated that there is basic to sufficient infrastructure in different areas, ranging from

85% to 100% of the geography of Malawi, with 29% penetration, that concentration being mainly in urban areas. Some participants said:

> **ICT5**: *Of course the mobile phone operators are doing quite a commendable work; they are covering the nation at a very good rate.*
>
> **ICT6:** *It's a big change in terms of technology and mindset from fixed devices to mobile ones and yet you need funds ... the issue of budget comes into play to fund such a big project. Thereafter basic infrastructure should to be implemented, for example telecommunications towers, issues of roads to facilitate the installation and support of these devices.*
>
> **M1:** *The business is continually expanding the network every year. Every month there are new activities and investments covering new areas in rural areas and boosting the capacity of the network in urban areas because, as the numbers are increasing, you need more network capacity within the urban areas.*
>
> **M1:** *We don't have the figures for 2011 yet, but it was around 29% which means 29 of every 100 people have mobile phone today.*

5.2.4 Privacy and security

The concerns of security and privacy were to ensure that information should be transmitted with high security. If this is not checked, it would result in the loss of confidentiality as participants claimed:

> **ICT2:** *There is no security and privacy of data when many people are handling the results.*
>
> **PM4:** *Mwinanso ... kumaheadquarters mumawoneka kuti mulibe security. Pamapezeka anthu ena atha kupanga hack bwinobwino kaya in terms of kuba mayunitsi ... manetwork awo afoyira, kupezeka kuti anthu tikuyimba mafoni aulere ... kaya mwina TNM kaya Airtel apanga mafoni meant for Airtel cards or TNM cards anthube amatha ku breaker code kuti foni izilowa makadi onse awiri ... security palibepo in terms of TNM and Airtel. (There is perhaps no security in headquarters. People can easily hack and steal airtime from your SIM card or people sometimes are phoning without loading airtime. It happens that cell phones are meant for a specific company say Airtel or TNM SIM cards only but people are able to break the codes so that cell phones can accept any SIM card from the two companies.)*

From the mobile providers' perspective on security and privacy issues, they indicated that they have systems that are used to monitor their towers and to detect any criminal activities. They have security people who have the mandate to, and have the right to, access to information. However, the problems being encountered are that the more they tighten the security measures, the more attackers tighten up their tactics to attack the networks, as observed:

> **ICT6:** *The more you tighten up the security measures the more the people tighten up the tactic. It's like every now and again we have to make sure that our security strategy and security software are up to date to safeguard ourselves, but it's tough.*

Mobile providers make sure that the customers are guaranteed to operate on secure networks using normal security issues; the security infrastructure is provided in line with global security design issues of the network. They further argued with an example:

> **M1**: *As an example you find banks are able to do transactions using our network, which means we can be able to provide secure infrastructure where banking transactions can go through without having worries for security issues.*

The security compromises usually come from external factors and not from the network provider. As network providers, they are continuously investing in security and privacy in their networks.

5.2.5 Mobile tools

There is an availability of mobile devices such as mobile phones, laptops and their dongles, iPad and especially mobile phones, both in urban and rural areas. MTs are improving and more service providers need to be involved. Participants noted that:

> **P1:** *In terms of laptops yes, the percentage of few individuals using the laptops is growing and in rural areas a number of schools are offering access to information through the computers*.

> **P2:** *Thus as country we now have to be changing the mentality, the mindset, political mindset must be there, and willpower must be there so that MTs are brought in the country.*

The players of the mobile technology industry indicated that they offer the following mobile services: data services which are devices with Subscriber Identity Module (SIM) cards, which are plugged into laptops and then people are able to browse the Internet from anywhere; financial transaction products, which are recent innovations which allow people to transfer money from any point to any point without travelling to banks; and mobile laptops with inbuilt mobile wireless facilities in addition to mobile phones for voice, SMS and MMS communications. The participants from the mobile industry gave the following explanation:

> **ICT12:** *If someone has a mobile device in the rural village you can transfer electronic money in the mobile device and then that person can take that electronic money to any nearest station to cash that money.*

> **ICT6:** *With data device, money product, mobile phones, most laptops with inbuilt mobile devices you can use them ... with WiFi technology which is wireless ... go anywhere and configure your laptop and connect to the wireless technology*.

It was also pointed out that the technology that can be used for m-government is SMS technology. There are also Internet and broadband technologies on mobile phones that could play an important role in m-government, if properly utilised. For one participant said:

> **M1:** *We as a network are able to provide the services from what I call a push kind of technology, whereby, on constant basis, people that are on specific databases can receive constant SMS messages on a regular basis.*

5.2.6 Demonstrability

The existing pilot systems running on MTs use SMS technology only, with cell phones from remote areas, to communicate with the servers. The champions (initiators) of the pilot mobile systems are UNICEF which uses RapidSMS system and Boabab Health which uses an HIV/AIDS counselling tool for data collection. Boabab Health in Malawi has a team of in-house software developers for health applications, which include mobile applications. USAID is promoting the use of a marketing tool called Esoko, which provides market information about agricultural products on mobile phones:

> **ICT1:** *Esoko is relevant although there is no direct relationship with the ministry. We have what we call market information system here, it's well developed, and it is a statistical sort of package.*

The donor-initiated FrontlineSMS system was implemented at St. Gabriel Mission Hospital in Lilongwe. The system helps to reduce delays in monitoring and administering patients who live in rural communities. The system was initiated after the donor observed, and was shocked at, the distances the health workers covered from the hospital to rural communities to visit the patients. The following was the participant's response to the donor:

> **N1:** *The donor asked me, how do you manage to move to see these patients? Now how do you get the feedback from your communities? I said they always come to the hospital and sometimes I go to visit them. He said thus time consuming, so he thought of implementing this system to offload some of the challenges we are facing*.

The basic structures of the systems consist of servers or laptops which use open source software, mobile network infrastructure and mobile phones, with people working in rural areas. Participants described them as follows:

> **ICT2:** *The RapidSMS is composed of a server, people with mobile phones in rural areas, mobile network to connect to the server. Field officers collect information, capture and transmit the information to the server and server sends the messages to the person who captured the information on scheduled time intervals.*

> **N1:** *The FrontlineSMS has one laptop as a central server and dongle, mobile phones with 140 volunteers and the mobile network and messages are received and sent any time depending on the activities.*

> **ICT8:** *Our HIV and AIDs counsellors are using mobile phones to collect data during counselling and transmit the data to the server through mobile network.*

There is also goodwill from the service providers to improve coverage in the areas where the pilot systems are being used, to ensure that the infrastructure is of good quality. The participants of these existing systems plan to cover many rural areas in the country and in other health institutions and institutional departments:

> **ICT2:** *It is the wish of this organisation that the system should roll out to the whole country and it will be cheaper than it is now.*

> **N1**: *For example, like in CHAM, we could easily be communicating from hospital to hospital to share knowledge, share challenges, share updates. We can easily know, for example, the other hospitals which are doing procedures which others hospitals could not do and so we can refer patients to hospitals as required.*

An example is that plans are already underway to implement an SMS system for the National Assembly, as a method to communicate with the Members of Parliament and administrative staff. The most difficult task is to first lobby the officials:

> **ICT5**: *The challenge with that is first to lobby with the MPs, the challenge has been that MPs sometimes are not willing to disclose their mobile phone numbers or they would submit and behind they change numbers and they don't communicate and their numbers are not working when you try to get them.*

5.2.7 Other factors

Facilitators/enablers

MTs enable people to be advanced in terms of rapid communication, to have access to information to improve their knowledge around them and to understand the world, because people learn what is happening beyond their borders, as indicated by one participant:

> **P1**: *In all essence if we say a person has developed is when he/she is using the mobile technology to acquire relevant knowledge and cannot be cheated because he/she can access information from mobile device*.

The prices of MTs are getting cheaper, especially for cell phones. Participants said that sometimes new mobile phones can be bought for MK2 000,00(US$12) or MK1500,00(US$9) for used cell phones, at the time of the investigation. The authorities are steadily reducing tariffs for mobile devices. MTs are cheap, that is, when equating MTs to cell phones:

> **ICT10**: *I am looking at a cell phone as a very good example of mobile technology and I don't see why every Malawian cannot have a mobile phone nowadays, at least a good percentage of people should be able to buy mobile phone because it's a cheap technology*.

The participants emphasised that it is essential to encourage increased uptake of these MTs and services where applicable as observed below:

> **ICT3:** *I think my views are that we need to embrace mobile technologies in government and elsewhere because I believe the world is moving towards wireless and mobile phones have transformed peoples' minds. I think thus the way to go*.

Constraints/inhibitors

MTs are not available to everyone in terms of cost because it is expensive to acquire mobile devices such as laptops and Blackberry phones, especially when: "S*omeone thinks of having to go and buy a first mobile phone, from a rural point of view the price is high*", as participant **M1** observed. To improve acquisition of mobile devices, **M1** further said: "*Sometimes we have programmes to subsidise the cost of handset for customers at the lower price to improve penetration."* If the rates are very high people would opt to not use technologies.

Since MTs use wireless infrastructure, in some places where there is no such infrastructure, mobile devices cannot be used to access services as one participant observed:

> **ADM4:** *Mobile technologies use wireless so I think the infrastructure for such devices is not there in some places.*

It is difficult to know whether the message received on mobile phones is trustworthy. The issues of security were highlighted in terms of MTs being prone to viruses and hackers. Security threats, if not attended to proactively, tend to compromise the confidentially of individuals, security of documents and that of information. Employees or stakeholders have poor knowledge, due to lack of training of mobile technology utilisation; this could lead to underutilisation of mobile devices in organisations to provide services. MTs also contribute to crime such as theft. The mobile phone itself is a source of crime, and the mobile device can be used to castigate and threaten other people. One participant said:

> **ICT5:** *With the increase of mobile technology there is also increase in crime, for example cybercrimes ... people would buy a SIM card, put it in the phone, call somebody and abuse somebody and discard the SIM card.*

The other observation is that SIM cards are misused for crimes, because there is no registration of individuals' identities against the SIM cards, as there is no legislation that covers this aspect in Malawi:

> **M1:** *It's not mandatory that you have their identity registrations; they buy SIM cards from the streets and may abuse it to either threaten other people, castigate them because they know they cannot be traced.*

It is also believed that MTs can cause brain damage, though there is no proof at the present.

> **PM3:** ... *Kuipa kwina ... mawavu ... amayambitsa khansa yaubongo ngakhale sanapange umboni (... the disadvantage I hear is that the waves which are used for communication do affect the brain and they potentially cause cancer of the brain though not yet proved.)*

Other added constraints of m-government readiness gathered during the investigation are as follows:

- Unavailability of the mobile network infrastructure in some areas of the country;
- The issues of how the market is responding to the MTs;
- The wireless devices' signals sometimes could be affected more easily by the atmospheric conditions which affect the continuous flow of communication;
- The anonymity issue where SIM cards are not connected to individuals;
- The issue with MTs about what services are to be provided to people and how the services will be provided;
- Each time technologies change, people and organisations are required to acquire something new, which is difficult to sustain in terms of cost implications. Economically, this is feasible as one participant said:

> **ICT11:** *Organisations may be compelled to get newer versions each time they change. And with the economic level that we have it is not viable for us to be changing to new upgrades often because it is becoming expensive*.

The other problem is that government senior management sometimes personalise mobile communication facilities in offices, because mobile devices are not used for government activities but for personal activities.

> **ICT11:** *And on the personalisation in office, it's that one is using a dongle; the office buys units for that particular director. It becomes expensive for an office because it's personalised and maybe the office does benefit much ... it sometimes becomes a status symbol.*

5.2.8 Mobile technology benefits

The benefits of MTs that were highlighted, especially the benefits of mobile phones, are as follows: the end users have privacy, they inspire confidence in people, it is easy to transmit and access information. For example, transmission of data is fast from villages to district offices:

> **ADM3:** *There is an idea of transferring information using the cell phones from villages to the district offices rather than just depending on collecting the village registers, go to the district and enter the data.*

It was noted that mobile devices are handy and convenient; people are able to work with the flexibility of use, anywhere, at any time, to transact businesses; they also promote time management if effectively utilised. One participant indicated wastage of time on unproductive work in offices:

> **RS1:** *Sometimes Malawians waste a lot of time negotiating, writing so many things, communicating, attending meetings, discussing and at the end of the day nothing is being implemented*.

It was additionally noted that MTs can promote participation of citizens in the running of the government:

> **ADM4:** *We are in a democratic dispensation and if the wider population possess devices, government could find out the views of people in the country and can use the devices to get feedback.*

MTs are the catalyst for transformational change. Technologies bring ICT services to the public in order to meet national economic development process, as one participant noted:

> **ICT1**: *They are catalyst for transformational change. They are not a luxury but a necessity that everyone is required to possess. Government should contact mobile operators, private businesses to bring ICT services to the public for national development process*.

MTs add to e-readiness in a country and, the more the country and the society open up to technologies, the more the country becomes a more civilised society, as stated here:

> **P2**: *We are not living in the Stone Age or Dark Age; we are living in the computer age. Mobile technology is just part and parcel of that.*

Other MTs' benefits are, as discovered during the research undertaking: bringing services to customers, advocating payment of services in remote areas, being easy to use and needing no complicated devices, being easy to deploy as it is wireless technology and covers more areas, assisting in cutting costs for reaching more inaccessible areas, the global village aspect is coming about because of improvement in MTs and transmission of information is instant as compared to up to late 1990s:

> **ICT5:** *My personal example, back in 1999 when use of mobile technology was quite at a very infant stage … my grandmother was seriously ill. The best people in my village could do was to write me a letter which took a week to deliver and by that time the situation was not in position to be rescued. Nowadays they would either call me or send me text ... know what is happening anywhere in real-time – transmission of information is instant.*

With MTs, there is a great deal of exchange of ideas. SMS is cheaper and it is faster to verify information through SMS. People do not have to travel long distances to access a service and government is considering taking the services to the people's respective locations.

> **ICT9:** *People have to come from all over the country to access service if the submission of service is centralised in one place. When you take that service to citizens or private sector it definitely improves efficiency and effectiveness.*

Figure 5.1 depicts the technology network of themes, as a result of analysing the participants' responses. The sub-themes with a positive "+" sign contribute positively to the organising themes, while the sub-themes with a negative "-" sign negate the organising themes. Similarly, the organising themes with a "+" sign positively influence the high level theme whereas organising themes with "-" negatively impact on the high level theme.

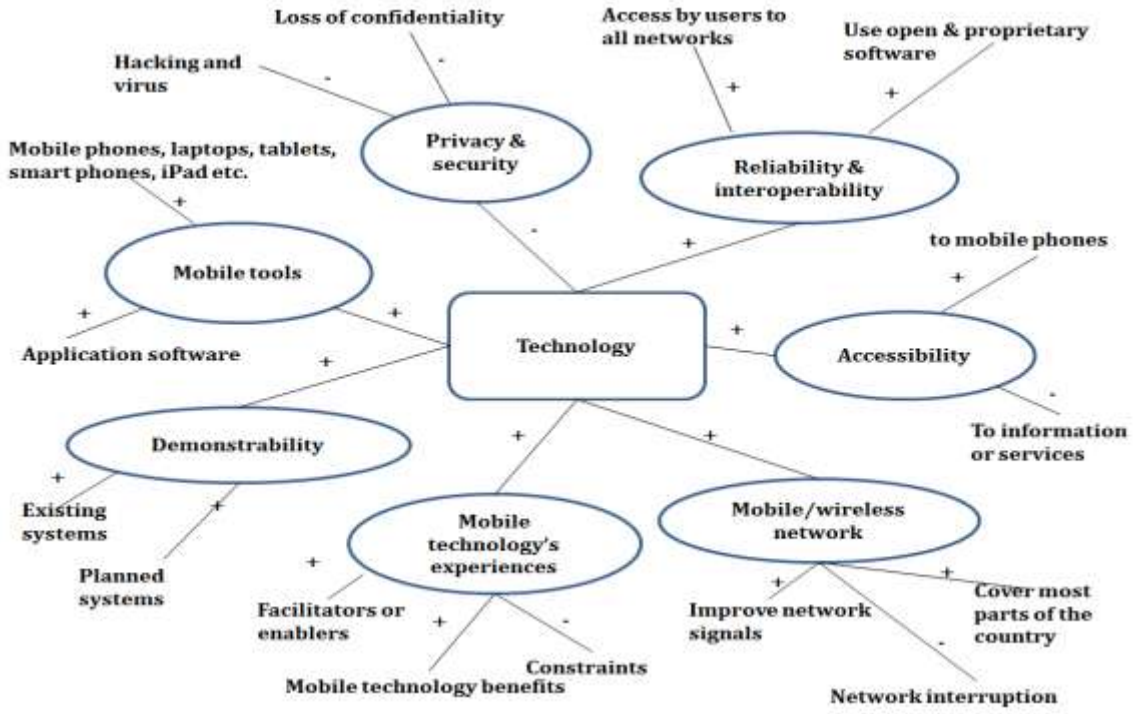


Figure 5.1: Technology thematic mapping network

5.3 Organisation

5.3.1 Competency

Mobile device users

The general observation is that people are able to use MTs; it is estimated that there may be 60% to 65% competence levels national wide. Other participants think that at national level it is less or lagging behind by between 20% and 30% in aspects of knowledge, as well as technologies. It was

noted that older people are not very competent in using any type of MTs. The research participants' views are/were that:

> **P1:** *We see it through Facebook, Twitter on mobile phones and I think that is part of mobile technology. In banks people are able to know that their salaries have gone into their accounts.*
>
> **ADM2:** *The highest competent people are the younger generation, maybe about 35 years and below, they are very competent with the mobile technologies but others are catching up. We see this when you have a smart phone, you give it to somebody younger will be able to use for various issues but you give it to somebody older maybe in fifties would have problems.*
>
> **ADM4:** *I have noticed that in terms of demographic data who is using what, I find that the people who are from 15 years to about 40 years are a bit more advanced in terms of mobile technology usage than the over forty, most people have never been exposed to new technologies and in Malawi many people are in rural areas.*

Government and private employees (users)

At organisational levels, the competence level is between 50% and 60% and the views of some of the participants are that:

> **ADM4:** *Most of the people working in organisations have access to technology but they are not well advanced to use various features that are provided but use them for basic things.*
>
> **ICT8:** *At government organisational level, many employees are competent to using mobile technologies and at national level people are competent to use mobile devices especially the mobile phones because people even in the villages have mobile phones.*

Still other participants think that competence/knowledge levels can be put at 20% to 25% for both organisational and national levels, in terms of achieving organisational or national developmental objectives for services delivery, as one participant observed:

> **RS1:** *I am putting that percentage on the perspective that people have cell phones, Internet, computers, but are they using these equipment as a mode of enhancing people's lives or just matter of using them?*
>
> **RS1:** *Government may buy airtime for officials, but how many of that airtime is used for the effectiveness of that organisation? It's being misused, so I am putting that percentage based on that perspective of poor knowledge of resource utilisation.*

It is generally understood that government ICT employees have no necessary competencies (skills) of MTs' applications development, because they have not been trained or exposed to them.

> **ICT3**: *I think most of our ICT officials have not gained skills in developing mobile applications. I think that's the competencies, I should say are non-existent or they are lacking*.

This lack of appropriate skills of mobile technology application development in government necessitates a need to train government ICT employees as some participants observed:

> **ICT2**: *Need for capacity building in government departments and to reduce illiteracy in villages so that writing should not be challenge.*

> **ICT8:** *In villages the issues of typing or texting might be a problem making people uncomfortable, so the content should consider such people by providing voice content.*

But, almost everywhere, many people are able to use cellular phones effectively. Many participants explained that, in terms of mobile laptops which have a high level of computing aspects, the use of these is very limited at the national level; **ICT4** said: *Applications that can be put on mobile phones are limited. We need mobile devices which can enable extensive computing of applications like laptops or tablets*. In government, the level may be different, especially for laptops and desktops, where specialist ones such as tablets and iPad are limited and access to using them is limited, considering the computing facility aspects.

It was also noted that the illiteracy rate in the country is high; this contributes to lack of basic knowledge of MTs, because many people are not able to write on their mobile phones as noted:

> **ICT3***: One could be talking of illiteracy levels in the country as some of the issues to have an impact on mobile readiness if we are to provide these m-government services even in rural areas.*

In order to improve mobile technology literacy, it is advisable to put deliberate plans in place to help people understand the importance of mobile devices.

> **P2:** *I think our curriculum in primary school, secondary school, tertiary schools such as the universities and other colleges should have had been introduced, computers and IT as a subject long time ago, because most of the people that we have today, even the ministers we have today, don't even know how to access the computers.*

But usage and awareness of cell phones are believed to be high at national level. It also depends on the tasks that one is performing, although there is a belief that the technology is not that difficult to utilise. Most of the mobile devices which are available have few challenges. The competency is not too much of an issue even for semi-literate users who are able to use the technology, although some difficulties cannot be ruled out, as observed by these participants:

> **PM4:** *Eya ambiri amadziwa kugwiritsa ntchito cell foni makamaka anthu amene amakhala town. (Many know how to use the cell phones. I would say that people who live in towns use the cell phones better than those living in villages.)*

ICT11: *I think mobile devices are not very difficult to learn from my point of view, because even our children, even those who have never gone to school, can easily use cell phones.*

ADM1: *I don't know I have at least a tertiary education. I am privileged in that sense. I don't know to extent if I had primary education how I would look at the same technologies. Do I look at them as very simple straightforward? In some cases some of our devices are all in English.*

M1: *Among the educated people or those at school mobile devices are used actively and much easier for them to use any of the devices. But it's a problem among the uneducated or the elderly uneducated people.*

M1: *The basic phone service is very easy for almost everyone to use but when it comes to sending SMS, the numbers starts going down especially in rural areas.*

M1: *What is comforting is the size of the population of Malawi, as an example the majority are the youth and are excited with these devices and they find their way around it very easily.*

5.3.2 Users

Users in possession of mobile devices

It was observed that many people possess mobile phones. It is estimated that there are three to four million people using mobile phones out of a population of more than thirteen million in Malawi. Mobile phones are currently used for phone calls and text messages through SMS. Cellular phones are also used for radio and music, Internet, e-mails and MMS.

P1: *A number of people are now buying new technologies, the issue of writing and posting letters, and whatever is reducing, new technologies such as SMS, e-mails are used to deliver messages. Mobile technology utilisation is not beyond us*.

Trust for mobile technology and optimism

Investigation indicated that many people are optimistic and know how to use mobile phones. This usage of mobile phones shows that people trust MTs in their daily life activities. However, where there are knowledge gaps, it is better to start basic educational messages to educate the people on the basic features of mobile devices, as the following participant observed:

ICT4: *Well, all of us have not been exposed to many mobile devices apart from of course cell phones which are almost everywhere.*

5.3.3 Leadership Issues

Willingness of organisational leadership

The observation is that organisational leadership is ready to accept m-government readiness, but some participants emphasised that it is a question of policies, benefits, impression in terms of development and productivity, in line with poverty reduction: "W*e want an ICT-enabled Malawian government as soon as possible."* The available statistics of people having access to mobile devices and how many of these people can read and write as prerequisites, would act as a guide to leadership. The majority of the participants were of the view that there is organisational willingness to use MTs, because the leadership shows keen interest in information communication technologies. Participant **P1** said: "*The Malawian government is ready for m-government that everyone can be accessing information and be comfortable to take himself/herself as part of government."* Leadership is generally eager and supportive of utilisation of ICT in government and **ADM2** said: "*This is why government created the Department of E-government Management in the Office of the President and Cabinet to ensure rapid development*." Another aspect for consideration is that, if m-government were seen to provide better services to the public, the leadership would be in a position to accept, as supported in the following statements:

> **ICT3**: *On that basis that if mobile government can provide better service to the public I think we will have no problems in terms of the political will on that one.*
>
> **ADM1:** *It is question of leadership, policy makers to consider all factors and then make a decision that from now onwards we will be using mobile devices for these tasks and for sending messages.*
>
> **ICT2:** *This system is not only for UNICEF but also in the general interest of government and in line with its mandate and plans.*

It was observed that already the Malawian government leadership is in the process of implementing e-government: "G*overnment is looking forward in that direction of mobile government."* The private sector is currently investing in MTs such as mobile banking with government approval.

> **ADM2:** *For example the banks have been allowed to be using m-governance. Now for them to be using m-governance, they needed to get permission from government. I think in as much as government is not practically ready in terms of resources but the mindset is ready, we have just to embrace it*.

Organisational leadership unacceptability

There may be some negative reactions in terms of cost and political implications. As the leadership wants to improve the efficiency and effectiveness of government operations, there should be no problem ensuring that government delivers what it is mandated to do to reach a wider population, through the available MTs. As a strategy to avoid any resentment from the leadership, there is a

need to ensure that there is sensitisation and a proper registration of devices, especially SIM cards. Participants also noted that:

> **ICT4**: *It may appear top officials may not accept, may need some sensitisation because they may have a low positive opinion, as to how this mobile government can assist in their operations. They think it is not important in their delivery of service.*

> **ICT10**: *I know in some places people would require an application to get just a SIM card. That way we become responsible as individuals. When you know that this SIM card is attached to me obviously you become responsible when using the technology. If there is any abuse later on you can find how best to regulate.*

Awareness and marketing plan

The creation of awareness and provision of all the necessary information on m-government would assist in convincing the leadership of the day to accept the implementation of m-government. What is most important is the aspect of awareness as far as leadership on m-government readiness is concerned. The initial approach is to educate and to bring awareness to important leadership about what m-government is all about so that it gets that appropriate political will. Many participants emphasised the importance of awareness:

> **ICT5**: *... after awareness to both political and administrative leadership on the benefits of ICTs in enhancing the mandate of legislation and representation ... I am glad that the leadership is supportive of our effort to utilise ICTs. I believe awareness is very important because sometimes people are not willing to adopt some aspects ... because are not aware of the benefits.*

> **ADM3:** *I don't think there might be any problems as long as pros and cons of mobile government are clear. It all depends on the group of the people that might initiate, lobby for the introduction of mobile government because for any leadership to accept anything depends on leadership understanding the whole concept.*

5.3.4 Cultural Issues

5.3.4.1 Beliefs and technology context

It is perceived by some people that if culture is integrated into technologies, this may hinder but can also encourage some of these technological developments. People may believe that if they use MTs, then everybody will know what they are doing or get access to their information during communication. Such belief would naturally turn into a culture to resist the use of technology in order not to expose their information to unknown people. For example, the proposed installation of Consolidated ICT Regulatory Management System (CIRMS) which has been nicknamed "spying machine" has brought fears to the general public. This spying machine has brought public debate to the extent that telecommunication operators were/are influencing the public to be against government to install CIRMS. Telecommunication operators claim that confidentiality would be

compromised because CIRMS has the capability to listen to phone conversations. The motive of operators or government is not yet clear. Government claims that CIRMS is for monitoring the performance of telecommunication operators and tariffs, as well as to enable government to charge the appropriate taxes. Some participants stated the following fears:

> **ADM2:** *Like now we believe that there is a spying machine, so if I am doing anything I would think they are spying on me. That would be a belief and maybe become a culture ... don't use mobile phone for this and that or Internet because whatever you do I understand people are watching.*

> **P1**: *People think when you plant a tower then they think you will police them or hinder their reproductive systems in their homes*.

The belief is that culturally people tend to have difficulties changing their mindset to accept new things and doubt the authenticity of the information that would be going to their mobile devices. So the participants noted that, culturally, there might be some resistance to change, which they said is naturally to be expected. They indicated that the service that is provided through mobile phones makes it difficult to differentiate between those for the older people and for young people.

> **ADM4:** *Difficult to know if a message is targeting adults. It may be difficult for government to exclude the children in their targets. So culturally it may have problems because messages which are targeting the adults may get through to young generation which may have a negative impact.*

Parents have problems opening up to too much media exposure because they say it is spoiling the young generation with too much bad information. Parents want young users of mobile phones to make use of the technology that would not spoil their mindset.

> **PM4:** ... *kubwera kwa foni ku Malawi kuno mbali inadi kwathandiza chikhalidwe, mbali ina chikupeputsa chikhalidwe chathu. Kayankhulidwe kathu kakuonongeka chifukwa ngati tikhakala kuti tikuyankhula ndi munthu wamkulu pa foni anthu sizimatikhudza kwambiri kuti tizipereka ulemu monga kuti tizimuyakhula pamaso ndi pamaso…taonongeka ndikutengera zinthu zina ndi zina… zikuononga chikhalidwe chathu. (... the coming of cell phone in Malawi on one hand has enhanced the culture while on the other hand has diluted our culture. For example in terms our speeches, our mode of talking has been spoilt even if we are talking to an elderly person, we don't mind that we should give respect as we do with face to face conversation. Our mode of talking has been spoilt because of imitating some of foreign cultures and these are destroying our cultural values.)*

Again, from the organisational culture, the problem is wondering who is going to determine the type of message that is going be sent out or the service that is going to be delivered, and how is it going to be done. Individuals may not accept the provision of services through the use of mobile

services, because there are some organisational bureaucratic tendencies and the political culture within the organisations, which are difficult to be managed and changed.

> **ICT1**: *Those hierarchical levels that you have to pass through to get services (messages) authenticated first or somebody should give a go ahead for that to finish.*

> **ADM4:** *I also see the problem whereby if the service is done by government may have a problem in the sense that anybody within the organisation would use the service and if it's not controlled and send out, information that may not be relevant to the objective and mission of the organisation.*

Proper mechanisms are needed when considering integrating culture and MTs, because organisational cultures are diverse in nature.

> **ICT9:** *Organisational culture constitutes policy issues, what is the policy content? Do we have that policy? There are legal issues that will affect it; do we have the necessary legal instruments to cover doing that? There are institutional issues, what kind of institutional framework are we talking about? There are technical and financial issues that have to be looked at in line with organisational culture.*

5.3.4.2 Non-stoppable acquisition of technology versus culture

Although MTs in some instances have a negative impact (spoil) on cultural values of organisations, for example **RS1** said: *Government may buy mobile devices or airtime for personnel … but how much device or airtime usage is for the effectiveness of an organisation?* Sometimes employees spend a lot of time on the Internet other than for their work. Other participants were of the view that whatever the case, culture will not stop the acquisition of MTs, because they are necessary to any organisational structures or any organisational setup in the modern world. Organisations cannot competitively perform without the help of mobile tools.

> **ICT8:** *I can't think of any cultural issue that can affect mobile government readiness.*

> **P2***: There is no culture that would stop anyone to access mobile world and no tribe that can stop anyone to access ICT.*

It transpired that in a village setup, people tend to sometimes use exaggeration, amplifying issues which are called mystical standards/beliefs.

> **ADM1:** *Some of those issues have to be either pretested so that you see people feelings on some of these issues, because sometimes we tend to exaggerate and amplify issues. So, instead of understanding the simple issues about these technologies, maybe they would want to find hidden meanings behind technologies.*

For example, in every village setting, the culture is that people may not trust the results from hospital sent via the mobile phones, leading to a sense of insecurity.

> **ICT2:** *They want to see the doctor and tell them off. Of course we send the messages which don't go to patient directly but the message goes to clinic workers who in turn release results to patient.*

There are some concrete indications that, at an organisational level, not many cultural problems are encountered, because here people are dealing with professionals who are well educated. But, possibly at national level, there could be more cultural problems with MTs.

> **ADM1:** *There are those dangers because of illiteracy and other cultural believes, it might be difficult maybe to send clear message across without negative repercussions in some cases if some people might misconstrue.*

The way forward, according to the participants' position, is to conduct civic education about m-government, to make people mobile-ready, without compromising their cultural values.

> **P1**: *So what is needed is to sensitise them, publicity can help people who believe in different cultural groups (tribes) to understand, even different organisations to understand that mobile government is very important and nothing is a problem with it. To civic educate the people is essential for every person and politics to play a role in mobile government readiness.*

5.3.4.3 Change of mindset

People are concerned about confidentiality of their information. The mentality of the people needs to be corrected, so that the information transferred can be made to be seen as secure. If the mentality is corrected, culture would have a positive impact on m-government readiness. People should have the willingness to open up to new ideas that are seen be useful, in order to promote government services delivery.

> **ICT5**: *So I think openness is a very critical element. When people are willing to open up, they make services available everywhere.*

People worry about guidance, rules, some restrictions, privacy and security issues as far as cultural values around m-government readiness in Malawi are concerned. They explained that their culture is that if people are conducting their work anonymously they tend to do certain activities beyond the normal official services. If there is that cultural element of anonymity when people are accessing the services, then there would be a tendency for exploitation to tarnish someone in the organisation's reputation.

> **ICT10**: *The way I am looking at mobile government, people can take advantage of it to do damage to whatever issues they are trying to achieve while providing services, since in Malawi we are using technology without attaching to an individual, for example a mobile phone ... you don't link a SIM card to an individual.*

When using MTs in a particular service, there may be a need to contextualise MTs with day to day specific cultural values that affect people's lives. How do MTs affect their understanding about confidentiality of issues and what can they do? Culturally there are certain sensitivities about things that are considered private.

> **ICT11**: *Some employees have a culture of holding onto government information as a symbol of authority and communicating such information using mobile devices any time will be regarded as diluting their confidentiality of authority.*

Because culture is to do with context in which people believe in and understand, they believe in what their peers do; so, when introducing new technologies, it is important that cultural issues are taken into account.

> **ICT9**: *You cannot just black out some of cultural things ... maybe sometimes these things may require something to be done to make people feel comfortable about certain information that culturally is considered as private.*

Therefore, in dealing with the users, it is necessary to consider obtaining content and consent from them. Culturally, people value face to face communication and like to know the people they are dealing with.

5.3.5 Boundary spanners

In this research, the boundary spanners are the agents that have prior knowledge or experience of the technologies, in order to facilitate the introduction of emerging technologies in organisations. These agents add essential information to m-government readiness assessment in Malawi. Some of the important activities of the boundary spanners are: identifying senior-level government champions, generating buy-in tools for management support and creating knowledge of mindset change into organisational and user culture. Some of the emerging boundary spanners are discussed in the next sub-sections.

5.3.5.1 Conception of mobile government

Most of the participants demonstrated that they know m-government as the utilisation of MTs in the running of government or bringing the idea of e-government. Government focuses on using mobile devices and applications to communicate with all government stakeholders. Some of the responses given are:

> **ADM2:** *I know the things that happen concerning mobile government like transactions through cell phones and some other things.*

> **ADM3:** *It is the way of communicating or passing information using mobile technology to deliver government services.*

> **ADM4**: *Mobile government from layman's view I think of a situation whereby you are taking government services to people. For example if you are using devices like mobile phones to what extent is the public have access to such devices.*

5.3.5.2 Championship

It is government's responsibility to initiate m-government and all recipients (all the stakeholders) must be involved. It is important to identify the "champion" within government. The participants indicated that:

> **ADM1:** *It has got to be championed maybe by the players who are going to be doing something on the services that will have a dent on some of the areas of interest.*

> **ICT9:** *First is to identify the home for such an initiative. Are we taking it as an ICT initiative, technical or what? It must find its home in the structures of government, so that a particular ministry owns it in terms of who is responsible to introduce it. Championing is very critical and it has to find someone to champion it first ... do the various activities and to believe in it, then to get things implemented. Maybe something is already happening but it's just that the people are not associating with that complexity.*

5.3.5.3 Risk management

One critical area of consideration is the management of risks when embarking on new technological development. It is observed that, as part of m-government readiness, government should consider how to manage risks associated with m-government because, "*Normally when you start a new project you can suspect risks, you need to analyse various risks in various sectors,"* as participant **ICT6** noted. Managing risks includes the following processes: discovering risks such as economic, political, and financial risks; analysing the discovered risks; developing a risk mitigation plan and, finally, having a clear definition of government's business case (business plan that projects costs and benefits for a project for a given period) to reduce the risks.

5.3.5.4 Planning

Government needs to consider developing a proper master plan when embarking on a new technology project, to ensure that each undertaking is in line with the plan. The issue of planning for improvement of delivery of services is essential. Promoting the marketing plan is important to the decision makers on m-government readiness, so that they can make an informed decision. It is important to do some sort of pilot, so that people can have an idea of what this m-government is all about. Planning at all levels is vital to know what exactly we want to do, how to do it, what services will be targeted, what resources will be required and where to get the resources. However, a plan may be excellent, but if those who have to make decisions do not understand it and do not appreciate it, the plan may not be supported. It is important to make sure that the plan has buy-in elements between all the relevant decision makers. One participant advised as follows:

> **ICT6**: *Most importantly, what most people forget is that it's like a vehicle that needs a driver to direct a vehicle who was taught but a vehicle is made of mechanics and it's an engine. The same thing applies to technologies like these.*

> **ICT6**: *We don't want the government to operate in the way that technology is operating, but we want first of all to have what is the business case government wants to do. And then you need to articulate main point and then come up with a plan on how the mobile technology is going to align itself with that plan.*

> **ICT6**: *Most governments make a mistake of plug and play and they go. Let's say in developed countries we have seen what the technology is doing, we must do it. What we forget is that developed countries have different landscape, different services to deliver. It is important that, before we go down, that we make sure that whatever technology you embark on it is aligned to a clear definition of the business case.*

5.3.6 Emerging factors

MTs are available in Malawian government organisations and access to MTs is already wide-spread; these are key factors that can necessitate m-government establishment. Some participants said Malawi is simply delaying the implementation of m-government:

> **ICT10:** *We have to move to provide service, the technology is there waiting to be used and technologies are already established and it's up to us to utilise them now to provide services that citizens may need.*

The other aspects that would enable the m-government readiness in Malawi are:

- The availability of mobile phones and other MTs with the end-users;
- The availability of mobile service providers;
- The availability of good network infrastructure including in remote areas.

If telecommunication infrastructure is rolled out to all the parts of the country, it would make m-government available to many stakeholders.

> **ADM1:** *Our telecommunication service providers should to make sure that network infrastructure is in each and every area to have access, irrespective of its remoteness*.

Knowledge of m-government

Government employees' knowledge for m-government and users' knowledge of how to use MTs, especially for m-government, are very critical. Participants noted that:

> **ADM2:** *If I as a civil servant do not know that there is mobile government or to use mobile technology for running the government, I think there will be a problem with other stakeholders as well.*

> **ADM1:** *It is sometimes complicated for people in town to remember what you need to do in order to call back. But you find that villagers are able to do that to at least flash you so that you can call back or they send SMS.*

The experiences from existing systems indicate that it is important to register the service users who would be targeted for m-government. It is also very important to determine whether the stakeholders can be reached in their respective areas.

> **N1:** *There is need to find out if the users are within the network coverage and who do you communicate with.*

Institutional capacity – staff development

Organisations or people in the country conversant with MTs should help government leadership and its employees either through training or support; **ICT8** said, "*I think the initiatives that are in place can help government to learn about important issues for consideration when trying to implement that kind of technology."* Therefore, training and consulting companies should be approached to offer training to government employees to acquire mobile technology skills to help change the approach to service provision. **ICT8** said, *"This would modify the institutional focus of organisation to suit that kind of service delivery."* These companies can also help to build government mobile applications.

User training – development

The participants revealed that the technology usage does not necessarily need somebody to be well-trained to use some of these MTs. However, some users would also require to be trained to use new technologies.

Other emerging factors

The other enabling aspect is the accessibility of subsidised mobile phones under a universal access facility to selected people with leadership roles in every village. These people could access services through mobile phones on behalf of traditional leaders or people of their villages, as culture may demand. In traditional culture, people have an important role to help in rolling out m-government. Government is also in the process of connecting to different fibre cables, without leaving it to the private sector. The government should have its own network for m-government and that could be easier and cheaper to access information.

> **P1***: At the moment the government does this, then the whole roll out to schools with e-government will be done and we will make sure that people will access information. If there are no network accessibilities in those areas we can boost up the network.*

The investigation revealed that there are many indications that the mobile providers are ready to bring the necessary MTs to government to make it ready for m-government readiness. Another enabler of m-government is the readiness of government itself and the available information, which

is in the correct format for processing and delivery to stakeholders. The mobile phone networks have been preparing the technology around the mobile phones for a long time. Economic environment or factors are important to acquire the mobile instruments:

> **ICT11:** *With advancement of technology, most officials are procuring and using mobile technology, specifically, for example, those who go to the field will prefer getting laptops instead of desktop computers*.

This study also considers the following as potential aspects for m-government readiness: policy frameworks of government; legal and regulatory framework for m-government; awareness of top government officials; achievement of full mobility required for the mobile computing devices such as laptops, tablets and PDAs.

The commitment from officials themselves is important in working towards understanding mobile services to achieve the improvement of service delivery to stakeholders as noted:

> **ICT11:** *Commitment of employees to work because now, with advancement of technology, most officers are using mobile specifically for field work such as laptops.*

It is crucial to make sure that there is that understanding of m-government at the decision making level, at the level of the citizens and that opportunities are well appreciated.

5.3.7 Mobile government initiation

5.3.7.1 Mobile government expected benefits

The investigation identified that m-government would bring these sort of benefits: it would be spontaneous, portable (it can be used anywhere and anytime), it is faster and keeps government connected, thus being more reliable and cheaper than the current systems. Below is a participant's response:

> **ICT9:** *I will give an example of a passport transaction today. In its current manual form filling it's faster. If it will reach that day where we can put that passport on the Internet where more people can access it even in remote areas, if there is accessibility. If we can bring that service to rural areas, it will be closer and easier. People will not travel long distances to get a service.*

M-government would improve government efficiency in service delivery through the use of MTs: *"We can access that on the laptop with built wireless capabilities",* and send messages to people with MTs, such as mobile phones. The other expected benefit is reaching a wide audience within a short space of time, even in hard to reach areas; in so doing, people would be well informed:

> **ICT4**: *Because the wired network will take much long time to reach hard to reach areas. But with mobile connectivity that can be achieved in relative much short time and hopefully at much reduced cost.*

> **ICT1**: *Many people have mobile phones compared to other devices. Information dissemination with mobile phones can be made at wide level and a lot of people can be reached than with other technologies.*

It would be convenient because users would be able to access government services from anywhere; **ICT8** said that, "*It provides increasing availability of access to services, you access services 24 hours a day and 7 days a week."*

It would be easier to pass information which, in return, would improve the economy of the country.

> **ICT3**: *With better services people will have confidence in government because people to people interactions delay actions.*

It would make government more open and accountable: "*I think some people want to seek favours but if you remove people to people contacts and then people to technology contacts, issues of transparency and accountability would be enhanced."*

It would enhance time management and the saved time could be used for other essential government activities:

> **ICT3**: *It will reduce time a person moves from one place to the other, but at the same time, the time gained will be used for other things.*

For instance government could actually monitor what is happening at a particular clinic, through viewing, for 24 hours a day and seven days a week. The government is well informed and coordinated, through the accessibility to available information. The current practice is:

> **ICT10**: *If I want to provide service at moment, it requires me to get out of my office, ... my thinking is if there is mobile service provided through this technology there has to be a kind of auto replies formulated to reduce on the capacity requirements of whosoever is providing that service ... and I am looking at mobile technology to be in a position to provide readily accessible services.*

5.3.7.2 Mobile government constraints

Lack of network

There are some parts of Malawi where there is literally no access to a network, either by Airtel or TNM, due to a lack of network infrastructure in those areas. The participants noted the continued use of old dial-up telecommunication devices.

> **ADM2:** *They use the old dial-up old phones; you know like the standstill old ones and they are no long here in town.*

Institutional infrastructure

Government might need infrastructure to make m-government run because there is lack of institutional infrastructure in some government institutions. The institutional infrastructure

includes internal networks, servers for storing information content and mobile devices and applications. It is important that government should use MTs like other institutions:

> **ADM2:** *I should think it is still possible because if the banks are doing it using the very same facilities that we have of Airtel, TNM, why can't government discuss that with MTL, Airtel and TNM and have its own system? I think the system is the same possibly the difference would be that government would want to have its own infrastructure for the sake of security purposes. Government would want to select, control some data to be transmitted and that it should not go through the spying machine.*

Security and privacy

The other area that might derail m-government readiness is the issue of security and privacy. People might think that government would be checking their information as one participant suggested:

> **ADM2:** *Let's say I am a political deviant according to government's position; they would try to be screening whatever I send through the mobile network.*

Quality of data

The quality of data was emphasised during the transmission from one point to another, due to poor quality of network service and signals. It is important to ensure that information reaches out to the intended beneficiaries in the original format. The participant said:

> **N1:** *I know that in some areas we might have problems in terms of the quality of services and of signals, but I think in most cases those services can still reach people to and from where there is good network.*

This research discovered that delays to award licences to potential investors in the mobile technology industry also contribute to poor quality of services as the current networks are sometimes congested. The misinterpretation of information, and problems of cultural and political interpretation of m-government, may inhibit m-government readiness. Another issue is the lack of resources for educating the people about m-government. The people have a fear of a spying or monitoring system in the anticipated installation. It may create negative results about m-government readiness in Malawi, if it is not well understood. There is need for the proponents to explicitly explain the benefits and the challenges of the system to the general public.

Figure 5.2 shows an organisational network of themes as a result of analysing the participants' responses. The basic themes with a positive "+" sign contribute positively to the organising themes and the basic themes with a negative "-" sign negatively contribute to the organising themes. Similarly, the organising themes with a "+" positively influence the high level theme whereas those with a "-" negatively impact on the high level themes.

Figure 5.2: Organisational thematic networks

5.4 Environment

There are policy issues for MTs which need to be dealt with first. Do we have a policy? What is the policy content? There are legal issues that would affect MTs. Do we have the necessary legal instruments to cover introducing m-government? There are institutional issues. What kind of institutional frameworks are to be considered? Regarding stakeholder issues, what stakeholder issues need to be taken into account? What other issues will also affect the beneficiaries?

5.4.1 Regulation and legislation

Existing regulation and laws

The Malawi Communication Regulatory Authority (MACRA) is the regulator responsible for regulating MTs and other telecommunication aspects in the country. As of now, some of the laws are out-dated and some are being revisited when the need arises. But generally the regulatory environment is quite friendly. It was noted that the regulator failed to regulate the prices or rates per minute, because the prices are very high. It was also noted that the issue of market liberalisation is not working:

> **ADM2:** *Because if you move from TNM to MTL, Access to Airtel and so on, the rates vary widely across the board. Had it been that the environment is very smooth, the rates would have been low.*

It was evident from the responses that Malawi at present has no proper policies and laws on how MTs could be utilised and it is likely that people in the country do not understand the regulations and are not aware of the regulations and laws. There are no regulations that seriously regulate MTs:

> **ICT1:** *You mean legally? We have MACRA but the piece of legislation that could be highlighted for regulating this technology, I haven't seen or I don't know if there is any.*
>
> **ICT2**: *I am not aware of any laws that will affect the system and we consulted MACRA to seek any of their opinion. I am sure we are dealing with government and government saw that it was necessary to have the project. I don't see any legal implications in using mobile phones or using Internet to connect to computer network. We want to use cheaper devices that are with remote users like cell phones instead of computers.*
>
> **PM2:** *... zoonadi malamuwo ambiri sitiwadziwa ... timangogwiritsa ntchito chifukwa chakuti tayipeza.* (*The truth is that we don't know the laws and many of us use the cell phones because we have it and it is the fastest way of communicating with others.)*

The licensing regime does not discriminate much; because of the deregulation, everybody can either be a landline or mobile/wireless provider, or have both landline and mobile phones. There was recently an improvement in licensing from fixed to open licensing:

> **M1**: *The recent improvement was where a licensing was changed from just being fixed to a particular service, for example one only provides 2G mobile technology to an open licence where you run both fixed and 3G or 4G phone networks.*
>
> **ADM1:** *MTL as a service provider of landlines phones has now gone mobile due to deregulation in telecommunication industry.*

Mobile network participants explained that legislation and regulation are there to regulate the tariffs which are offered to customers. They protect the customers by making sure that customers are getting the services for their payment. The operators submit monthly reports to the regulator to prove that the output of up-time is always available. They also regulate the interest of the telecommunication companies in the way they provide services to the customers. Participants of the mobile networks felt the regulatory environment is satisfactory and any regulatory challenges can be resolved, because there are always regular contacts between the regulator and operators.

The regulation that is there is the registration of the company itself to provide those services and how they get the frequencies; the only current law is the Communications Act 1998. The major functions of this Act are for deregulation and the establishment of MACRA. The legislation is a technologically neutral kind of regulation:

> **ICT3:** *I believe the Act may not provide all the instruments to regulate the mobile technologies. I think as a government we noted that. I think the Act needs to be*

reviewed; however MACRA is in a better position to explain how mobile technologies are regulated in the country.

ICT10: *So if, for example, you want to set up mobile company you need to conform to certain rules setup by MACRA. Already some work has been done on the ground ... it's up to us to explore further to refine some of the regulations that might be in place because the mobile government would be a new thing and to ensure that we don't have fears regarding security and privacy.*

Current and new policies and laws

The present emphasis is that there is a need to set up proper laws or policies for MTs, for example, the authorities are delaying submitting the Information Bill to Parliament for enactment. There is a lot of talk of the Access to Information Bill which is to be discussed and enacted in Parliament.

ICT5: *It's not yet presented in parliament that is the only Act that will be relevant in regulating mobile technology.*

P2: *I don't know what their fears are all about on the access to information bill. Sometimes these simple issues that can be implemented you find that there is resentment.*

RS1: *Malawi is a small country and if we are ready to implement we need to have an effective regulator (people) on the ground that can make these companies work towards the common good of a Malawian.*

The research noted that it is just a matter of producing a policy to ensure that the government has m-government because, to a small extent, it is already there in place. **ADM3** said, *"We are informally using it."*

There must be policy issues for increasing access through affordability and convenience. The participants proposed said:

ICT9: *We have to set policies about universal access. How is it going to be achieved? What about those who cannot afford? So for me the issue is having very clear policy. We are supposed to provide favourable environment to maximise private sector contribution. Then we have to target what type of environment we need to put in place so that we are increasing competition.*

Setting of proper standards is needed in terms of access to the services. There is a need, also, to set standards on issues of expandability. It transpired that there are no laws on the usage of open source software in government, but there is a need to encourage the use of open source software in government. It is hoped that e-legislation which is being drafted will cover most substantial laws, to effectively enable the usage of MTs in the country.

5.4.2 Partners

Private and public organisation

There is a degree of good working relationship with partners and line ministries when carrying out certain activities; using MTs, for example, the participants perceived the following:

> **ICT2:** *We are working together with government*
>
> **ADM1:** *We are working with partners and with government line ministries*
>
> **ICT8:** *Ministry of health is involved because the initiatives aim to assist government and we work in partnership.*

However, the relationship with government in terms of support is minimal, although the government, through the Ministry of Health, is aware of the system. One participant indicated that:

> **N1:** *There is not much cooperation from government to support the system but government is knowledgeable of how the system is operating.*

Esoko has no working relation with the Ministry of Agriculture. Some of these NGOs bring technology but they do not involve the ministry very much:

> **ICT4:** *We are a bit in difficult position in the ministry because as of now we have no policy that is the ICT policy. We intend to develop one which should make it clear even to NGOs, donors that they need to assist us along in line with the policy. But as of now since we don't have the policy then there is not much we can do. We want to be involved and know what the NGOs are doing.*

There are plans to have public and private partnerships for infrastructure development so that the Internet becomes reasonable in price, as stated by the participants:

> **P1:** *Malawi government is looking forward to put telecommunications as priority number one in partnership with private sector.*
>
> **M1:** *I think one of the crucial factors is partnerships between government and mobile operators who mostly own mobile technologies.*

There is a great deal of competition between the players in the industry about market share, but not on pricing. In this industry, information is not shared; information is only shared when the regulator publishes the submitted information, as observed by this participant:

> **ICT6**: *We work independently in silos.*

Some participants, however, indicated that there is an increased collaboration in areas of infrastructure sharing among the players in the industry and a very good relationship has also been shown with others who either are providing complementary or competing services:

M1: *For example giving each other access is quite a good operating relationship for customers' interaction of different operators.*

Government participation

It also transpired during the investigation that the Malawian government is participating, through the process of building its own network and connecting to an undersea fibre cable through Tanzania and Mozambique. One participant said:

P1: *So, what is supposed to be done is to make sure that government has the fibre backbone which is connected to Tanzania to the north and to Mozambique. When the government does this, then e-government roll out to schools will be done and ensure that people will access information.*

5.4.3 Economic issues

Affordability of citizens

a. Affordable costs

The current pilot mobile systems are cost effective, because the physical transporting of data and processing of results has been eliminated. Delays in processing the data have been reduced. If, at the end, one of the pilot donors withdraws, government should be able sustain the operations. A participant who is involved said:

ICT2: *The system is not going be costly to government in terms of sustenance for the system and training of users, even if the donor is to hand over the system.*

b. Prohibitive costs

The cheap rates for buying and using mobile technology facilities for users are critical. The participants noted that to procure a mobile device is expensive for some members of society. The cost of using mobile technology facilities is sometimes prohibitive and may only allow people who have money to have airtime in their phone to access information on mobile devices. It is expected that it will be expensive in the initial stages of the m-government processes.

ADM2: *If the rates are very high people would opt not to use them because it will be very costly.*

N1: *We gave them mobile phones and the computer here automatically gives them airtime on request.*

PM3: *Mbali ya bomalo kuti izitumiza mautenga osiyanasiyana kudzera makampani popanga offer mobile services ndiyo gwira ndipo yothandiza. ... kuti anthu aziyankha mautengawo ndiye kuti azionetsetsa kuti ka fee kake kazikhala kochepa ... boma likhale ndi price ina yake yabwino .... (It is viable and helpful for government to sending messages through companies that offer mobile services. But if the government*

wants people from the villages to respond to the messages charges should be lower than the current charges ... government should subsidise the difference and government should have special charges.)

The cost of access for users' initial connection to MTs is sometimes prohibitive to people.

ADM3: *If it can be taken to be compulsory, it means government will provide the devices to the people. At the initial stage it might be expensive*.

Infrastructure development

The observation is that economic development is crucial for investing in the basic infrastructure which needs budget, transport and availability of spare parts. The people should have the skills to deploy such technologies. There is a loss of revenue on the part of mobile providers, because customers stop communicating when there is an interruption of network connectivity.

ICT6: *It's a big change in terms of technology and mindset from fixed devices to mobile ones and yet you need funds. So, one thing that comes into play is the issue of budget and funding for big projects.*

Foreign exchange for importation

There are challenges in terms of economic issues such as foreign exchange shortages. The other challenges include roads and importation of equipment. The participant noted that:

ICT6: *Foreign exchange shortage impacts our customers because as you know we are not self-reliant when it comes to manufacturing. We are facing challenges in terms of ordering spare parts and mobile devices, due to lack of foreign exchange.*

Use of open source software

The use of open source software has also resulted in the reduction of cost compared to using proprietary software (institutional owned) which costs a lot on initial procurement, licensing fees and sometimes issues of maintenance of contracts.

I**CT2:** *Our goal is to make this system sustainable as possible and so we opted for open source programs that are not costly. We have developers to modify the application program which runs on open source Linux operating system.*

ICT9: *Maybe there is an understanding that probably open-source software should be encouraged because initial cost of proprietary software is huge if you are to procure it and sustainability limitations.*

Power outage

The lack of power is grouped into the two categories of power for infrastructure and power for recharging phones:

Power for infrastructure

The challenge that the service providers have been or are experiencing; has been the issue of power outage which results in network interruptions. Some participants' observations:

> **ICT6**: *How do people in rural areas receive phone calls? We erect tower signals. In places where there is no electricity we are using the generators to run the towers. If we have shortage of diesel we do experience down time in those areas, which means if the towers are down people in those areas can't make phone calls.*
>
> **ADM1:** *Once power is not providing for their tower equipments, it means that they are spending more on backup power generators. Now I have seen they have gone solar.*

Power for recharging phones

In remote villages, due to lack of power, one of the major problems is the issue of recharging of mobile devices because, in LDCs, power is usually available for a few hours per day. Government is encouraging small businesses to have solar systems:

> **ADM1:** *But strides have been taken, we are having ICT entrepreneurs in the villages that are having solar systems to assist in charging the mobile phones.*
>
> **N1:** *We are planning to distribute the solar panel ... these people live in typical villages and there is no electricity.*

5.4.4 Political issues

Political leadership support for ICT utilisation

There is political leadership support for ICTs' usage in organisations and the country in general, because the leadership and legislators have keen interest in information communication technology utilisation in the country. The participants were of the following views:

> **ICT3**: *If mobile government can provide better service to the public, I think we will have no problems in terms of the political will on that one.*
>
> **ICT11**: *If the political leadership was not interested in mobile technologies they would not have approved these operators that are in the industry ... shows that there is commitment from the government side. From the political part, they want this country to be in line with other countries whereby most government organisations have gone mobile.*
>
> **P1:** *Malawian government would make sure that mobile government is a priority and is deployed.*
>
> **N1:** *I think the politicians as political heads in government will be positive towards mobile technology usage in government service delivery.*

M-government readiness in the country, especially regarding the political situation, could somehow be a challenge, because politicians simply cannot accept that they have no knowledge of m-government, which may sometimes lead to fear of the unknown as observed:

> **RS1:** *I think we have still a long way to go for our politicians to be conversant with mobile readiness and more especially if we are talking of political leaders.*

> **ICT8:** *I think the politicians could be sceptical of reliability and security of the technology in ensuring the reliability of services and that integrity is maintained when providing services.*

Marketing plans and awareness

Creating awareness and providing all the necessary information on m-government would assist in convincing the leadership. What is most important is the aspect of awareness as far as leadership willingness to accept m-government readiness is concerned. One participant said:

> **ICT7**: *The top officials may need awareness on this issue because they may have negative opinions towards mobile government usage in their delivery of service to the public.*

Political and government leadership is there in terms of utilisation of ICTs in government. Possibly the initial approach is to educate and to bring awareness to the necessary political leadership about what this business is all about, so that it gets the appropriate political will.

Political stability

It was observed that the country is stable and can attract new investors in the mobile technology industry, to improve efficiency and competition.

5.4.5 Mobile/wireless providers

The investigation has shown that the country has the main mobile technology establishments in Airtel, TNM and MTL; all of these have put their infrastructure in place but not sufficiently, because the providers depend entirely on MTL broadband for bandwidth which may result in some bottlenecks with efficiency.

> **ADM2:** *All of them depend on MTL because it's MTL only which has fibre cables from whether Tanzania or Mozambique. Currently, government is also trying to install other fibre cables because MTL ones get congested.*

Participants felt that the establishments are still in their infant stages; they should invest more in the country to enhance connectivity to rural areas, because there are no mobile networks in some remote areas. The leadership should sensitise the network providers to be proactive in addressing the network issues.

> **ADM4:** *It is spreading across the country but it's not well advanced, maybe in the urban areas I would say that to some extent it's well-developed than in rural areas.*
>
> **N1:** *The local companies that are supplying the network may need to expand and enhance the amplification of network signals.*

Staff training

Human resources with very high engineering backgrounds are required for infrastructure deployment and maintenance; there is a need for high levels of skills or resources that understand mobile applications (IT) and there is a need for people who understand government service delivery framework. It was noted:

> **ICT6:** *First, you need people who know what the government wants to do. Those people must have the knowledge base of the government processes. Below that there are engineers and IT people to implementing those processes using mobile technology.*

Global comparable technology

Participants from the mobile providers revealed that they use 3G/3.5G technology which is quite comparable with the technology being used in developed countries. The difference is that in developed countries the same technologies are being used for processing government applications (tasks) which provide services to the public, unlike LDCs. In other countries they have introduced applications that are well advanced and suit their environments:

> **M1:** *For instance in some European countries mobile government is already operating today while here we don't have it yet because maybe we haven't yet deployed it because we want to learning from others.*

Participants from mobile providers explained that they develop the interface between the network and the platform so that the application is able to connect to the network. It is also expected that MTs' penetration is going to be higher than any other technology:

> **M1**: *One good thing that we are noticing is that some of the technologies which were being dreamed of in first world countries are available in our country, for instance the roll out of high-speed Internet.*

New mobile providers

There is a need for more players or new operators in the industry to erect their structures and provide mobile devices, for example, specifically in rural areas, so as to promote usage of interactive computing devices in the country.

> **ICT4**: *We need companies that provide not just mobile phones. The applications that can be put on mobile phones are limited. We need mobile devices which can enable computing of huge applications like laptops, tablets*.

Access to the Internet has improved significantly because of the mobile/wireless network and it is assured that, with the drop in prices of the Internet, Internet ready mobile phones would make a huge impact in rolling out of MTs. This would facilitate the roll out of m-government. In the meantime, there are well established mobile providers, but the main stumbling block is the cost of airtime which is high in the country.

The participants noted that the private sector is currently providing mobile network and government is there to provide a favourable environment. The regulator has the responsibility to persuade providers to cover the whole country. On affordability issues, the regulator has a role to play. The government must have a master plan of what it is intending to accomplish in terms of resources it can afford.

Users' development

Users have poor knowledge of mobile technology utilisation, due to lack of training nationwide – this could lead to under-utilisation of the mobile devices. In some cases, users of technology in remote areas may need some training to use mobile tools appropriately:

> **P1:** *Even computers are in rural areas where a number of centres/schools are offering access to information through Internet*.

Customer retention

Participants from mobile providers revealed that the ratio of customers is 65% and 35% respectively for Airtel and TNM. Each company tries as much as possible to protect the customers. The retention of customers in the market is extremely difficult, because customers move from one provider to another. The two providers said that one of the methods to retain customers is to engage in various campaigns or promotions.

> **ICT6:** *On customer retention there is a lot of cannibalism in the competitive market*.
>
> **M1:** *The mobile phone technology generally is loyalty kind of service customers are looking at mobile technology as commodity.*
>
> **PM1:** *Zoonadi makampani onse a Airtel ndi TNM ndiosakhazikika chifukwa makasimotola a Airtel ndi TNM amasinthasintha makampani makamaka iyo ya Airtel poyambirira inali ngati Celtel panopa tinganene kuti ingosinthasintha ... chifukwa makasitola ambiri akumadandaula*. (*It is true that both companies Airtel and TNM are not stable because the customers for both Airtel and TNM keep on changing from one company to another, especially Airtel, it was initially called Celtel then Zain and it is just changing names ... many customers are complaining.)*

5.4.6 Additional services and guidance from mobile network providers

It was discovered that mobile network providers, in addition to infrastructure, can provide the skills and knowledge and experience required (intellectual property) to implement all the needed

requirements. They work with content providers to interface with their networks. They can also give government direction and possibly advice:

> **ICT6**: *We can give government direction and advice on how to implement, facilitate mobile technology to improve the services to the people whether in the health sector, education, and all other service delivery prospects can be enhanced.*

Figure 5.3 represents the environmental network of themes as a result of analysing the participants' responses. The basic themes with a positive "+" sign contribute positively to the organising themes and the basic themes with a negative "-" sign negate the organising themes. Similarly the organising themes with a "+" positively influence the high level theme whereas those with a "-" negatively impact on the high level theme.

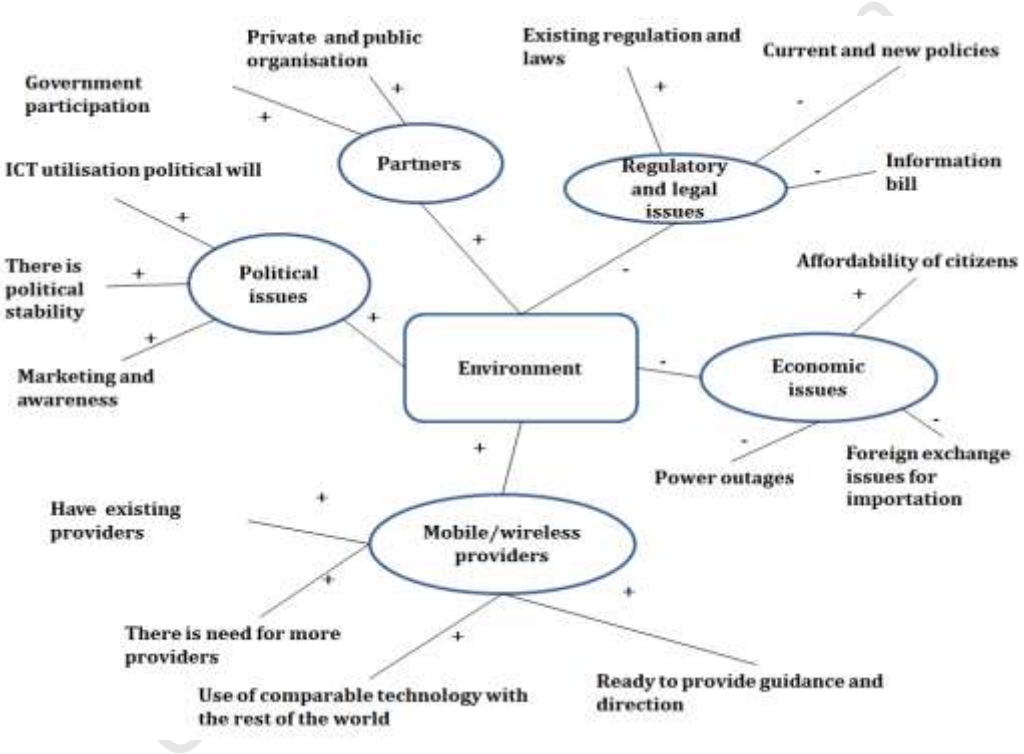


Figure 5.3: Environment thematic networks

5.5 Task suitability

In addition to technology, organisation and environment dimensions, task suitability or task fit (applications) are crucial to m-government readiness deployment. M-government can be meaningful if government processes the tasks and communicates the results to the stakeholders. Tasks are analysed at various levels according to repetitiveness, structure, process complexity and other characteristics (Gebauer & Shaw, 2002).

Government can only invest in new technologies and provide favourable environment and organisations if there are benefits for the general welfare of the country. The general welfare can be

achieved through service delivery to stakeholders, after tasks have been processed. These tasks are in four classifications of m-government growth. The research considered the tasks as the following in their application stages (Norris & Moon, 2005; Gebauer & Shaw, 2002).

5.5.1 Informational

Informational tasks provide services to stakeholders through the use of laptops with built-in wireless capabilities or by using data cards (dongles) and mobile devices (mobile phones using SMS and MMS technologies) and global positioning systems (GPS) which assist people in locating the actual position or place. The participants were of the view that suitable tasks at the informational level include emergency alerts to let people know the type of emergency, such as notification of disease outbreaks and what actions to be taken, examination results whereby students can make enquiries and get feedback of their results after providing the identity such as student number through SMS technology, stakeholders would be able to do their licence and passport renewals and find out tax returns status. Additionally, they offer agriculture market information systems for commodities (quantity, prices locations), voting, student registration, and tourism licence status notification using SMS:

> **ICT3**: *If government can provide some of those services through mobile services so that people don't have to go to government offices to get a service, I think that would be a plus for our country because it will reduce time a person moves from one place to the other.*
>
> **ADM4:** *For example we at ministry of tourism can send the SMS to all the tourism operators about the status of their units whether they qualify for a licence or they don't qualify for a licence and what steps to take.*

The participants noted that it can be used as a marketing tool if SMSs can be sent to targeted individuals to try to convince them to travel to touristic sites in the country. It can also be used to target the private sector to invest in the tourism industry:

> **ADM4:** *We would use this platform to promote the investment opportunities that are available in Malawi to prospective investors.*

They further suggested other tasks such as m-health for child health care services in rural areas. Another area could be education sectors which could offer registration of students with the examination board and send notification of results:

> **RS1:** *I am thinking of people in the rural areas, they have hospital yes, but have been referred to another hospital, they need to interact with somebody or doctor somewhere to communicate about the problem.*
>
> **ICT4***: To introduce e-health services in the ministry and m-health services also will be part of that especially to cater for hard to reach areas, rural areas are the ones to benefit most from m-services.*

5.5.2 Transactional

Transactional tasks are tasks that can be performed and provided in two ways such as interactive processes between government and stakeholders through mobile devices, using SMS and sometimes MMS technologies. The participants suggested that suitable tasks at the transactional level include:

M-democracy: citizens can participate in and contribute to government activities such as voting and policy reforms.

M-payment could assist government to contact civil servants living in rural areas and also people could pay their utilities, using mobile tools.

M-procurement could help government officers to buy government goods online and this could reduce the cost in terms of time and money, because officers would not need to leave their offices.

M-licence will enable people to apply and renew their licences online and monitoring the status of each stage of licence production could be done.

M-agriculture would assist in the provision of market products and their prices and other relevant information to agriculture activities.

M-health would assist in getting information of children's nutrition, monitoring data for home based care patients and drug monitoring.

M-education or m-learning would facilitate the learning of students away from the physical institutions, using MTs.

> **M1**: *People can learn if we can transfer learning from a centre of learning to mobile facilities so that people can access it.*

Other benefits are national registration, financial systems and human resources systems. The mobile providers have so far facilitated the payment system, health sector related systems and market information systems. Government can learn from other mobile based services that have been rolled out somewhere, such as the "Mpesa" success story of how money moves through the MTs. Government could be involved in mobile payment programmes. Participants said the following:

> **M1***: In Kenya they are using "Mpesa" quite a world case whereby we can easily learn from that and deploy some of those services to help our own people in this country.*

> **ICT6:** *If a rural area has no bank people can be paid using mobile devices. Government can transfer money from one mobile device to the other. Civil servants can be sent SMS that your salary has been paid, please to go to such collection centre to collect your salaries...you can improve service delivery through engaging mobile devices to facilitate payments.*

> **ICT6:** *The other area is the sending of campaign, say an HIV/AIDs campaign in health sector and others. If you have a database of population mobile phones numbers you can start publishing campaign on their mobile phones on various aspects about campaign for voting ... how to control disease outbreak.*
>
> **ICT9:** *We can even learn from other countries what they have done and put it in our strategy so that we have a comprehensive strategy instead of doing things in a fragmented way without a proper framework.*

5.5.3 Operational

Operational tasks are tasks that provide stakeholders with interactive commutation through SMS and MMS technologies on mobile devices. The quotes from participants provided under transactional tasks (5.5.2) apply to operational tasks. Sometimes it is difficult to differentiate the operational tasks from transactional tasks. Some participants identified the following tasks which are applicable for this stage:

M-police would assist the people to report crimes and police officers could communicate with each other while in the field and check criminal records of suspects.

M-disaster and m-fire could be used to communicate natural accidents such as flooding, fire for assistance or warning people to avoid going to such places. ADM2: said, *"In transmitting press releases say on drought, fire breaks or maybe there is violence somewhere, so it's breaking news you need people to know."*

GPS tracking could be used for example; the post office could be well established to deliver mail to specific homes. It could help police officers to know exact coordinates during their security tasks; in other intelligence services, operations and emergencies could be undertaken.

> **ADM1**: *With GPS tracking we should be in a position if there is an emergency somewhere, ambulances and other services should be able within reasonable distance reach particular individuals within reasonable time.*

Bill monitoring could also make use of MTs to track the progress of a bill in Parliament, by either Members of Parliament or other interested people. **ICT5** had this to say: *"Right in their constituency there will be able to submit their bills and to follow processes."*

5.5.4 Managerial

Managerial tasks are provided to stakeholders who are responsible for managerial and administrative actions, such as decision making. They are provided through SMS, MMS technologies and powerful computing mobile devices.

The participants were of the view that the suitable tasks at the managerial level could include administrative systems to address administrative issues through sharing of electronic documents through the mobile devices. These managerial tasks are as follows:

M-fleet and m-inventory would enhance the monitoring and management of stock levels in stores, as well as vehicle utilisation and maintenance. **ADM2** said: *"This will be helpful in monitoring and evaluation of transport systems and fleet management."*

M-administration could assist in planning and assignment of activities to particular officers, decision making and monitoring events occurring in organisations, through tracking their accomplishments of the assigned tasks. It would help monitoring events taking place internally and externally in an organisation. **ADM2:** said, "*In administrative matters can be used for communicating information on something, while this is true or is not true.*"

M-finance would provide a mechanism for financial analysis and online monitoring of financial transactions. **ADM1** said: "*This will also be helpful in financial accountability issues in government."*

Management of human resource (HR) could be achieved through sharing of electronic documents in the planning and decision making, processing and monitoring of events taking place internally in an organisation. **ADM2** said: *"HR issues, to know who has passed away and has not been automatically deleted from the system. Who else has joined? Are there vacancies?"*

However, it was noted that managerial tasks would require powerful mobile computing devices to do the data processing, data analysis and reporting.

Figure 5.4 illustrates the tasks network of themes as a result of analysing the participants' responses. The basic themes with a positive "+" sign contribute positively to the organising themes and the basic themes with a negative "-" sign negate the organising themes. Similarly the organising themes with a "+"positively influence the high level theme whereas those with a "-" negatively impact on the high level theme.

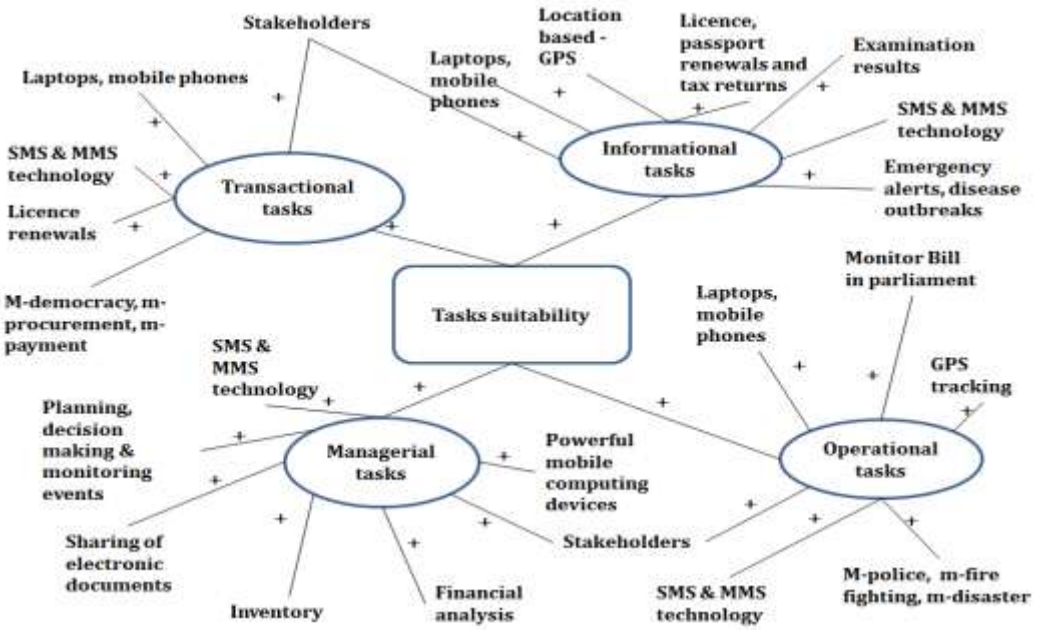


Figure 5.4: Suitable tasks thematic networks

5.6 Interdependencies between themes

The analysis process identified that there are greater interdependencies of themes between each other to adequately achieve the intended purposes. Some of the interdependencies are as follows:

Mobile providers' dependence: Mobile providers are dependent on political stability for the smooth operations of their business. They need economic stability to import goods and services. Other firms' mobile tools such as laptops and cellular phones are also important to support the mobile provider. They require the competency of employees to implement and support establishments. They depend on users or customers to procure their products and services. Regulatory and legal issues in a particular country are other areas that regulate the business of providers. Negative regulations and laws would frighten away the providers.

User dependence: Users (also employees) are dependent on organisational leadership for directions. Users/employees require the necessary competency to understand the technology and tasks that would be implemented. They depend on laws to guide them when performing tasks. Economic issues play significant roles to enable users to buy the necessary MTs. Political situations at particular times in the country encourage users to be committed to access government services, without fear of such issues as spying machines to spy on their activities.

Partners' dependence: Partners are dependent on good organisational leadership and culture to work with other organisations. Political leadership of the country would influence and promote partnership between government organisations and the private sector for a common goal. Partnership also depends on the economic status of each partner involved for balanced contributions to a particular undertaking. Competence of the people is also a critical dependency factor of particular organisations involved in a working relationship. It is the competences of all players in the partnership which assist to understand what is to be achieved during the life of the relationship. Other dependent themes are regulatory and legal issues which regulate a particular partnership when each organisation is required to know the laws and to know which role each partner plays in the partnership.

Accessibility dependence: Accessibility relies on the mobile network to facilitate communication to information. Access to information requires mobile devices. Reliability and interoperability are other dependable aspects for the interaction of systems and users, while competency is also important to achieve accessibility.

Demonstrability dependence: It is dependent on organisational leadership to accept the systems to be implemented. It also relies on the users' and employees' competency to use and manage the systems. Systems depend on the mobile tools to perform and produce desired outputs. Mobile networks are also the enablers of demonstrable systems.

M-government initiatives dependence: M-government initiatives are dependent on mobile tools, mobile network, organisational leadership and political leadership readiness. These initiatives are

economic affordability of government organisations. Some m-government initiatives would need partnership for successful deployment. The initiatives would require competent government employees and general users of the systems. The users also depend on economic affordability to access and manage the mobile devices to access government services.

Privacy and security dependence: Privacy and security are dependent on the competency of users, employees and mobile providers, who are responsible for the provision of mobile network, mobile devices and software. Government employees would be responsible for internal security and privacy of information, while users would be responsible for their data. The favourable environments of organisations are dependent on culture, which is embedded in organisational politics and user behaviour. This user behaviour influences the level of readiness to new technological processes, privacy and security management.

Reliability and interoperability dependence: Reliability and interoperability are dependent on compatible mobile tools and network. Interoperability is being facilitated because of open source software utilisation in the existing systems.

Mobile network dependence: Mobile network is dependent on the availability of mobile tools to build the network. Mobile network also needs competent employees on mobile provider to implement the network. Mobile network depends on the well-established mobile providers in the country. It relies on enhanced and reliable network security tools.

Competency dependence: Competency depends on users, employees and leadership exposure to MTs. It also demands the knowledge of regulatory and legal issues, so that the application of m-government can operate within the legal framework of the country. Literacy levels of organisations and of the country determine competence levels. Literacy levels in the country need to improve so that more people are able to use mobile devices effectively (UNESCO, 2005). Organisational exposure to demonstrable systems or learning from other countries enhances competence.

Leadership dependence: Organisational leadership depends on economics and politics of the government organisations, to make decisions to use MTs. The leadership is also dependent on users and their competencies in the systems. Regulations and legal issues determine the position of the leadership in any new undertaking. Partners and mobile providers are other leadership dependent variables. It also depends on the boundary spanners which include conception of m-government, championship, managing risks, planning and additional services and guidance from mobile network providers as discussed in 5.3.5.

Culture dependence: Culture is dependent on the bureaucratic hierarchy of each organisation. It depends on organisational and national leadership to preserve it. It relies on the security and privacy mechanisms that would be applied to preserve cultural values. Users are also fundamental to adherence to or modification of culture, to suit the MTs. Boundary spanners would also influence the cultural values, both in organisations and in the country.

Boundary spanners dependence: Boundary spanners are reliant on organisational leadership to make decisions. Employee competencies are critical to be put in place and operated successfully. They also depend on users and their competencies to utilise the systems. These spanners need to comply with the regulations and legal framework of a particular setting. To some extent, culture has an impact on the boundary spanners. The general politics of an organisation and a country may contribute positively or negatively to the boundary spanners. They are also dependent on the reliable economic status of an organisation and country.

Regulatory and legal issues dependence: Regulatory and legal issues depend on the users (employees) to formulate them in accordance with a particular environment. These depend of the competence of people to understand and interpret them for proper utilisation of MTs. They also rely on the political leadership to approve them and depend on organisational leadership to enforce them. They need people to make them nationally known through awareness campaigns.

Economics dependence: The economic issues are dependent on the political leadership which leads to a stable government and business environment for mobile providers. They also rely on organisational leadership to manage the economic status of a specific organisation. Competence of employees is vital for managing the economy at all levels.

Political issues dependence: They are dependent on national leadership to ensure that there is country and economic stability. It also depends on the national culture which determines the direction of the national policies to use MTs in government operations. They require political leadership as well to understand the regulations and laws governing utilisation of MTs in government offices. User competence of political dynamics, both in government organisations and in the country, is also essential for undertaking new technologies.

The high-level themes of technology, organisation, environment and tasks are also dependent on each other to achieve m-government readiness. They are explained in the next paragraphs.

Technology dependence: The technologies are dependent on organisations which employ competent people to assemble and implement them. Organisational culture also determines the utilisation levels of MTs. Technologies are reliant on the enabling environment, which encompasses such issues as economic status, political, national culture and regulating factors. They depend on the tasks availability in organisations and other national services that could make use of the MTs.

Organisation dependence: Organisation relies on appropriate MTs to perform different processes. It depend on suitable tasks which, when processed, produce the required services for delivery to the society. Environment is another important dependent theme for an organisation, because environment involves critical factors such as laws, politics, economics, competitors, users and partners.

Environment dependence: Environment relies on organisations to produce products or services and these products would boost the economy of the country. It also needs the technology to access

the services that the organisations produce. It is directly dependent on tasks for it to get the services. The environment can only formulate policies, regulation and laws to guide organisational, technological and tasks functionality.

Tasks dependence: Tasks are dependent on organisations to transform them into a usable status. They require technologies to be processed, transmitted, secured and accessed. They need the environment to consume their products or services and regulation to regulate their usage.

Table 5.2 presents a matrix of the interdependency of themes. IDs A to D vertically represent the high-level themes of technology, organisation, environment and tasks. IDs E to V vertically represent the organising (subject) themes. The themes on the horizontal dimension are represented by IDs A to V. The tick "√" indicates the dependent themes for each organising theme, a cross "×" indicates the interdependency of high-level themes and ● indicates critical dependences. Table 5.3 summarises the interdependency of themes.

Table 5.2: Interdependency of organising and high level themes

ID	Subject themes	Dependent on these themes																				
		A	B	C	D	E	F	G	H	I	J	K	L	M	N	P	O	Q	R	S	T	U	V
A	**Technology**		×	×	×																		
E	Reliability & interoperability							●	√	√													
F	Accessibility					√		√		√			√	●									
G	Mobile network								●	√			√	√									●
H	Privacy & security							√		√			√	√		√							√
I	Mobile tools													●									●
J	Demonstrability							●		√			●	√	√								●
K	Mobile technology experiences					√		√		√	√			●	√	√							√
B	**Organisation**	×		×	×																		
L	Competence										√	√		●	√				√				
M	Users							●		●			●		√	√			√		●	√	●
N	Leadership												√	√			●	√	√	●	●	√	√
P	Culture								●					√	√			√	√			√	
O	Mobile government initiatives									●		√	●	√	●					√	●	√	●
Q	Boundary spanners												√	√	√	√			√		√	√	
C	**Environment**	×	×		×																		
R	Regulation & legal framework												√	√	√	√						√	
S	Partners												√		●	√			√		●	●	
T	Economic issues												●	√	√	√						●	
U	Political issues												√	√	●	√			√		●		
V	Mobile providers									●				●					√		●	√	
D	**Tasks**	×	×	×																			

● = Critical dependency √ = interdependency of organising themes x = interdependency of high-level themes

Table 5.3: Summaries for interdependency of themes

Subject themes	Dependent on themes
Mobile providers	Political leadership, economic issues, mobile tools, regulation and legal issues and users
Partnership	Organisational leadership, political leadership, economic status, regulatory and legal framework, culture and competence
Accessibility	Mobile network, reliability and interoperability, competency, mobile tools, users
Users (including employees)	Organisational leadership, competence, laws, tasks, economic and political situations
Demonstrability	Mobile tools, mobile networks, mobile providers, users, leadership and competence
Mobile government initiatives	Leadership, users, mobile tools, mobile providers, political leadership, partners, competence and mobile technology experiences
Privacy and security	Competence, users, mobile network, government employees, mobile providers, mobile tools and culture
Reliability and interoperability	Mobile network and mobile tools
Mobile network	Mobile tools, users, competence, mobile providers and security
Competency	Users, leadership, exposure to technology, regulatory and legal issues, literacy levels and demonstrability.
Leadership	Users, economics, politics, regulatory and legal issues, boundary spanners, partnership, mobile providers and competence
Culture	Privacy and security, organisational and political leadership, users, boundary spanners, regulations and legal issues
Boundary spanners	Organisational leadership, users, political leadership, culture, competence, regulatory and legal issues and economic issues
Regulatory and legal issues	Users, competence, leadership, political issues and culture
Economic issues	Political stability, competence, culture, users and organisational leadership
Political issues	Leadership, culture, regulatory and legal issues, users and competence

5.7 Comparisons

The comparison of service providers is important, because it helps to show the common tools that are being used and common services the service providers offer to the public, and to know their common challenges. It will also help to understand their differences. The comparison also highlights the common interest areas, challenges and differences among service providers, government employees, politicians, ordinary citizens and those with operational mobile systems in the country. The comparison would also ascertain the reliability of services and be able to determine the future emerging themes.

5.7.1 Service providers comparisons

The common responses and differences for service providers are presented.

Common responses

All the service providers are expanding their network to cover the country to increase connectivity. As of now the network coverage is over 85% across the country. The service providers are providing common mobile devices such as mobile phones, laptops, dongles (data cards), voice, SMS and MMS technologies. They have installed and are installing the comparable technologies with rest of the world such as 3G, GSM, CDMA, Wi-Fi and WiMAX, and EVDOs. They are making people more aware of the importance of using MTs in government daily operations. The customer retention is a challenging issue for all the providers and the service providers are putting in place incentives to retain the customers.

They all feel that the environment is good for business, as government through MACRA is providing favourable conditions. There is a favourable working relationship between them, for example, the sharing of towers in different areas of the country where other players have no tower and the leasing of circuits from other players. There is an understanding that the mobile technology industry is established but still need for more players to invest. The service providers agreed that there is political leadership in the usage of ICTs in Malawi. There are several initiatives government is undertaking to improve ICTs deployment in different sectors of the economy. On security and privacy, the consensus was that they have tools to deal with some of security and privacy challenges. Security and privacy are big problems which require heavy investment, both in human resources and tools. Affordability in terms of foreign exchange shortages was another concern of the service providers, to procure spare parts and new equipments from outside the country.

Differences

They do not share business information. They have different strategies for market share of retaining customers. They work independently in silos for the core business of companies. See Appendix H for a summary of service providers' comparisons.

5.7.2 Service providers, government employees and general public comparisons

For the purposes of comparing the common findings, the participants were grouped into three categories: mobile service providers; government employees which comprised of ICT offers, non-ICT officers and politicians; and general public which comprised of ordinary citizens and those operating pilot mobile systems. The similar (common) responses and differing views are presented.

Common responses

Participants pointed out that awareness at all levels on the importance of MTs and m-government should be addressed. They agreed that there is an availability of both mobile technology devices and services in the country such as mobile phones, laptops, SMS and MMS technologies, and dongles. Participants observed that the mobile network in the country is sufficient and covers many parts of the country estimated at above 85%. Penetration of mobile phones subscriptions is 29%.

Security and privacy is another area in which participants raised concerns about the security of their data, whether during transmission or storage. It was encouraging that the groups were knowledgeable of the suitable applications which could run on MTs. The participants in the groups focused on the mobile phones' common uses which include voice, SMS, MMS, and Internet, e-mail, listening to radio and music, playing games and participating in competitions. The general agreement was that m-government requires a champion to initiate the process of its deployment with authorities. The majority of the participants in the groups demonstrated that they have an idea of m-government and its benefits. Another area was the impact of MTs on culture in organisations and the country in general. The clear observations were that bureaucratic tendencies and organisational politics, denial to change and slowness in changing the mindset, would have a negative impact on m-government readiness. At national level, MTs contribute to spoilage of cultural values because people copy foreign culture which is in conflict with the national culture. Sometimes MTs are used for abusing and castigating people and for criminal activities.

The competence level is generally good because above 3 million people are able to use mobile phones. The important observation is that the younger generation uses the mobile devices with fewer difficulties than the older generation. It was observed that in Malawi, leadership and political will is there for the utilisation of ICTs. There are many enabling factors such as the available MTs and mobile network, the favourable legal environment, government support and people's enthusiasm to use mobile devices. It was also observed from the responses that many people are not aware of any laws that regulate the mobile technology industry. They were sure that MACRA is in a position to enforce regulations on the key players in the sector. They emphasised that the laws need to be revised, because it seems the laws are technologically independent. The groups agreed that the mobile technology establishment is stable, but more players should be encouraged to invest in the sector. In terms of working relationships, government and other players are working together to improve the telecommunication sector. It was observed that the sector was experiencing many challenges, which ranged from foreign exchange shortages for importing new

equipments and spare parts to power outages, enforcing security and privacy, cultural conflicts and lack of user trust.

Operators and government working together is regarded as a key strength to boost the telecommunication industry in Malawi. This spirit of working together demonstrates traditional cultural values of oneness and a hardworking spirit to develop the country electronically.

Differences

Government and operators sometimes have differences with certain aspects. They discuss and resolve the differences. For instance, the issues surrounding the spying machine can be interpreted in such a way that the operators deliberately influence the general public to stop government from installing the system because they (the operators) are aware that the so-called spying machine will expose the operators. Currently, there is no system to monitor the operators' activities. They could be remitting low tax to government and not providing the recommended network services to customers.

The participants noted that the mobile systems are not secure because people can hack into them and steal other customers' airtime. People outside the system are able to break the codes of proprietary mobile handsets, so that they can accept any SIM card. Participants complained that the operators connive on tariffs that they charge customers, because the cost of airtime is high. They do not consider the welfare of the customers but their main focus is to make hefty profits.

Appendix I illustrates the summary of the comparisons of the three categories of the participants of the research.

5.8 Summary of the themes

The following is a summary of the themes and their sub-themes which were noted in the course of the analysis of the transcribed data for m-government readiness in Malawi.

Technology: The MTs offer communication anywhere and at any time. There are reliable and interoperable tools, because the demonstrable systems can switch from one operator to another and the systems use open source software. Mobile tools are available and many people have access to these tools, especially to mobile phones, but currently they cannot access government information or services. The network infrastructure is in place and covers major parts of the country. There are enablers, benefits and challenges to MTs. Another area of concern is the high cost of airtime. Privacy and security is a concern for utilising MTs. The MTs are also a source of crime because, currently, SIM cards are not registered. Demonstrability, mobile technology benefits and other factors (facilitators and constraints) are the emerging factors from the data.

Organisation: Competency levels are generally adequate, more especially on mobile phones, both at organisational and national levels. Many people know how to use mobile phones. However, where knowledge gaps exist, it is advisable to educate the people on the basic features of mobile phones. The leadership is enthusiastic to ICTs' utilisation, including m-government. The focus of

culture is on operationalisation of the content and the usage of MTs, in the areas of privacy and confidentiality, of the sensitive cultural values. Bureaucratic tendencies of some organisations and villages countrywide slow the rate of important undertakings to be put in place; as such they would be delaying the fulfilment of m-government readiness. Many people are acquiring MTs, although they are impacting on culture. Boundary spanners that were identified are as follows: m-government conception, the identification of a champion, management of risks and planning. Emerging factors included institutional capacity and user training. M-government benefits and constraints were also identified.

Environment: The regulating and legal environment for MTs is generally favourable. It seems the technology is independent of the laws, because people use most of the technologies, and people are not aware of any existing laws that regulate the technology usage. Government and mobile providers are working in partnership in many areas of the telecommunication sector, to improve the quality of access to MTs. In general, there is political leadership at both organisational and national levels for ICT utilisation in Malawi. Economic affordability of organisations and people is one important area that needs consideration, to promote increased access to mobile devices and daily utilisation of the devices. There are presently only a few mobile service providers who provide all the required MTs' expertise in the country. More new providers are required to invest in the telecommunication sector to enhance quality of service and competition, which will result in cost reduction.

Task suitability: There are several tasks that were identified, which could be suitable for m-government in Malawi. Tasks are key elements to government operations and performance in ensuring that quality services are produced and delivered to stakeholders when required. Tasks are categorised into informational, transactional, operational and managerial tasks. Some of the tasks which could run on MTs are health, agriculture, education, security, finances, human resources, administration and registration of citizens.

Figure 5.5 shows the final main themes and sub-themes after the iterative data analysis, with reference to initial themes in Table 5.1 in section 5.1 and to the theoretical framework. Figure 5.6 depicts a thematic network map, which constitutes m-government readiness in Malawi.

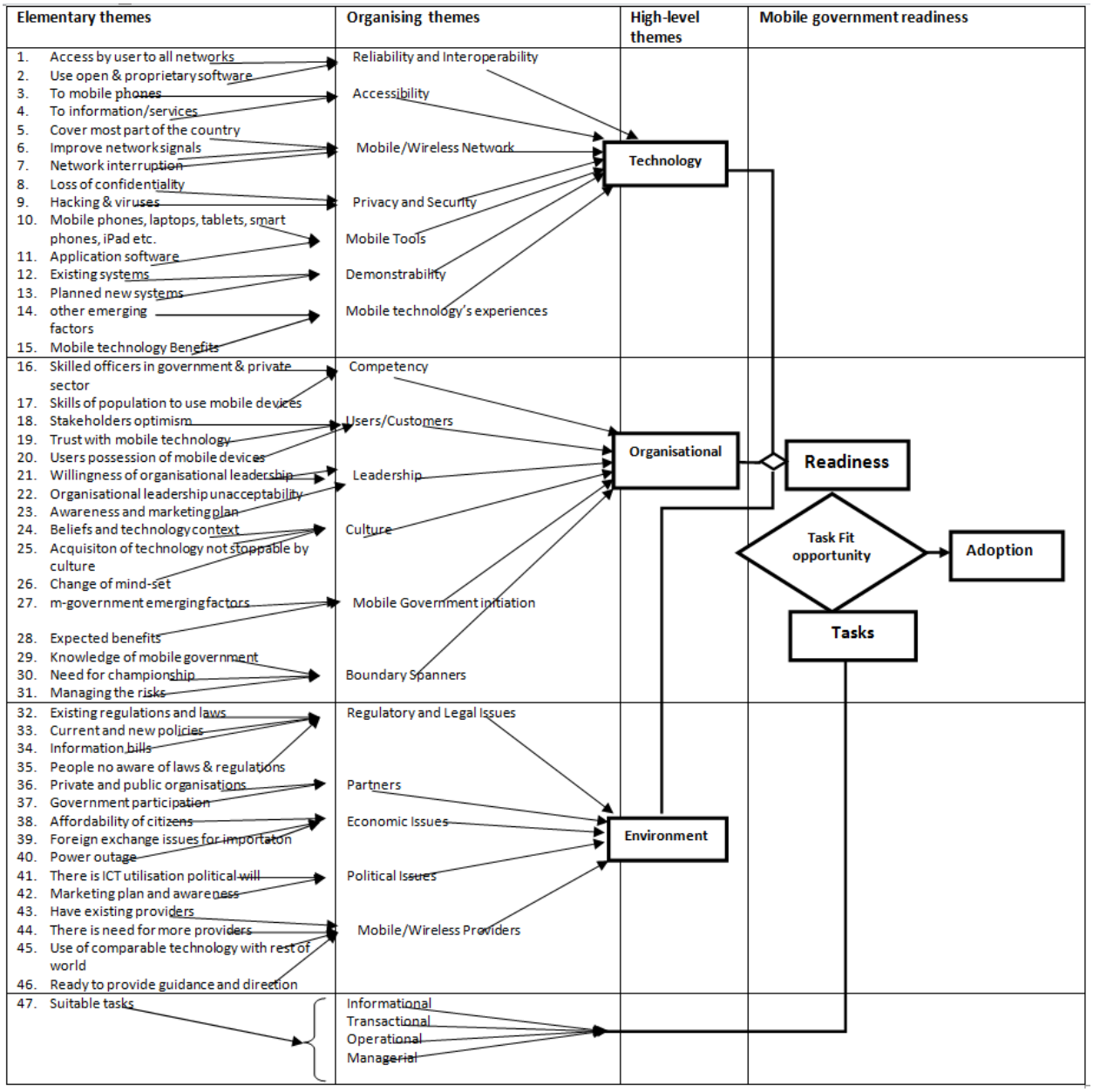


Figure 5.5: Groups of themes development

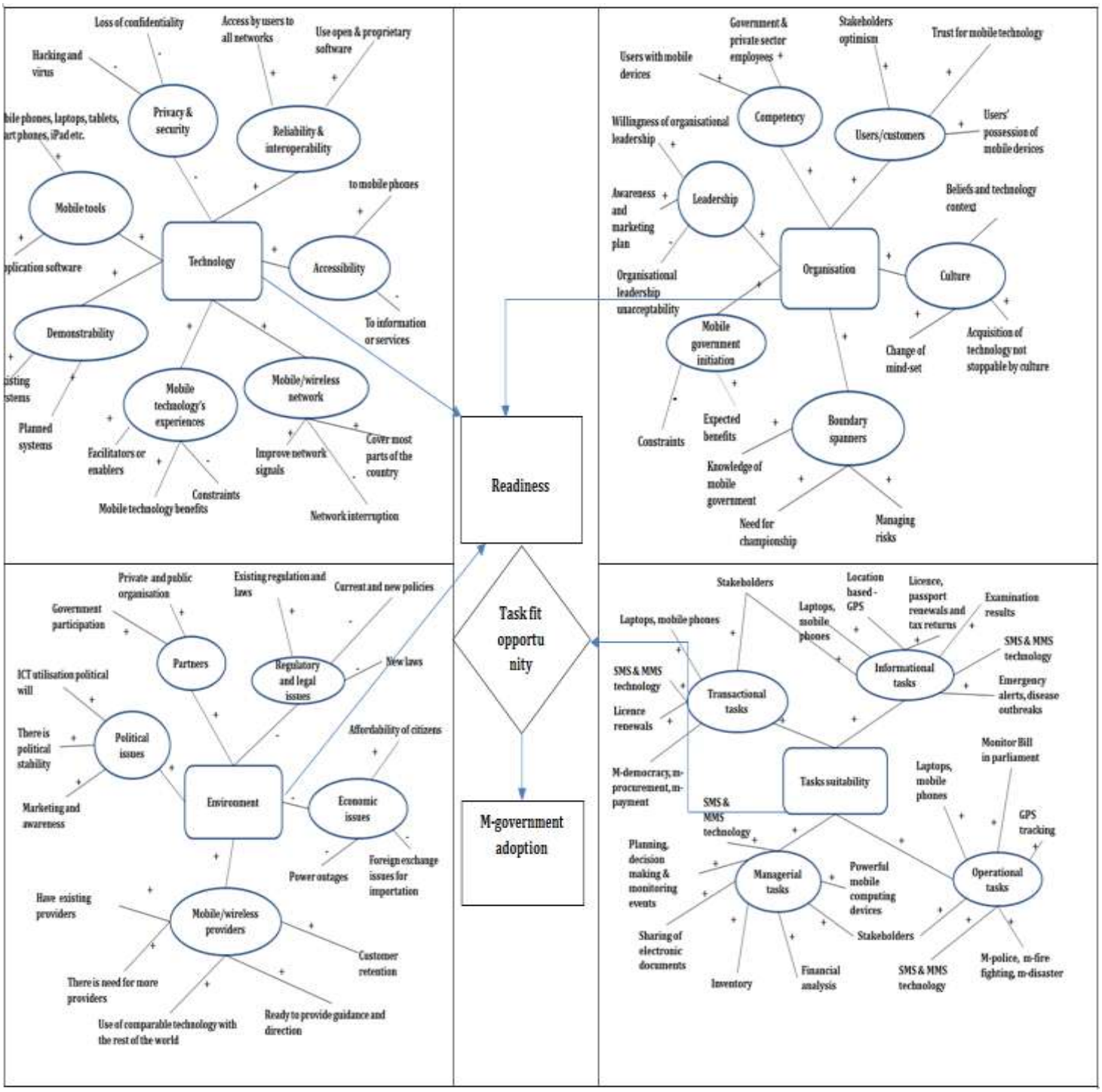


Figure 5.6: Thematic network map for M-government readiness

In the next chapter the research discusses and interprets the research findings.

Chapter 6 Discussions of the findings

This chapter discusses the findings which respond to the research questions and objectives. The chapter also presents the implications of the reviewed literature for the research. An in-depth discussion of the research theoretical model effects on the research findings and their related propositions as discussed in sub-section 3.4. *The propositions responded to, are indicated with a "P" and a number such as "(P1)".* A discussion is presented on emergent concepts of the research findings. The aspects that could enforce m-government readiness are introduced and present the factors that are critical for the realisation and readiness of m-government services. Finally, the challenges and a summary conclude the chapter.

6.1 Introduction on readiness factors

The readiness factors are the enabling aspects that contribute to the readiness of m-government. The focus was to assess government readiness and to determine the enabling factors of m-government readiness in Malawi. These factors are mostly those in the three readiness dimensions of the theoretical framework in Figure 3.6 which comprise technology, organisation and environment, as well as any other factors that emerged during the analysis of the transcribed data. Suitable tasks were identified for m-government. There are tremendous improvements in MTs and therefore many people are interested in m-government to help government operations. The new mobile devices with high computing capabilities are influencing new ideas for m-government services.

6.1.1 Technology dimension

Reliability and interoperability: The interoperability with government systems is very important. Systems within government can communicate with each other and with mobile technology systems (P1). The demonstrable pilot mobile systems in the country use two mobile providers to transmit the information. This interoperability or compatibility is due to the fact that the operators are using 3G or 3.5G technology standards, which assumes that firms compete within a joint network (intra-technology) or enter through deferred rival technology (inter-technology) (Langenberg, 2006; Pankowsk, 2008). Reliability is dependent on several issues such as availability of network, provision of services and so on. Considering that Malawi is a least developed country, the mobile services are reliable, while efforts to improve reliability are being implemented. These are important because both users with limited knowledge and knowledgeable users do not need to understand the technicalities of how information is transmitted from one point to another.

Accessibility and availability: Mobile devices and information accessibility are considered important to foster valuable communication (El-Kiki & Lawrence, 2007; Karan & Khoo, 2008). This is so, because of rapid mobile network infrastructure deployment, mobile phones penetration and the enthusiasm of the people to embrace the technology age in the country (P2). To achieve accessibility, the government has a role to provide the available information or services through the

available MTs to society at large. The stakeholders such as citizens should also use the available technologies that suit their requirements to promote the m-government. It should be emphasised that sometimes availability of MTs do not necessary translate to proper utilisation (Carroll, 2006).

Mobile network technologies: The investigation into m-government readiness research has revealed that mobile networks are a key technology, for they are proper tools for delivering any mobile services through data transmission to and from users' mobile devices. So far, 3G/3.5G networks have been deployed in some LDCs like Malawi (P3). The presence of 3G/3.5G technology enables data transfer rates that guarantee consistent mobile Internet accessibility (Sharma & Gupta, 2004; Malladi & Agrawal, 2002). Mobile network providers still need to strive to optimise the available infrastructures' performance countrywide. This continued trend of new enhanced mobile network technologies will facilitate the introduction for different mobile applications that involve high data transmission speeds. Network signals should always be improved, regardless of the areas, because currently strong signals are mostly in urban areas. For instance, national registration tasks would require strong signals in rural areas to transmit data, because the activities are carried out in remote villages.

Continued infrastructure investment: The research found out that there is a need to continue infrastructure investments to enhance or complement the existing mobile providers, so that when government decides to embark on m-government, the infrastructure would be fully reliable (P3). Mobile network infrastructure development in LDCs in Africa is seen to be the viable approach to reach difficult to reach remote areas. The infrastructure development in LDCs could only be achieved through strengthening private-public partnerships (Karan & Khoo, 2008). Currently the Malawian government is in the process of connecting to the undersea fibre cable through Mozambique and Tanzania, to support the private sectors in addressing the mobile network connectivity in the country. The question is: Would this idea of government having its fibre be in conflict with private sectors in terms of business deals with government? But what is important is that the action government is taking will enhance its network coverage and, in the long term, will reduce government expenditure, because it would not be leasing bandwidth from the private sector. There would be a possibility that government would be leasing the bandwidth to the private sector. The involvement of government would enable more remote areas to be connected. This enhanced connectivity would prompt government to start offering services, using MTs.

Security and privacy: On the security and privacy issues, the participants considered the issues to be very critical to m-government readiness, because people are concerned with their confidential data being exposed to the wrong recipients (P4). Other issues that were highlighted were the failure of attaching individuals to their Subscriber Identification Module (SIM) cards, which renders identification failure in times of need, to trace the source of information when something illegal has taken place, such as abusing or castigating people anonymously; the mobile devices themselves have become the source of crime. The issue surrounding SIM cards registration is somehow contentious. The issue requires a stakeholders' forum to discuss SIM card registration; the likely

stakeholders will include the regulator, telecommunications operators, consumer groups, government agencies and the media in Malawi. As a result of high levels of crimes, in 2008 a number of African telecommunications regulators held consultative meetings through different committees to deal with the issue of the rise in crimes executed from the use of mobile communications in their countries, and a directive was agreed upon (Hemeson, 2012). Some countries in Africa such as Kenya, Tanzania, Rwanda, Algeria and South Africa have adopted the directive and are implementing the SIM Card Registration Directive that was agreed upon by numerous African nations through their telecommunications regulators (Hemeson, 2012). SIM card registration in Malawi requires a law to be enacted first before enforcing the registration, as other countries have done.

The mobile providers in Malawi indicated that they have the tools to safeguard customers internally on their networks; however, their concern is the speed at which the external attackers invent new methods of making the security systems vulnerable. Issues of security are worth consideration when the need to deploy m-government in Malawi is finally agreed upon. Users would certainly have problems if they are not assured of their privacy, because they may be hesitant to use m-government if they do not trust the system to securely process their data (Karan & Khoo, 2008; Sharma & Gupta, 2004). However, despite the security and privacy concerns, the research has revealed that people are still utilising MTs to pass their data from one point to another through SMS, MMS and social networks. Although privacy and security are critical issues for consideration, many people in the country are acquiring mobile devices for personal use. The rate at which people are acquiring these at all levels of the country signals the readiness of people to use mobile devices for other services. This acquisition of mobile devices directly influences m-government readiness.

Principal mobile tools: The mobile network technology facilitates the presence of portable mobile devices for communications (Sheng & Trimi, 2008). These devices include mobile phones, laptops, PDAs, tablets, the Blackberry and iPad at any time and everywhere. The commonly used mobile tools are mobile phones which fundamentally support voice and text transmission (P5). But contemporary phones such as smart phones afford users with adaptable features and comprehensive functions. Some of these features or functions comprise mobile accessibility to the Internet, MMS, GPS applications, web browsing, calendar for time management, media and many others (Malladi & Agrawal, 2002). The research has discovered that mobile phones seem to be popular and are likely to be the most suitable handy end devices for influencing m-government readiness for service provision in Malawi. Thus, in this research, the main focus had been put on these devices. The prospect of m-government can be empowered through the ubiquitous mobile phones to provide services, especially to underprivileged communities, and to provide new methods for public participation in running government (Poblet, 2011). Other mobile devices are very limited in the country for complex computing, but consideration should be made to select applications such as tablets for mobile workers.

MTs enable citizens the chance to engage in creation of information, production of service, solving problem, and formation of government policies (Nam, 2012). He developed two frameworks of multidimensional citizen-sourcing and citizen-sourcing evaluation criteria with an expectation that they would enhance government to appreciate citizen sourcing in the public domain. He argues that citizen sourcing has two features *"from the people and with the people"* which are to democratic principles of *"the people, by the people, and for the people" though the use of technologies.*

Demonstrable mobile systems in Malawi: This research noted some pilot mobile systems that are currently operating for transferring data from one point to another, such as RapidSMS, which is under the ownership of UNICEF (UNICEF Malawi, 2009), FrontlineSMS which is under the ownership of St. Gabriel Mission Hospital (Banks et al., 2008), and HIV and AIDs counselling in the health sector which is under the ownership of MACRO/Boabab Health (P14). All of these use SMS technology and they all use open source software platforms. Banks also use MTs to provide services to the customers through mobile or Internet banking, using the existing two mobile providers (Institute of Bankers in Malawi, 2011). These demonstrable systems are private company owned systems, or donors initiated the implementation of systems. The presence of these systems in the country could play an important role in influencing government to consider delivering services, using MTs, to its citizens.

Other factors: MTs assist people to communicate rapidly and to access information or service, to improve their knowledge and understand what is taking place around the world. The cost of mobile phones is significantly decreasing compared to other mobile devices, at the time of this research. It is also encouraging that the uptake of MTs in the country is steadily increasing.

Benefits of MTs: The research participants noted that the MTs provide the following benefits to people and organisations (P2):

- Convenience to individuals as mobile services are accessible anywhere and at any time,
- It brings services to customers,
- It advocates for payment services remotely,
- There is easy access to information,
- The user has privacy compared to using a desktop in the office,
- It is easy to deploy as it is wireless technology,
- Costs are cut in reaching hard to reach areas,
- It promotes participation of citizens,
- People learn what is happening in other countries,

- It opens up the country to become a more technologically advanced society,
- Transmission of information/services is instant.

Most of the benefits are comparable to those found in the existing literature (Gebauer & Shaw, 2004; Basole, 2004; Basole, 2005; Nah, Siau & Sheng, 2005). Table 6.1 summarises the responses of the participants on technology dimension (theme) and its factors (sub-themes). Beneath the table are the meanings of the symbols that are in the table.

Table 6.1: Responses of the participants on technology dimension

Themes & Subthemes	Participants of study responses																							
Technology	ADM1	ADM2	ADM3	ADM4	ICT1	ICT2	ICT3	ICT4	ICT5	ICT6	ICT7	ICT8	ICT9	ICT10	ICT11	ICT12	M1	N1	P1	P2	RS1	PM1	PM2	PM3	PM4
Reliability & Interoperability	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Accessibility																									
mobile phones	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Government services	××	××	××	××	××	××	××	××	××	××	××	××	××	××	××	××	××	××	××	××	××	××	××	××	××
Mobile network	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Privacy and Security	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!
Mobile tools																									
mobile phones	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
other mobile devices	±	±	±	±	±	±	±	±	±	±	±	±	±	±	±	±	±	±	±	±	±	±	±	±	±
mobile application development	××	××	××	××	××	√	××	××	××	××	√	××	××	××	××	√	√	××	××	××	××	××	××	××	××
Demonstrable sytems	√	√	××	××	√	√	√	√	××	√	√	√	√	××	√	√	√	√	××	××	××	××	××	××	××
Mobile technology experiences																									
as enablers	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
as constraints	Ψ	Ψ	Ψ	Ψ	Ψ	Ψ	Ψ	Ψ	Ψ	Ψ	Ψ	Ψ	Ψ	Ψ	Ψ	Ψ	Ψ	Ψ	Ψ	Ψ	Ψ	Ψ	Ψ	Ψ	Ψ
benefits	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√

√ = facilitating readiness √** = needs awareness & facilitating readiness ! = crucial issue but cannot stop acquisition mobile technology
?? = not sure ×× = do not know ± = limited Ψ = do not outweigh the benefits

6.1.2 Organisation dimension

Competences and users/customers: The people's competences with MTs' general utilisation, human resources and technical ICT skills are essential factors for m-government readiness (El-Kiki, 2007; Al-Omari & Al-Omari, 2006; Rao & Troshani, 2007). This research revealed that in LDCs, MTs competencies are high at organisational levels and moderate at national levels (P6 & P7). Many users in various organisations have a good level of literacy, which enables them to utilise the technology effectively. At national level, problems are multifaceted because of illiteracy. The most commonly used MTs are the mobile phones at both organisational and national levels. Other MTs such as tablets, laptops and iPad are limited at organisational level and very limited or possibly there are none at national level. What is very encouraging about mobile technology competencies is that the age bracket of 15 to 40 years is comprised of active users of MTs who, in turn, assist the older generation (P15). The young generation is very explorative and it finds and uses different available features of mobile devices. Training through the introduction of ICT curriculum in primary and secondary schools, and awareness of ICT, were identified as critical to improving competencies across the board. The research revealed that ICT government employees are not up-to-date with mobile applications development and they need exposure to mobile application

construction. The exposure to mobile software developmental techniques would enable them to manage the applications that would be running on m-government, when the Malawian government would decide to do so. It was also observed that, if people are competent enough, change of mindset could be enhanced and would result in reduced levels of resistance to new technologies. **ICT4** said: *"Need some kind of sensitisation on how this mobile government can assist in delivery of service to the public ... they still have the mentally that we are better off with paper and pen ... we would need proper knowledge to change that type of mentality".*

Culture: On culture, the research found that it would be important to take into account the cultural values at all levels in the course of considering m-government. These include cultural issues of organisation such as bureaucratic tendency, who is going to do what, segregation of responsibilities and internal politics. At national level, people highlighted that MTs have an adverse effect on cultural values in general. For example, it would be difficult to separate the messages meant for adults from the young generation, because it would be difficult to know the age group in the absence of proper individual SIM cards registration. Privacy and security of culture and confidential matters were/are also focal points that surround the cultural issues. It was noted that the young generation has lost respect for their elders when using MTs. Again what is evident is that even if there is this clash of interest between MTs and culture, people are increasingly acquiring the mobile phones and no tribal leaders can stop people from buying and using technologies.

As discussed in sub-section 2.9, the findings of South Africa on culture can easily be generalised to the Malawian cultural environment as far as ICT uptake is concerned. The research emphasised that people should be willing to be open to MTs, while preserving the core values of culture (P9). It was also highlighted that when embarking on any new undertaking, for instance, m-government, it is important to contextualise cultural elements. Culture cannot just be thrown away because it identifies the different characteristics of societies within a country.

Champion and commitment of officers: The existence of a champion among the policy makers leads to proper coordination of efforts and the desired outcomes (Cilingir & Kushchu, 2004)). The research articulated that, while looking at other factors of m-government readiness, championing is also critical, because there can be talk of m-government but, if there is no one to initiate it, the talk would be simply a dream (P8). It was therefore suggested that the Department of E-government in the Office of the President and Cabinet be the home of m-government, since m-government worldwide is considered a channel of e-government to offer government services to the stakeholders. It was pointed out that it is the champion who should be in a position to know the government business cases and to decide which tasks should be considered for m-government, in liaison with the concerned government ministries and departments.

One of the factors that emerged during the research is the commitment of government employees who would be entrusted with m-government establishment and operationalisation (P8), as emphasised by **ICT11** who said: "A*part from acquiring the devices, commitment from the officers is important. With advancement of technology most offices are using mobile devices, for example, those*

who go to the field will prefer getting laptops to desktop computers." This commitment also includes the mobile network providers, users and above all the leadership at organisational and national levels. In deciding, the m-government applications users should be the focal point when designing the applications. The design should include such things as simplicity and usability, to attract their willingness to use the application with no difficulties (Carroll, 2006).

Conception and benefits of m-government: The majority of the participants demonstrated some knowledge of m-government through commonsense in which the three words *"mobile", "government"* and *"technology"* were combined and articulated in their responses (P6). For instance one participant defined m-government as *"conducting government operations using mobile technologies"* (see 5.3.5.1). The participants considered the following as expected benefits of m-government: cost effectiveness, time management in terms of fast turn round time, reaching hard to reach areas, flexibility in transmitting and collecting information, it would make government open and more accountable, it would keep people connected with their government, efficiency in service delivery, it would be convenient both to people and government, it would add e-readiness, it would help boost the country's economy and the people would be advanced and understand the world. The findings of the m-government benefits, while assessing readiness in a least developed country, confirmed similar findings from the literature review (El-Kiki & Lawrence, 2006; Sheng & Trimi, 2008; Carroll, 2006).

M-government planning: It is important for government to develop a proper master plan on which to base its decisions, before embarking on a new technology project. It requires planning at all levels to ensure that vital needs are considered, what mechanisms will be used to produce the intended services and how they would be delivered. A plan should have important facts that would influence policymakers to make rightful decisions regarding m-government. The planning should focus on technologies, tasks, organisations, and end users, be it employees or consumers (Mobi Solutions, 2010).

Managing risks: In any new undertaking, it is important for management to familiarise itself with the likely risks (Basole, 2005). A few participants observed that, while considering the possibility of having m-government, government should prepare itself on the risk issues such as economic, political, financial, social and skills risks (P4), at both organisational and national levels. They concluded that risks could be managed as follows: initially identifying the likely risks to m-government, analysing the risks and finding ways of dealing with the risks. The development of a mitigation plan and its utilisation through to its implementation would reduce the risks. Finally it is essential that the government should have a clear definition of its business case, to help in reducing the incidences of obvious risks.

Additional services and guidance: The mobile network providers are ready to offer their skills, knowledge and experiences in deploying the requirements and to provide direction and advice on how to implement mobile devices and applications for government.

Knowledge of m-government and institutional/user capacity: It is necessary that ICT employees and users should acquire the knowledge to enable them to implement and use m-government effectively and skillfully. The knowledge could be obtained through training or learning from the existing mobile systems in the country.

Other emerging factors: The accessibility to mobile phones through a subsidy to leaders in the village could be implemented. Government is also in the process of connecting fibre cables from undersea cables and intends to have its own network backbone. Policy frameworks, legal and regulatory issues, full mobility of powerful mobile computing devices, an understanding of m-government at decision making level, stakeholders' levels and benefits are also important factors. Table 6.2 summarises the participants' responses for organisation dimension (theme) and its respective factors (sub-themes). Beneath the table are the meanings of the symbols that are in the table. Blank or unmarked spaces in the table mean that participants did not provide any responses.

Table 6.2: Participants responses of organisation dimension

Themes & Subthemes	Participants of study responses																							
Organisational	ADM1	ADM2	ADM3	ADM4	rCT1	rCT2	rCT3	rCT4	rCT5	rCT6	rCT7	rCT8	rCT9	rCT10	rCT11	rCT12	M1	N1	P1	P2	IS1	PM1	PM2	PM3	PM4
Competency																									
mobile phones	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
mobile application development	××	××	××	××	××	√	××	××	××	√	××	××	××	××	××	√	√	××	××	××	××	××	××	××	××
other mobile devices	±	±	±	±	±	±	±	±	±	±	±	±	±	±	±	±	±	±	±	±	±	±	±	±	±
organisational level	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
National level	√	√	√	±	√	√	√	√	±	√	√	√	√	√	√	√	√	√	√	±	±	±	±	±	±
User/customers																									
having mobile phones	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
user optimism	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
trust technology	??	??	??	??	??	??	??	??	??	??	??	??	??	??	??	??	??	??	??	??	??	??	??	??	??
Leadership	√	√	√	√**	√	√	√	√**	√**	√	√	√	√**	√**	√	√	√	√	√	√**	√**	√	√	√	√
Culture	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!
M-government																									
Facilitators	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Constraints	Ψ	Ψ	Ψ	Ψ	Ψ	Ψ	Ψ	Ψ	Ψ	Ψ	Ψ	Ψ	Ψ	Ψ	Ψ	Ψ	Ψ	Ψ	Ψ	Ψ	Ψ	Ψ	Ψ	Ψ	Ψ
Expected benefits	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Boundary Spanners																									
M-government knowledge	√	√	××	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	××	??	××	××	××	××
Champion										√			√			√	√								
Managing risks										√			√												

√ = faciting readiness √** = needs awareness & facilitating readiness ! = crucial issue but cannot stop acquisition mobile technology/government
?? = not sure ×× = do not know ±= limited Ψ= do not outweigh the benefits

M-government emerging factors can positively or negatively influence m-government readiness. However, regardless of the concerns of, for example, culture and illiteracy on m-government, the benefits outweigh the constraints.

6.1.3 Environment dimension

Regulatory and legal issues: The research has revealed that an appropriate regulatory framework is required to ensure that the m-government service provisions are based on a firm legal foundation (P10). A sound policy setting for telecommunication sectors is required, so that it regulates the market environment. The regulation makes the market competitive and ensures the provision of quality mobile technology services to citizens, at reasonable costs (Karan & Khoo,

2008; Basole, 2005; Crook & Kumar, 1998). During the investigation, it was evident that people in Malawi are not aware of any laws relating to mobile technology acquisition and utilisation. This was seen as a lack of awareness and sensitisation on the part of Malawi Communication Regulatory Authority to the public about any laws for governing MTs. The only law available is the Communication Act 1998 which consists of telecommunications, broadcasting, spectrum and postal services.

Political leadership: The research discovered that there is already leadership and political support to using ICTs in the country and in government in particular (P12). As far as m-government readiness is concerned, the leadership would be able to accept it with some sensitisation in some areas.

Economics: On economics, the research revealed that the availability of foreign exchange is crucial because Malawian mobile technology provision companies depend on importing goods from various countries. The other issue on economics is the affordability of individuals to acquire the mobile devices in the first place, followed by the sustainability of the mobile device in terms of airtime charges (P12), since Malawi is regarded as charging high mobile phone tariffs in the southern African region (ITU, 2011b).

Partnership: Public-private partnership is essential if a country wants to achieve meaningful mobile technology infrastructural development to influence m-government readiness and eventual deployment (Al-Khamayseh, Lawrence & Zmijewska, 2007; Karan & Khoo, 2008). The research revealed that currently there are few private organisations that make use of MTs to deliver services in partnership such as UNICEF and mobile providers. What is clear is that private organisations are implementing mobile systems for decision making processes, to provide information to government and for their other business activities (P11). There is a favourable partnership among the telecommunication operators in terms of sharing the towers throughout the country. The sharing of towers has resulted in huge cost saving. Government is now planning to have its own network through the country. The research has also shown that there is sometimes less trust among partners and this leads to a short life span of partnerships.

Mobile/wireless providers: Mobile network technology is appropriate in many areas, especially where physical installation of network media is not feasible for people to access information (Malladi & Agrawal, 2002). The participants of the research were in agreement that Malawi has well established mobile and wireless providers in Airtel, TNM and MTL (P13). All mobile operators have put infrastructure in place. They also emphasised the need for more providers to invest, in order to cover more areas with a strong network signal, because it was noted that, in remote areas, the network signals are sometimes weak. The other reason cited was to enhance competition amongst the players, which might result in lower cost for mobile technology services. What the research found was that even though Malawi is a least developed country, the MTs that are in place are comparable with those in developed countries. The operators have deployed a 3G/3.5G type of technology. The major difference could be in the degree of utilisation of MTs in Malawi and

developed countries. The mobile technology penetration is rapidly increasing at a higher rate than any other technology in the country, while mobile network coverage is above 85%. The research also discovered that the Malawian government is currently trying to connect to the undersea fibre cable through Mozambique and Tanzania respectively, in order to assist the private sector with high-speed bandwidth and to cover the country with mobile Internet.

Awareness and readiness: The survey has emphasised the issue of awareness as an essential aspect of m-government readiness (P6). Awareness is an overall, encompassing and on-going activity, which has to be rendered to all important stakeholders such as citizens and government employees, who are certainly critical of m-government facilitation (Karan & Khoo, 2008). This awareness is also important to leadership issues and politics within organisations and at national level to understand m-government (P15). This understanding will help people in decision-making positions to make wise decisions on new developments. Awareness is also essential on cultural issues, privacy and security and the roles of each player in the m-government. The obvious result of the awareness is to avoid frustrations between government implementers and citizens, because each group would have the relevant information beforehand. Training, which forms part of awareness, should be provided where necessary. When all participating groups are familiar with m-government's expected services and its opportunities, they will willingly utilise m-government and hence make themselves responsive to m-government operations.

Convenience: One of the findings of the research is that MTs are convenient because people interact continuously. Currently mobile users participate in various activities such as entering competitions, distributing photographs and disseminating different events of news articles and these findings support the study results of Vincent and Harris (2008). Mobile phones contribute to awareness and interest in social networks and are proving to be important devices in enabling information sharing between people of similarly inclination, in a short space of time and at any location (Hermanns, 2008, p. 79). Mobile phones create new ways for citizens to participate and to deliver services that address the need for "innovative ways of popular participation" (Nyalunga, 2006, p. 5).The general feeling is that most essential government business should now be processed on MTs which would serve the multitude of stakeholders with timely information (P4). What it means is that if m-government was taken on board, this would provide convenience to government administration, citizens and other users of government information or services (El-Kiki, 2007; Carroll, 2006).

Open source software: It is important to encourage the use of open source software in government for mobile applications (Banks et al., 2008). This would assist in reducing the procurement costs of the proprietary software. Government will also save on annual contract, licence and maintenance fees. Government would be required to draw a policy or legislation for the utilisation of the free software, to avoid some resistance from some top government officials.

Power supply: The Electricity Supply Corporation of Malawi (ESCOM) is the sole provider of power. The research has discovered that there are critical problems of power supply in the country

for the mobile industry. The power supply infrastructure covers few areas of the country. However, during the investigation it was learnt that the government is encouraging small scale entrepreneurs to install solar power to help recharge mobile phones in rural areas where power is not provided. Electricity power is available in all four cities, 28 districts, trading centres but not in villages. Of the Malawian population, 8% is served from the grid-connected electricity power. National grid serves mostly peri-urban and urban areas. It is estimated that around 25% of urban houses have an electricity supply and 1% of houses in rural areas have electricity. A population of 85% in rural areas of Malawi has no electricity (Reegle, 2012). Table 6.3 summarises the participants' responses of environment dimension (theme) and its respective factors (sub-themes). Blank or unmarked spaces in the table mean that participants did not provide any responses.

Table 6.3: Participants' responses of environment dimension

Themes & Subthemes	Participants of study responses																							
Environment	ADM1	ADM2	ADM3	ADM4	ICT1	ICT2	ICT3	ICT4	ICT5	ICT6	ICT7	ICT8	ICT9	ICT10	ICT11	ICT12	M1	N1	P1	P2	RS1	PM1	PM2	PM3	PM4
Regulatory and legal issues	??	??	??	??	??	??	√	??	??	√	√	??	??	??	??	√	√	??	√	??	??	××	××	××	××
Partners	√	√				√	√	√		√	√	√	√		√	√	√	√	√			××	××	××	××
Economic issues																									
User affordability	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!	!
handsets subsidy	√	√					√				√					√	√	√	√						
Forex for importation										±						±	±								
Political issues																									
ICT utilisation political will	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Marketing plan & awareness	√	√					√	√	√	√	√	√	√	√	√	√	√	√	√	√		√	√	√	
Mobile/wireless Providers																									
Existing providers	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Need more providers	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√	√
Provision of guidance									√	√						√									

√ = facilitating readiness √** = needs awareness & facilitating readiness ! = crucial issue but cannot stop acquisition mobile technology
?? = not sure ×× = do not know ± = limited ψ = do not outweigh the benefits

6.1.4 Tasks suitability

Information Systems through m-government aim at assisting government employees and other users to perform their tasks in an effective and efficient manner. Tasks are actions which are performed or undertaken by individuals to process inputs to produce outputs (Goodhue, 1995). Tasks have to fit into MTs for processing, for them to produce meaningful products or services, which are useful for all stakeholders in organisations and the environment. Tasks are required to be created into applications that would employ appropriate MTs to generate valuable government services (Poblet, 2011).

The research identified the following as suitable tasks for m-government in Malawi: education, health, agriculture, disaster administration, security warnings, passport renewals, tax returns, inventory, procurement, tourism, management issues and financial transactions, among others (P14). The broad categories of the tasks are: informational, transactional and operational processes (Norris & Moon, 2005). Sheng & Trimi (2008) describe these categories of transactions as follows: *Informational* processes include information publication, updates and alert communications

through e-mails or SMS, online broadcasting and dissemination to end-consumers automatically. *Transactional* processes allow customers to do transactions interactively, such as procurement, licence renewals, voter registration and online financial payments through mobile devices. *Operational* processes are internal to government operations, such as coordination across government organisations while working in the fields. For example, policemen can remotely access the database for information. The suggested tasks are quite comparable to most international widely used applications on m-government (Mengitsu et al., 2006). *Managerial processes* are the internal and external links of government organisations, which are sustained with ICTs' devices to improve agility and coordination, for example, use of MTs for monitoring internal and external financial transactions and administrative processes (Gebauer & Shaw, 2002).

6.1.5 Similarities of the research findings against NRI indicators

Table 6.4 gives the Network Readiness Index indicators in relation to their pillars that can influence m-government readiness in Malawi as measured by the World Economic Forum and as reflected in Global Information Technology (Dutta & Bilbao-Osorio, 2012). The indicators are mapped to the themes of the research findings in Table 6.4 to show the similarities of the two findings. Considering the scale used and the fact that Malawi is a least developed country, the network readiness index scored Malawi satisfactorily in most issues that are related to m-government readiness factors. The indicators include ICT laws, latest technologies, procuring of advanced technology by government, mobile network coverage and accessibility to digital content. The other indicators are improved quality of educational systems, social network usage, mobile phone subscriptions, absorption of technology at firm levels, extent of Internet usage and staff training. Further indicators are government prioritisation of ICT, importance of ICT to Malawian government vision and ICT impact on new organisational models, products and services. Finally, other assessed issues are ICT impact on access to basic services and ICT use in government efficiency. These findings are quite similar with the findings of this research.

Table 6.4: The Malawi network readiness index details

Network readiness index				Research findings
No	**Pillars**	**Indicators**	**Value**	**Themes and (section numbers)**
1	Political and regulatory environment	1. Laws relating ICT*	3.6	1. Political leadership, see 5.4.7 2. Regulatory and legal issues' see 5.4.1
2	Business and innovation environment	1. Availability of latest technologies* 2. Venture capital availability* 3. Government procurement of advanced technology*	4.3 1.8 3.6	1. Mobile tools 2. Mobile providers and organisational, see 5.2.6, 5.4.8 3. Organisational and mobile tools
3	Infrastructure and digital content	1. Mobile network coverage 2. Accessibility of digital content *	85% 4.2	1. Mobile/wireless network 2. demonstrability
4	Affordability	1. Mobile cellular tariffs PPP $/month 2. Internet and telephony competition 0-2 (best)	0.67 1.13	1. Technology emerging factors 2. Users, accessibility and mobile providers
5	Skills	1. Quality of educational system* 2. Quality of math & science education*	4.1 3.9	1. Users and Competency 2. users and Competency
6	Individual usage	1. Mobile phone subscriptions/100 pop 2. Individual using Internet 3. Use of virtual social networks*	20.4 2.3 4.5	1. Technology emerging factors, see 5.2.3 2. Accessibility, see 5.2.2 3. Users, accessibility
7	Business usage	1. Firm-level technology absorption* 2. Capacity for innovation* 3. Extent of business internet use* 4. Extent of staff training*	4.2 2.9 4.2 3.9	1. Mobile/wireless providers, mobile tools, see 5.4.8 2. Mobile tools, Competency, see 5.3.1 3. Accessibility 4. Competency
8	Government usage	1. Government prioritisation of ICT* 2. Importance of ICT to government vision* 3. Government online service index	4.2 3.8 0.02	1. Organisational 2. Organisational and environment 3. Accessibility
9	Economic impacts	1. Impact of ICT on new services and products* 2. Impact of ICT on new organisational models*	4.0 3.8	1. Economic issues 2. Organisational and economic issues
10	Social impacts	1. Impact of ICT on access to basic services* 2. Internet access in schools* 3. ICT use and government efficiency*	4.2 2.7 3.8	1. Users, accessibility 2. Users, accessibility 3. Technology and organisational

* = measured on a 1-7 (best) scale

Source: Dutta & Bilbao-Osorio, 2012

6.2 Obstacles and challenges

The research investigation found numerous aspects that are considered as challenges to m-government readiness. These challenges include the following:

- Lack of investment for rural network infrastructure, as a result of inadequate budgets and foreign exchange for procurement of networking tools
- Lack of suitable techniques for handling privacy and security to enhance trust and confidence are questionable

- Lack of procedures to enforce identification of the source of information which would in turn reduce or eliminate the issues of anonymity when accessing the services privately or publicly
- Absence of e-government infrastructure in the country and institutional configurations
- Organisational bureaucratic tendencies, which result in an unwillingness of leadership to modify the processes of business undertakings to accommodate MTs
- Lack of user focused business approaches, poor quality of data and users in most cases are not consulted
- Lack of private sector and government partnership in dealing with issues of common interest
- Lack of manageable government business case or model to reduce project risks
- Mobile technology appropriate legislation is also lacking to effectively regulate its utilisation.

All the challenges in the research are quite similar to challenges found in other studies on m-government in developed and developing countries (El-Kiki, 2007; Kumar & Sinha, 2007; Trimi & Sheng, 2008).

6.3 Summary

The chapter has discussed the following factors in their respective readiness dimensions: the technology dimension consisted of the following factors – reliability and interoperability for ease of compatibility and communication; accessibility and availability discussed on issues of access and affordability to mobile devices; mobile network technologies which are in use are 3G and 3.5G technologies; need to continue mobile technology investment in the country to improve network signals across the country; privacy and security need to be a consideration; demonstrable pilot mobile systems and benefits of m-government were presented.

The organisation dimension consisted of the following readiness factors: competency of the people in organisations and country; user readiness which covered the optimism of the people in the usage of mobile tools; culture discussed the people's perception on mobile devices on issues of identity, confidentiality and acquisition rate of mobile devices; government championship of m-government and the commitment of government employees to manage the m-government; knowledge of the people about m-government, benefits of m-government and management of risks such as economic, financial and political risks.

The environment dimension consisted of the following readiness factors: regulatory laws that are relevant to regulate the mobile technology industry in Malawi; economic and political issues that focused on the affordability of mobile providers to procure equipment from other countries; people's affordability to buy the mobile devices; that the political environment is supportive to ICT

utilisation in government and the country in general; partnership between private sector and government is regarded as one of the important factors to influence m-government readiness; the mobile providers are important to the development of mobile network across the country; that more mobile providers should be encouraged to invest in the country to improve network connectivity and its signals; people have convenience with mobile technology utilisation because they are continuously interacting with stakeholders; awareness for m-government was emphasised so that all stakeholders should have the knowledge of what m-government is all about.

The tasks dimension consisted of the following readiness factors: informational, transactional, operational and managerial tasks with their respective applications. There was strong agreement between this research's findings and those of NRI index indicators. There still remain a number of obstacles and challenges to m-government, which include lack of investment for rural mobile network infrastructure, security and privacy of people's data, lack of private and government partnership and lack of appropriate regulation and legislation of MTs.

In summarising the discussion of the findings in response to the research questions and objectives, Table 6.5 presents the objectives and their available assessed factors and services, since the purpose of the objectives is to address the research questions and the broad objective. This research answered the main research question, "To what extent are governments of least developed countries ready to embark on mobile government?" as follows: LDCs are generally ready in terms of mobile technologies' availability, mobile network coverage and mobile phones competencies at both organisational and national levels. There is need to train ICT officials in government either internally or externally to acquire mobile application development skills. The applications (tasks) to run on m-government were identified. Challenges were identified which are comparable to challenges in developed countries and can be addressed alongside the implementation of m-government. Finally, m-government awareness to stakeholders is critical and should be prioritised.

Table 6.5: Findings to the research objectives

Research objectives	Available assessed factors and services
To assess the enabling factors for m-government readiness	• Technology availability, accessibility, reliability and interoperability • Mobile services providers, mobile network coverage in the country and encouraging more investors • Mobile phone subscription penetration is increasing steadily • Organisational leadership willingness to use mobile technologies • People and organisational readiness • Legal instrument is currently not an obstacle to use mobile technologies • Championship and partnership are critical to m-government • Commitment of government employees • Training of government employees on mobile application development
To assess the factors that may encourage user readiness for m-government	• Cheap mobile devices and airtime • Presence of network in users' locations • Competence at all levels of mobile technologies • Awareness of the importance of m-government • People's optimistic for mobile technology utilisation • Cultural context realignment toward mobile technology processes • Proactive approach to security and privacy concerns • Affordability of users
To determine the mobile services that m-government may offer	• Proposed m-government services are m-police, m-health, m-payment, m-administration, m-education, m-agriculture, m-democracy, m-security, m-disaster, m-registration, m-voting, m-passport and these are categorised into informational, transactional, operational and managerial functions
To propose factors that would stimulate mobile government readiness awareness.	• Awareness of political and organisational leadership • Government need to provide mobile services • The presence of pilot mobile systems and mobile banking in the country would encourage government to decide going mobile • Learning from other governments how they are using mobile technologies in day to day government business

In the next chapter, the conclusion, recommendation, limitations and future research presents a final discussion of the research with conclusions, recommendation and limitations and suggests future studies.

Chapter 7 Conclusion and recommendations

This chapter concludes with how research questions and objectives have been met. Recommendations for policy direction and practical deployment are also discussed. Furthermore, framework revisited, limitations and the significance of the research are presented. Finally, it discusses future research areas of interest.

7.1 Introduction to conclusions

The research question is: "To what extent is a government of a least developed country ready to realise m-government?" The research broad objective is to assess the extent of the Malawian government preparedness to realise m-government. To respond to the question and to address the objective, the following activities were undertaken: literature review, creating a theoretical model, developing propositions, choosing participants and conducting interviews, transcribing the interviews and using qualitative thematic analysis. The main findings are as discussed in Chapter 6 and summarised in sub-section 6.3 and in Table 6.5.

An examination of m-government shows that mobile technology based solutions is widely adopted all over the world. It is expected that on-going developments of MTs and growing mobile markets will intensify this trend. The various activities in the field of m-government substantiate the importance of m-government.

M-government encompasses a wide area of applications. The research has shown that m-government applications in LDCs of Africa are used in healthcare, agriculture, financial services, education, and public management, banking and learning solutions. It has also been shown that m-government has the capacity to significantly influence societies and strengthen m-democracy. In this chapter, core conclusions of this research are presented.

7.1.1. Mobile government reduces digital disparities

M-government is an international phenomenon which aims at assisting governments to reach the marginalised societies as well as the privileged societies. There are substantial differences between m-government readiness in developed countries and in LDCs. In least developed African countries which have difficulties in deploying wire-networked infrastructures, MTs are currently the only prospective modes for fast communication. Through MTs, the governments in LDCs could interact efficiently with entire citizenship and other stakeholders.

The networks available are 3G/3.5G, thus services are not limited to SMS and voice transmissions, but can do other computational transactions. The few mobile systems that are being piloted in Malawi have demonstrated that they are suitable tools to enable the people to communicate and transmit information in LDCs and to minimise the digital disparities.

7.1.2. Mobile government linking communities

Mobile networks are the only substitutes for rural areas' communication in LDCs with problems encountered in developing wire-networked infrastructures. The participants noted that the demand for government services which can be accessed at any time and everywhere is rising. Mobile phones are always with the people and always switched on. Hence, these devices are suitable to act as end-user access points to access the services, regardless of the users' current location and context. In addition to linking communities, m-government may create online communities for people with common ideas, goals, culture and expertise.

7.1.3. SMS and MMS technologies

The assessment of m-government readiness has shown that current applications are constructed around SMS and MMS technologies. SMS and MMS technologies are ideal and practical for service delivery in LDCs. Mobile devices such as mobile phones and combining SMS and MMS with 3G/3.5G networks which are now present, provide full mobile Internet capability using HPPS and Secure Socket Layer (SSL) for security. SSL is vulnerable to intruders when connected to a wireless LAN. Many security-sensitive procedures are dependent on SMS technology. In banking solutions, for instance in Malawi, user authentication with banking applications is essentially dependent on SMS communication via mobile phones.

The perceived factors of *ease of use*, *efficiency in time and location*, *added value for money, convenience, and availability of mobile devices and infrastructure* are significant in compelling governments to use SMS-centred m-government services (Susanto, & Goodwin, 2010). The perceived factors of: *usefulness*, *responsiveness*, *relevance, reliability and quality of information*, *trust in SMS technology based systems*, *risk of user privacy*, *reliability of mobile/wireless network, trust in government and quality of public services*, *risk to money*, *compatibility*, and *self-efficacy on using SMS* discourage stakeholders to adopt the SMS-centred m-government services (Susanto & Goodwin, 2010).

7.1.4. Stakeholder readiness key factor

Users' readiness is an important factor for influencing m-government readiness. Reliance on approaches revolving around user centred requirements is crucial to recommend m-government services that specifically fulfil user's requirements. Napoleon & Bhuiyan, 2010 observed that users are not involved in most research approaches used in m-government research and they recommend that researchers should be using approaches that involve users to serve user content and enhance the service worthiness. The present excitement of mobile phones and other MTs is an enormous opportunity to register specific citizens (users) who would influence the m-government readiness. Those currently providing m-government services need to provide awareness for medium to long term plans of m-government services, to achieve stakeholder's needs and, through that, readiness could be accomplished.

7.1.5. Location based context

The research showed that the MTs, especially mobile phones, assist many people to access certain services other than government services, from any location. This will give mobile service providers the chance to provide location-based services that meet people's explicit requirements. The people's context solutions and locality centred systems are significant, particularly in hard to reach areas (Royer, Deuker, & Rannenberg, 2009).

Awareness of m-government developments is a subject of importance, as it allows for the growth of utilisation and usefulness of technologies. The research noted that, bearing in mind the element that user explicit context data has to be categorised as private and sensitive data, context responsiveness would pose many critical challenges which would have to be dealt with accordingly.

7.1.6. Essential need for security and privacy

M-government applications often include the transmission and processing of secure, private, sensitive data. Citizens want their data to remain undisclosed in order to protect their privacy. Unfortunately, experiences with certain m-government projects have shown that people often associate mobile phones with fun, not with critical tasks such as government transactions. Therefore, people sometimes refuse to use their mobile phones for m-government services, because they have no trust in the system's security and reliability. The non-regulated SIM cards and the spy machine are examples of the perceived threat to people's security and privacy.

It is thus not surprising that security and privacy are frequently mentioned challenges of m-government systems. It has already been noted that user readiness is crucial for the success of m-government. Secure and reliable m-government services that enhance the users' trust in MTs could in turn be important factors for user readiness. With assurances that m-government offers secure services and preserves users' privacy, m-government readiness would be successful.

7.1.7 The importance of embarking on mobile government

There have been tremendous developments in the availability of mobile phone technology infrastructure in the country. People are comfortable in accessing and sharing data/information through the technology. The popular technologies are voice, SMS, mobile applications, MMS and mobile web. It is essential for government to embark on m-government for it to move in the direction of open government for its citizens. The opening up of government would lead to increased levels of interaction between government and citizens, thus improving trust. MTs facilitate a ubiquitous environment and provision of immediate access to services. In addition, if professionally planned, the technologies would assist government to implement applications which are citizen location based. The citizens' location-based implementation would make life easier and deliver required information on time. MTs would facilitate connection and engagement amongst the stakeholders.

Citizens would be expecting the following outcomes from the use of the m-government when in place: enhanced social and economic growth, balanced choices, flexibility and fairness for the common goals, facilitation of government accountability and users' engagement to participate in contributing to the ideas of good governance.

7.1.8 Theoretical research model revisited

Chapter 5's thematic analysis identified other key findings (themes/factors) from the research data which were not conceptualised in the proposed research theoretical model. These identified factors necessitated the need to revisit the theoretical model. The following were the noted ten key factors in their respective dimensions that were related to m-government readiness:

(a) Technology readiness dimension has these additional factors: demonstrability, mobile technology benefits and other factors;

(b) Organisation readiness dimension has these additional factors: boundary spanners, emerging factors, m-government benefits, and m-government constraints;

(c) Environment readiness dimension has these additional factors: power outage, costs and open source software.

These factors have been discussed in Chapters 5 and 6. These important aspects are incorporated into the revisited theoretical model (see Figure 7.1).

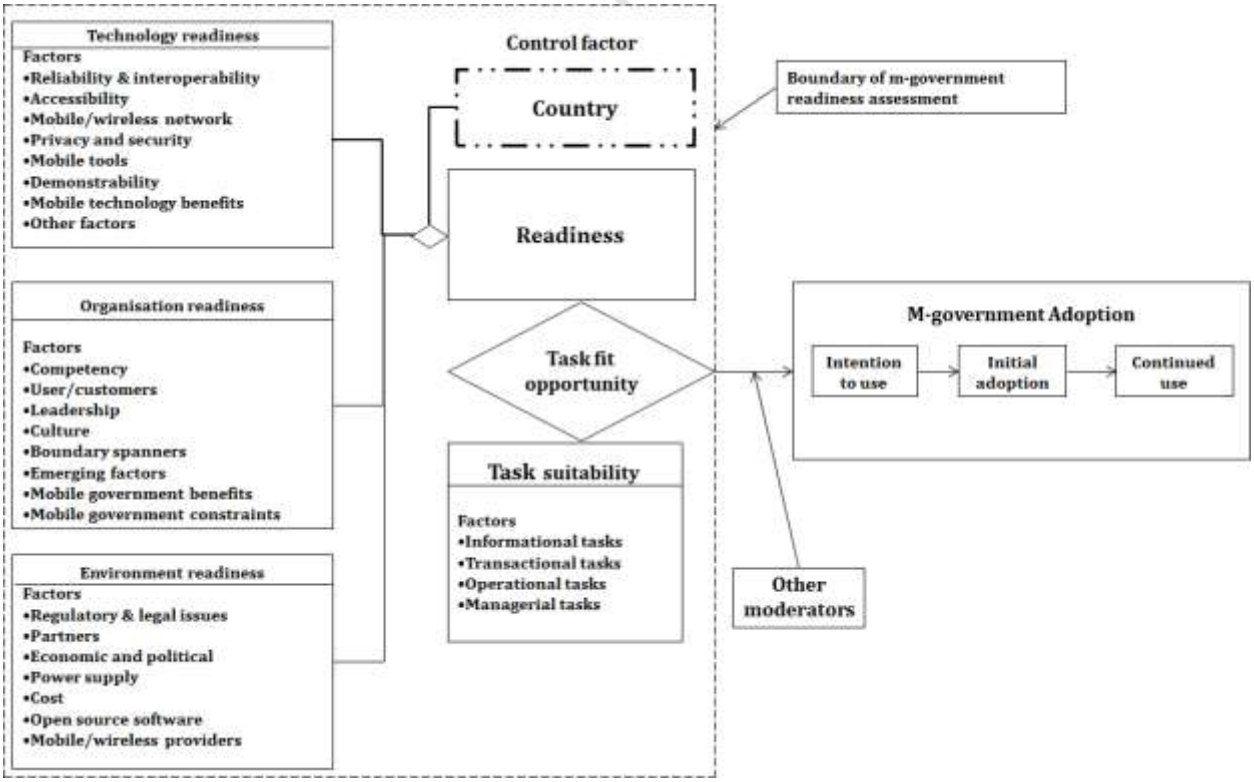


Figure 7.1: Proposed research theoretical model revisited

7.2 Limitations

The research has some limitations which should be reflected when considering this research and contributions. Some of the limitations were well known at the start of the research. Research methodology was thoroughly designed to reduce the impacts of the limitations. The limitations are discussed in the next paragraphs.

The researcher did not get a suitable existing theory for research; as such, he used a proposed theoretical model which was formed from previous models' constructs. Thematic analysis tools have no well established procedures, but are guidelines from different researchers. Some of the proposed participants declined to take part in the research interviews. M-government was a new terminology at the time of data collection which required introspection for the participants to familiarise themselves with the main aim of the survey. Distance between the participants and researcher for constant physical verification was a limitation, because the researcher returned to a South African university.

The planned time of data collection coincided with holiday periods, since it was between December 2011 and February 2012 in line with research activities, see Appendix F. Another critical element was lack of Qualitative Data Analysis (QDA) software and appropriate software competency of the researcher for the analysis of data. Organisational cultures, privacy and trust issues, cost of travelling, the demography and weather of the country had some impacts that led to prolonged data collection activities.

7.3 Recommendations

The governments in LDCs have already invested in MTs for improving information communication to respond to the pressing needs of the stakeholders. Government should be able to work with whatever MTs it currently has, through the process of re-organising the existing technologies and systems to operate on mobile devices. The mobile devices could offer transactional and managerial platforms to offer stakeholders real-time access to government business and information stores. The usage of mobile devices would enable governments in LDCs to make reasonable savings. The elimination of additional procurement of fixed network infrastructural tools will yield savings and leads to fast deployment of m-government.

In terms of mobile application development in government, ICT officers are not exposed, but the private sector is exposed in such institutions as Boabab Health and UNICEF – these can serve as the learning points for ICT officers in government. So, as a country there are ICT human skills for developing mobile applications from which to start.

Mobile providers are ready to provide direction, to work on content, or work with any content providers, to develop contents which are suitable for mobile devices for ease of connectivity of the content to mobile networks. The Malawian government could use the approximately three to four

million mobile subscribers who can be engaged to pilot the suitability of m-government in any field of interest.

Leadership and politics have the will to utilise ICTs in the running of the government operations to provide services and improve socio-economic growth. The Department for E-government Management should champion m-government implementation in various fields of importance.

Several of the challenges highlighted from the research participants' responses are worldwide m-government challenges (El-Kiki & Lawrence, 2009; Sheng & Trimi, 2008; Carroll, 2006). But in many countries m-government processes are operational and the concerns are being addressed along the way. Researchers need to recommend practical or real-world solutions after identifying barriers of m-government, (Napoleon & Bhuiyan, 2010). What is critical is the selection on the part of government, businesses and individual citizens or group of citizens as to what content they want to transmit. For Malawi, some challenges could also be sorted out while m-government is operational, because m-government is the imperative option to assist e-government development in Malawi.

Training key ICT employees is one challenge to address. Government ICT officers could learn mobile application development and deployment from the pilot mobile systems in the country and also learn from other countries. Government can develop a deliberate policy plan to train its ICT officers on mobile application development and privacy and security issues. The research has discovered that Malawi is generally ready for m-government in terms of mobile technology establishments, people optimism in using mobile devices and government support to use ICTs.

There is mobile readiness and government can start pilot projects to rural areas to get maximum benefits of MTs. This should be a user's phased approach and not full development approach. The public-private partnership should be enhanced, since huge funding is currently available from development partners. Government should develop plans to include a special national ICT development amount in its national budget for a given period of about ten years, to fast-track the development of ICTs.

The world-wide comparable mobile tools penetration among individuals, merging of Internet and mobile/wireless networks has triggered the provision of mobile services platform (such as location-based services, personalisation and intellectual services). M-government applications would increase the effectiveness of services for citizens. But conditions of many LDCs are not suitable for optimisation and delivery of m-government applications. If governments in LDCs would decide to embark on m-government they should use the m-government maturity model with 6 stages (see Figure 7.2) with modifications depending on the country's context and the main technologies which are used for each stages (Alijerban & Saghafi , 2010).

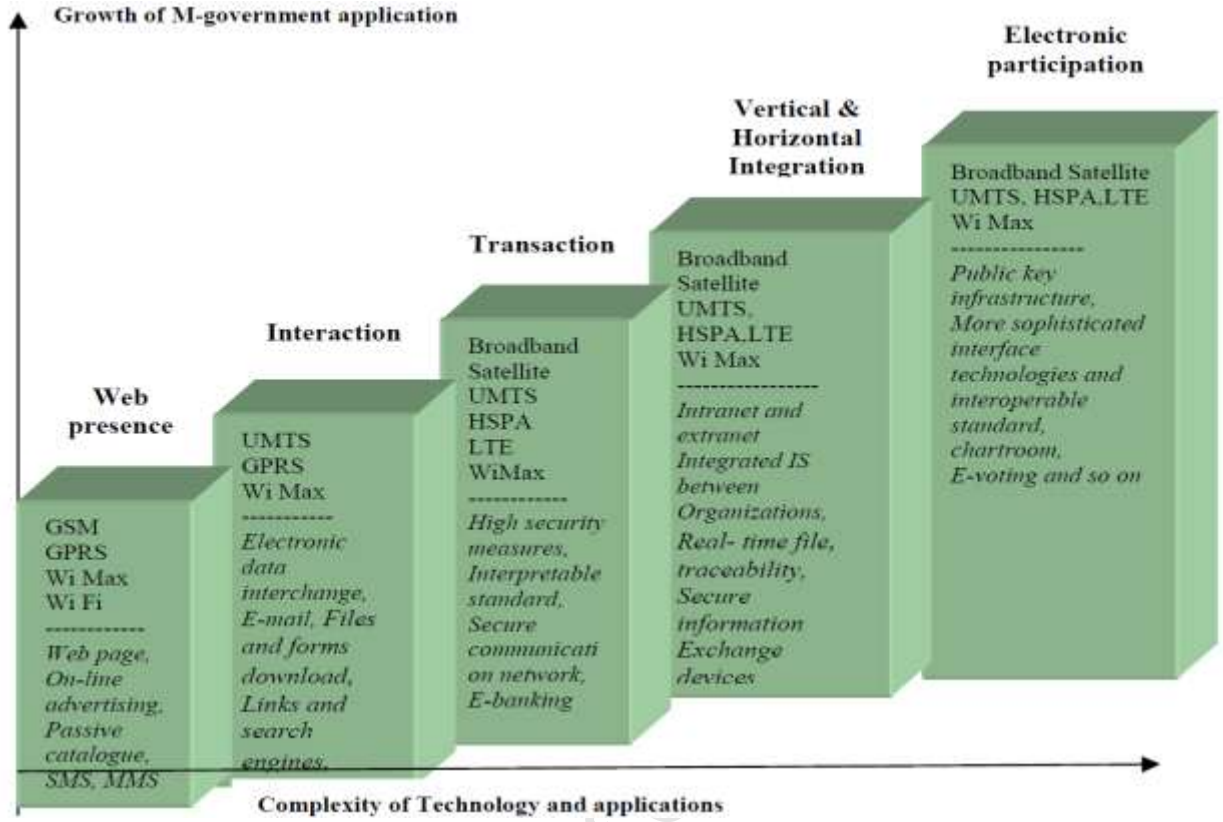


Figure 2: M-Government maturity model and useful technologies in each stage (Alijerban & Saghafi , 2010)

7.4 Significance and contribution of research

The research on m-government readiness in LDCs has made the following contributions:

- The research has shown that MTs penetration, especially for mobile phones, is high in LDCs. There is a need to improve the literacy levels and enabling legal framework, while culture has a minimal impact on mobile technology acquisition.
- To research communities there is a theoretical framework which can be applied to LDCs. Other various researches can use the same model, compare it or expand it. The outcomes will offer the Information Systems (IS) communities a holistic approach to assessing m-government readiness in LDCs. The results would also contribute to the body of knowledge in IS.
- For the Malawian government, now it has an overview of mobile readiness and an overview of tasks, it can work on these areas and can forward recommendations. The research outcomes would help to guide policymakers and implementers to make informed or right decisions when considering m-government development. It will also provide both theoretical and practical understanding of m-readiness aspects, to attain the goals of establishing m-government.

- Other governments in LDCs can repeat the research to their satisfaction or to verify the findings of this research. As the research was conducted in one of the African countries, the outcomes will be the foundation for comparison with similar IS researches that have or will be conducted in similar environmental settings. The academic and practitioners' world will appreciate the opportunities and challenges of m-readiness for m-government in such a unique environmental context of Africa.
- M-government in least developed African countries could be deployed without having fully developed e-government infrastructure (leapfrogging). MTs' presence in LDCs can influence the introduction of m-government and improve the interaction between government and stakeholders. Mobile phones have improved the lives of individuals in terms of communications and access to other services.

7.5 Future areas of research

Most participants raised the issues of security and privacy; some mentioned issues of anonymity and that they would want to know the context (location and other details) of the owner of the mobile devices in use at a particular moment. These are enormous undertakings which require specific individual research in the near future, with the focus on the least developed African countries' context:

1. With high demand for trustworthy and secure m-government services, there is an urgent need for tools that ensure that mobile applications are secure and reliable. The security and privacy defensive development technique for m-government services is a research topic for the future.
2. Mobile phones are personalised devices, for example, the contemporary smart phones are fitted with different sensors that can determine the user's exact situation. The presence of innovative mobile devices with advanced detection capabilities and context-responsive identification methods will be another research field for the future. This will help ease the fear of anonymity. PM2 said: "*Technology in Malawi is advancing ... in other countries a person is able to see the person he is talking with ... we need such type of advanced technology in order not to be abused or castigated by unknown people.*"
3. The demonstrable pilot mobile systems in this research are built on architectural server-client basis. Transmission of information is between clients with mobile phones and a central server, through mobile network providers. There are no known client-to-client communications that have been reported in least developed African countries. This may be a future research area of interest for m-government solutions.

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Appendices

Appendix A1 Cover letter for participation in interview survey

Department of Information Systems

Leslie Commerce Building

Engineering Mall, Upper Campus

OR Private Bag, Rondebosch, 7701,

Cape Town

Tel: 021 650-2261

REQUEST TO PARTICIPATE IN A RESEARCH SURVEY

Dear Participant,

I am an Information Systems Masters student at the University of Cape Town. I am conducting a research on mobile readiness for mobile government in Malawi. Mobile government is one part of E-government service delivery by governments to citizens. The survey will be important to Malawian policy makers and researchers and will provide benefits such as access to information by citizens, effective and efficient administration and citizens' participation in government affairs. The study will collect information through face to face interviews.

This is to request your participation in the interview survey. The interview will be taking up to 50 minutes to finish. The data gathered will be kept confidential. Your identity will remain unidentified and no recognisable details such as name, address and phone will be demanded. The gathered data will be processed with strict secrecy.

Your involvement in the survey is voluntary. The set of questions have been approved by Commerce Faculty Ethics in Research Committee. I will gladly send you a copy the final report. I thank you in advance for your expected participation.

Kind Regards,

John Edward Mtingwi

University of Cape Town

For inquiries, please contact:

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Appendix A2 M-Readiness semi-structured interviews

Interview No:
Institution No:
Date:

1. Introduction

- Introduction and greetings
- The interview of purpose
- The participant will be briefed about the ethical procedures regarding the information from the interview.
- The participant will be assured of confidentiality and anonymity fears.

2. Rights of the Participants

The participant is provided with the following information

- The participant may respond to any question
- The participant may decline to be recorded
- The participant may offer any information at a later time.
- The participant may ask for a copy of the research results
- The participant will be sent the summaries or recordings of the interview for validation

3. Participant Basic Information

Gender.....

Number of years of work experience.....

Occupation.....

4. Consent

CONSENT FORM

I/we ……certify that I/we am/are in sound state of mind to participate in the study of mobile readiness for mobile government in Malawi. The researcher may request some documentaries for further study from you.

By signing this form you confirm your participation in the research on "Mobile Government Readiness Assessment in Africa: Case of Malawi" either through face to face interviews or questionnaires in exceptional situations.

Signature..... Date: .....

5 General Interview Questions Outline

A. Mobile government questions

1. If you have heard about M-government, what do you understand by M-government?
2. What factors can influence readiness of M-government?
3. In your opinion, what do think are the advantages of M-government?
4. What do you consider can be the disadvantages of M-government?
5. What cultural issues will have direct impact on M-government readiness among organisations and individuals?
6. What are the leadership views of M-government in Malawi?
7. What tasks do you currently have that can be suitable for M-government?

B. Technology questions

8. What is your understanding of mobile technology?
9. What are the knowledge/competency levels for mobile technology?
10. What services do you use on mobile technology?
11. What features influence you to use mobile technology?
12. What are your views of mobile technology in Malawi?
13. How is mobile technology environment regulated?
14. In your opinion, what are the advantages of mobile technology?
15. In your view, what are the disadvantages of mobile technology?
16. Do have anything else you would like to say?

C. Service Providers Questions Framework

1. What mobile technologies are on the market?
2. What services do you offer on mobile technologies?
3. What services can you provide for M-government if it established?
4. How wide is your mobile/wireless coverage in the country?
5. How do you rate the subscriptions and customers retention?
6. What are the factors that affect your business?
7. In your view what government applications can use mobile technology?
8. How is the industry regulated?
9. What are your working relationships with other players in the industry?
10. How are you handling privacy and security issues of mobile technology?

D. Questions for agencies with applications on mobile devices

1. What applications are being run on mobile technology?
2. What factors influence the use of the mobile technology?
3. What knowledge levels are needed to use mobile technology and applications?
4. What are the advantages and disadvantages of using mobile technology?
5. What cooperation are you getting from government?

6. Conclusion

A brief review of the interview is discussed

7. Appreciation

Appreciate and thank the participant

Appendix B Summary of other readiness studies

Area	Title	Authors	Publication	Theory/Framework	Research Methodology	Data Analysis	Key points/ critique / Comments
Agricultural Extension	Assessment of Readiness and Barriers towards ICT Programme Implementation: perceptions of Agricultural Extension Officers in Indonesia.	Sutrisno Hadi Purnomoi & Yi-Hsuan Lee	International Journal of Education and Development using Information and Communication Technology (IJEDICT), 2010, Vol. 6, Issue 3, pp. 19-36.	Based on the assessment model of e-LRS from Aydin and Tasci (2005), Variables (Farmer readiness, Personal readiness, Infrastructure Readiness, Management readiness)	Quantitative research, survey, questionnaires	Descriptive statistics, exploratory and confirmatory factor analysis, one-way analysis of variance (ANOVA) and post hoc test Scheffe's Multiple	Study only one region, cannot be generalised the results, readiness was assessed at the beginning stage
Public Organisations	Assessing e-Readiness in the Arab Countries: Perceptions Towards ICT Environment in Public Organisations in the State of Kuwait	Abdel Nasser H. Zaied, Faraj A. Khairalla and Wael Al-Rashed	Electronic Journal of E-government Volume 5Issue 1 2007 (77 - 86)	Harvard CID (2002) and APEC (2000) models. Variables (human skills, infrastructure and connectivity)	Interviews, Questionnaire, five-point Likert-type scale	Descriptive or explanatory	
Non-Profit Organisations	E-government and the E-Readiness of Non-Profit Organisations in the Western Cape, South Africa.	Steve Vosloo and Jean-Paul Van Belle	2nd Annual Conference of the Community Informatics Research Network (CIRN). 24-26 August, 2005, Cape Peninsula University of Technology (CPUT), South Africa	Bridges.org real access to ICT model	Quantitative, cross-sectional study, descriptive and interpretive. questionnaire of quantitative and qualitative questions	Demographic Analysis	
E- government	E-government readiness: Does national culture matter?	Omar E.M. Khalil	Government Information Quarterly (2011)	National Culture Framework of House et al., (2004). (Power distance, uncertainty avoidance, future orientation, institutional collectivism, in-group	Survey of 7-point bipolar scale for cultural dimension and cultural practices.	Mean rating, and standard deviation	

				collectivism, humane orientation, performance orientation, gender differentiation, and assertiveness.)			
E-government	E-government Readiness Assessment for Government Organisations in Developing Countries.	Ibrahim A. Alghamdi, Robert Goodwin and Giselle Rampersad	Computer and Information Science Vol. 4, No. 3; May 2011	E-Readiness Framework for Assessing Government Organisations(Alghamdi et al., 2011)	Qualitative Literature Reviews		Organisational ICT readiness for E-government is embryonic. There is insufficient research linking e-readiness and E-government implementation in a nation (Altman, 2002).
E-government	E-government Readiness Assessment Model Jordan Government	Ahmed Al-Omari and Hussein Al-Omari	Journal of Computer Science 2 (11): 841-845, 2006	General framework model for E-government Readiness Assessment. Organisational Readiness, Governance and leadership Readiness, Customer Readiness, Competency Readiness, Technology Readiness and Legal Readiness (Gartner Group, 2002).	Qualitative, Literature reviews	Descriptive	
E-readiness In developing Countries	E-Readiness For Developing Countries: Moving The Focus From The Environment To The Users	Danish Dada	The Electronic Journal on Information Systems in Developing Countries	Modified Version of Molla and Licker's Model (2005)	Qualitative, case study, Secondary data, group participation		An e-readiness assessment may not be of much use after a study in nine Africa countries. No Framework provided on how to go ahead and deal with the situation.
SMEs in the ICT	E-readiness of SMEs in the ICT sector in Botswana	Stephen M. Mutula and	The Electronic Library Vol. 24 No. 3,		Qualitative approach and used focus group	Thematic tables.	

sector	with respect to information access	Pieter van Brakel	2006 pp. 402-417		discussions and in-depth interviews to collect data		
E-Readiness Tools	An Evaluation of E-Readiness Assessment Tools With Respect To Information Access: Towards An Integrated information rich tool	S.M. Mutula, P. van Brakel	International Journal of Information Management 26 (2006) 212–223	An Integrated Information Rich E-Readiness Assessment Tool. (information readiness; enterprise readiness, human resources readiness, ICT (infrastructure) readiness and external environment readiness)	Qualitative research, Secondary data		
Mobile Technology Usage	M-Governance: From Vision to Reality	Rain Rannu	Baltic IT & T Review	M-Watch Mobile Readiness Index (MRI) (Jazic, and Lundevall, 2003).			
New Technologies	A Multiple-Item Scale to Measure Readiness to Embrace New Technologies	A. Parasuraman	Journal of Service Research 2000, 2	Technology Readiness Index (Tri) (four dimensions: optimism and innovativeness are drivers of technology readiness, whereas discomfort and insecurity are inhibitors.)	Extant literature and extensive qualitative research, computer assisted telephone interviewing	Assessment of Factor Structure and Reliability Assessment of Validity	

Appendix C Permission letter from Department E-government in OPC

Telephone: 265 1 789411
Fax No: 265 1 788 56
Communication should be addressed to:

In reply please quote No.....
Office of the President
and Cabinet
Private Bag 301
Lilongwe 3
Malawi

9th January, 2012

TO WHOM IT MAY CONCERN

Mr. J.E. Mtingwi is an employee in the Office of the President and Cabinet under the Department of Information Systems and management of Information Systems (DISTMS) and is currently studying Masters in Information Systems at university of Cape Town in South Africa. He will be conducting a research on **Mobile Government (M-Government) Readiness Assessment in Africa: The Case of Malawi**.

The Office E-government Management has granted permission to conduct this research for Malawi. Therefore, I kindly request your office to assist him with an ICT and non ICT officers to participate in the research area.

Attached is a list of the sampled participants.

I will be looking forward to your favourable assistance on the request.

Yours faithfully,

Mrs. H. O. Ndilowe
PRINCIPAL SECRETARY FOR E-GOVERNMENT

Appendix D Participants demographic data

Politicians

Interview Number	Interviewee Code	Gender	Position	Years of Services	Age	Qualification
Interview001	P1	Female	Minister	> 12	>46	Bachelor's Degree
Interview020	P2	Male	Member of Parliament	> 3	>47	Bachelor's Degree

ICT Government and Private Participants

Interview Number	Interviewee Code	Gender	Position	Years of Services	Age	Qualification
Interview002	ICT1	Male	Chief Systems Analyst	>30	>50	Diploma
Interview003	ICT2	Male	ICT Officer	>9	>35	Bachelor's Degree
Interview004	ICT3	Male	Network Manager	>20	>40	Masters
Interview006	ICT4	Male	Chief Systems Analyst	>20	>45	Bachelor's Degree
Interview007	ICT5	Male	Chief Systems Analyst	>10	>35	Bachelor's Degree
Interview008	ICT6	Male	Director of ICT	>8	>35	Masters
Interview009	ICT7	Female	ICT Officer	>5	>30	Bachelor's Degree
Interview011	ICT8	Female	Principal Systems Analyst (PhD Student)	>10	>30	Master's Degree
Interview013	ICT9	Female	Principal Secretary	>25	>48	Master's Degree
Interview016	ICT10	Male	ICT Officer	>10	>45	Bachelor's Degree
Interview018	ICT11	Female	Systems Analyst	>20	>40	Bachelor's Degree
Interview022	ICT12	Male	ICT Officer	>15	>40	Bachelor's Degree

Non-ICT Government Officers, Marketers, Religious, Nurses, Ordinary Users

Interview Number	Interviewee Code	Gender	Position	Years of Services	Age	Qualification
Interview005	ADM1	Male	Deputy Director	>20	>45	Bachelor's Degree
Interview010	ADM2	Female	Principal Admin Officer	>8	>30	Master's Degree
Interview012	ADM3	Female	Deputy Director	>10	>35	Master's Degree
Interview014	ADM4	Female	Deputy Director	>15	>40	Master's Degree
Interview015	RS1	Female	Executive Secretary	>12	>35	Bachelor's Degree
Interview017	M1	Male	Marketing manager	>5	>33	Master's Degree
Interview019	N1	Male	Nurse	>10	>30	Diploma
Interview021	PM1, PM2, PM3, PM4	2Male/2female	Various	NA	>17	Various

ADM (1-4) = Administrators (non-ICT) **RS1**= Religious Sister **M1**=Marketing **N1**=Nurse

PM (1-4) = Focus group for ordinary users

Appendix E User acceptance models

1 Motivational Model (MM)

Motivation Models are entrenched in psychological field to know persons' approval of information technologies (Vallerand, 2000). The models differentiate between extrinsic and intrinsic motivations. Extrinsic motivation is concerned with the performances of technology to attain required results (Venkatesh, 2000). Perceived effectiveness is an instance of extrinsic source of motivation and perceived pleasure is an instance of intrinsic source of motivational features (Davis, Bagozzi & Warshaw, 1992). If intrinsic and extrinsic sources of motivation work together, the usage intention and actual usage are influenced (Venkatesh & Spencer, 1999). MM with its intrinsic and extrinsic motivations is demonstrated in Figure A.1.

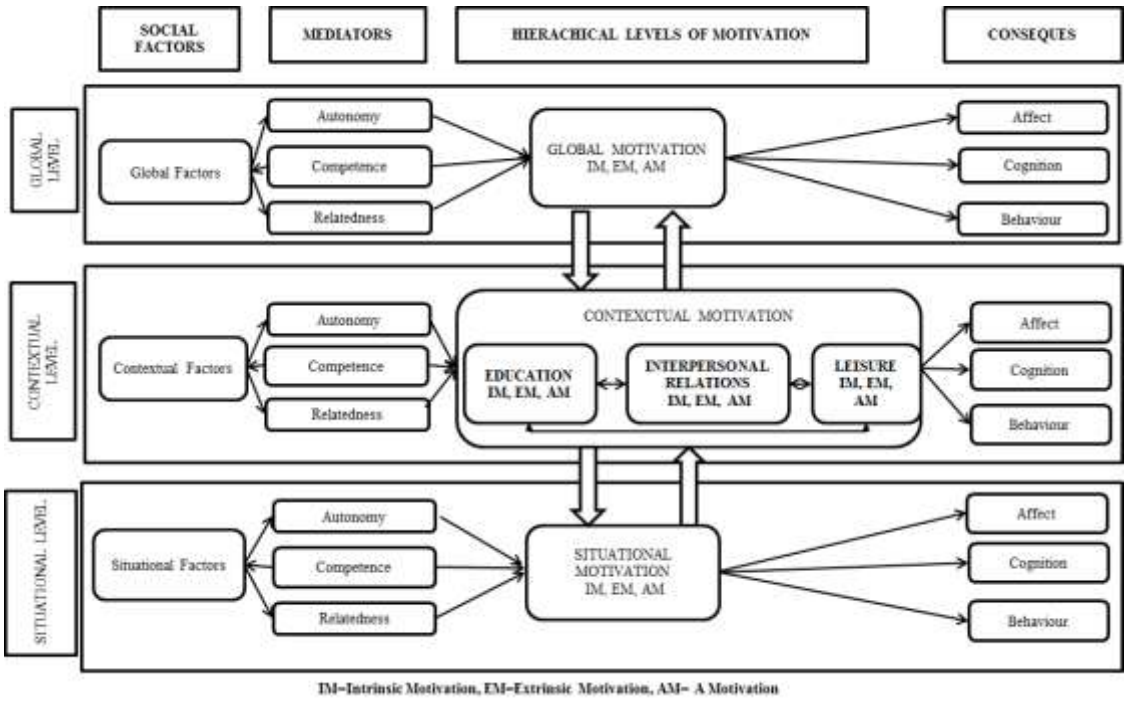

Figure A.1: Motivational model (source: Vallerand, 2000)

2 Theory of Reasoned Action (TRA)

Theory of Reasoned Action is applied to clarify or explain the real behaviour after acceptance and adopting the technologies. It is the mostly organised and comprehensively applied technique to attitudes and behavioural researches. The model/framework suggests that person's real behaviour that is influenced by attitude and subjective norms is decided by consumer's intentions to execute the behaviour. A customer's behaviours are mostly decided with significant principles of the outcomes of that behaviour (Fishbein & Ajzen, 1975). TRA has the following constructs; behavioural intention which performs the behaviour; attitude which is the state of mind regarding the behaviour and subjective norm which persuades end user's usage (Davis et al., 1989). TRA claims that attitudes and subjective beliefs significantly persuade behavioural intent towards the technology (Yu, Ha, Choi & Rho, 2005). TRA model diagram in Figure A.2 shows the factors for adopting technology.

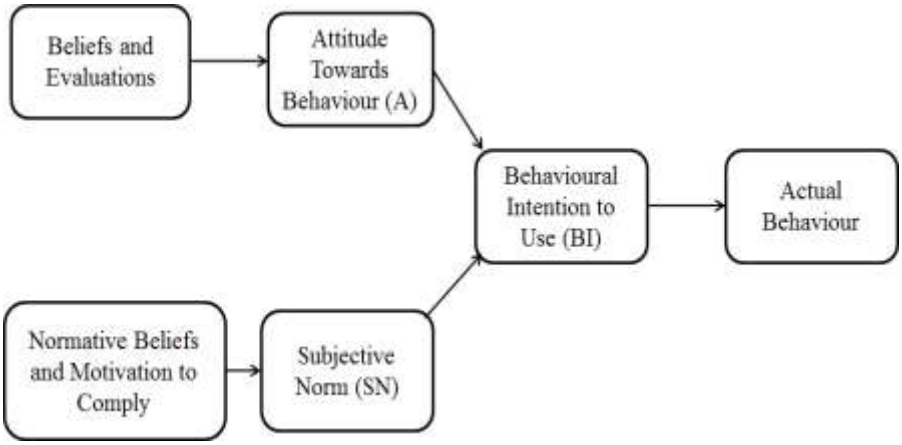

Figure A.2: Theory of reasoned action (source: Davis et al., 1989)

3 Theory of Planned Behaviour (TPB)

TPB is an enhanced TRA by introducing a third construct: perceived behavioural control to attitudes and subjectivity constructs (Armitage & Conner, 2001). TPB helps in its explanation and predictive behaviour, and predict a diversity of behaviours (Sheppard, Hartwick & Warshaw, 1988).TPB claims that real behaviour is decided by behavioural intentions and perceived behavioural controls. TPB model presents many advantages of solving limitations of TRA (Teo & Pok, 2003). TRA failed to tackle imperfect choices and therefore could not be utilised where users had no control over such an environment (Ajzen, 1991). TPB main constructs are given in Figure A.3.

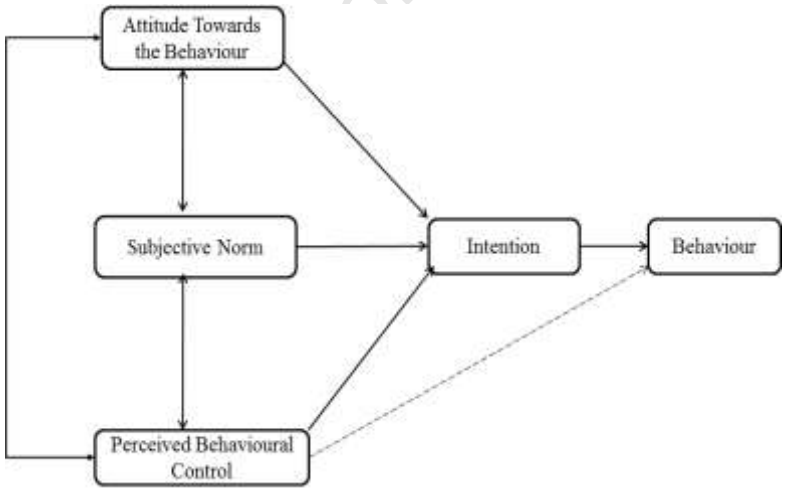

Figure A.3: Theory of planned behaviour (source: Ajzen, 1991)

4 Technology Acceptance Model (TAM)

TAM has its origins from the theory of reasoned action (TRA) and was constructed to explain technology (system) acceptance and adoption and its usage in organisations (Davis, 1989; Vijayasarathy, 2004). The model has two principles or beliefs and these are perceived usefulness and perceived ease of use which are essential in their explanation to the user's intentions of utilising technology. Perceived usefulness is the level to which "anyone believes that system use will enhance performance" whereas perceived ease of use is the level to which

"an individual believes that system utilisation will be of less effort" (Dholakia et al., 2004). Any simple and valuable new innovative technologies that are employed leads to optimistic attitudes and intentions towards applying them. TAM key constructs are shown in Figure A.4.

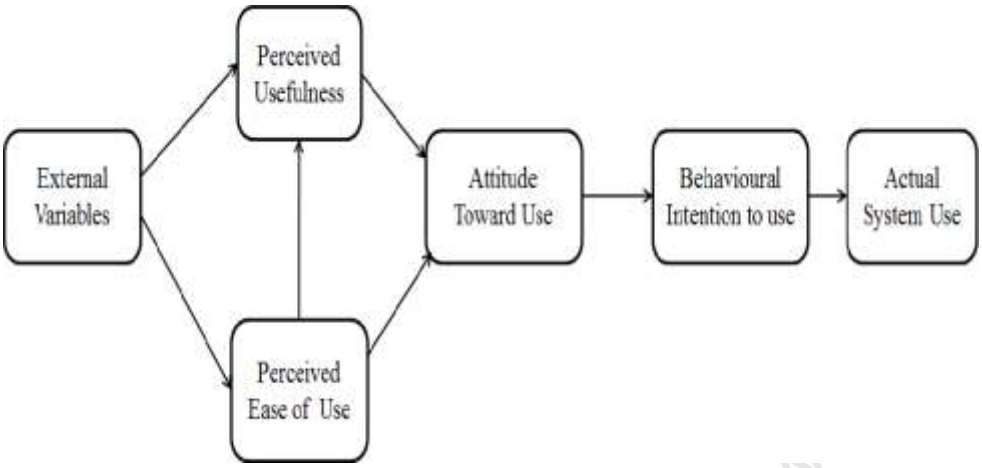

Figure A.4: Technology acceptance model (source: Davis et al., 1989)

5. Unified Theory of Acceptance and Use of Technology (UTAUT) Model

The UTAUT model incorporates constructs from eight technology acceptance and adoption models (Dholakia et al., (2004). It has enhanced performance than the other discussed models so far. UTAUT has three factors of desire to use and these are performance expectancy, effort expectancy and social influence and two factors of utilisation behaviour which are intention and facilitating conditions. The five characteristics define the observation of how the factors of intention and behaviour change over time. UTAUT model includes factors such as gender, age, experience and voluntariness to regulate usage (Min, Ji & Qu, 2008). UTAUT has a problem of employing the model outside the organisation or place of work (Carlsson, Hyoonen, Repo & Walden, 2005). This problem is appropriate to mobile services as they are to be used anywhere and anytime whether at the place of work, home and leisure times of a person and not only at workplace. The key constructs are discussed as follows:

Performance Expectancy: is the degree to which users expect that the employment of the new technology improves the performance (Venkatesh, Morris, Davis & Davis, 2003).

Effort Expectancy: is level of simplicity related with the usage of a technology (Agarwal, Rastogi & Mehrotra, 2009).

Social Influence: is extent to which the user believes that other users accept the deployment of new technology (Agarwal et al., 2009)

Facilitating Conditions: are the expectations of a user that there is the infrastructure and organisational support for the intention to use the new technology (Agarwal, et al., 2009). UTAUT model is illustrated in Figure A.5.

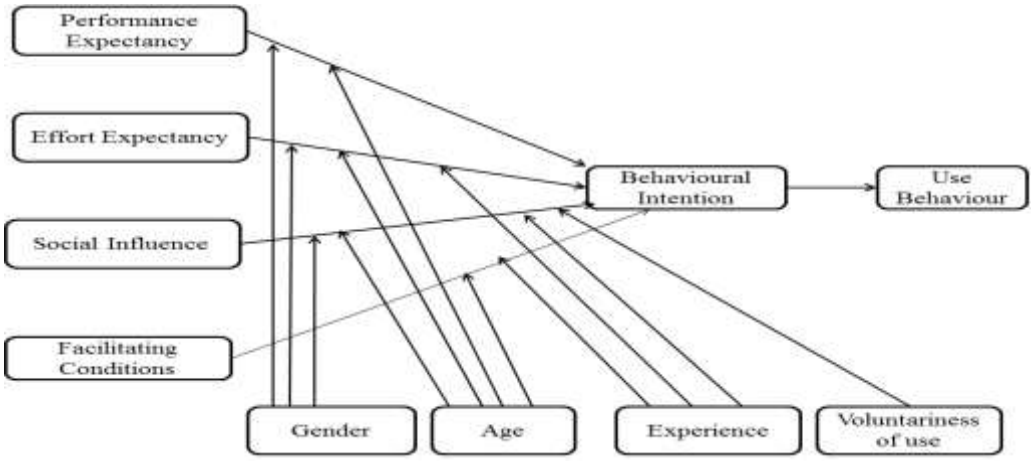

Figure A.5: UTAUT model (source: Venkatesh et al., 2003)

Appendix F Research activities and deliverables

Activity	Period in Month(s)	Completion Dates	Handing in Deliverables
High Level Proposal	2	19.05.2011	High Level Proposal
Literature Survey	2	25.07.2011	Literature Survey
Research Design & Interview Questions	1	30.09.2011	Writing research design and formulating interview /questionnaire questions
Research Design	1	03.10.2011	Research Design
Research Ethics Approval	1	31.10.2011	Submitting the proposal and related documents to ethics committee and getting approval
Collecting Data	3	28.02.2012	Collecting data through interviews, documents and questionnaires
Analysing Data	1	30.03.2012	Processing and analysing the collected data sets
Dissertation Draft	2	31.05.2012	Submitting of draft thesis and doing corrections
Final Dissertation (Dec 2012)	3	15.08.2012	Final Dissertation

Appendix G Ethics approval

UNIVERSITY OF CAPE TOWN

Faculty of Commerce
Ethics in Research Committee

Courier: Room 2.21 Leslie Commerce Building Upper Campus University of Cape Town
Post: University of Cape Town • Private Bag • Rondebosch 7701
Email: Irwin.brown@uct.ac.za
Telephone: +27 21 650-2311
Fax No.: +27 21 689-7570

20 October 2011

Mr John Edward Mtingwi
Department of Information Systems
University of Cape Town
John.mtingwi@uct.ac.za

Dear Mr Mtingwi

Project title: M-Government Readiness Assessment in Africa: The case of Malawi

This letter serves to confirm that the project entitled, **"M-Government Readiness Assessment in Africa: The case of Malawi"**, as described in your final submitted protocol dated 18 October 2011, has been approved. You may proceed with the research.

Please note that if you make any substantial change in your research procedure that could affect the experiences of the participants, you must submit a revised protocol to the Committee for approval.

Best wishes for great success with your research.

Regards,

I BROWN

Prof Irwin Brown
Commerce Faculty Ethics in Research Committee

Appendix H Comparison of responses by service providers

CRITICAL ASPECTS	SP1	SP2	SP3
Activities in progress and future	• To continue network expansion	• Mobile network country wide	• Rolling out GSM mobile technologies for voice and data
Aspects of legislation and regulation	• Regulates then tariffs that are offered to customers. • Protect the customers to make sure that customers get the services they are paying for • Submit monthly reports to the regulator which is to prove that out up time is always available • Regulates both the interest of the customer and also regulates the interest of the telecoms companies in the way they provide services to customers.	• Regulatory environment is alright • Regulation challenges can be resolved • Always regular contacts between the regulator and operators • Improvement in licencing from fixed to open licencing	• MACRA regulates frequency allocation • Operate within limits of the licence • MBS ensures that devices used are of good standard
Availability of mobile services/technologies	• Data services, financial transaction product, mobile phones, mobile laptops with inbuilt mobile devices • Voice or SMSs communication • Technology for mobile government is the SMS technology	• Internet technology on the mobile phone, • The broadband technology on mobile phone • SMS technology	• CDMA technologies using Mobile phone • EVDOs & dongles as access points to CDMA network infrastructure, WiMAX for data or internet • Voice and data,
Awareness of mobile technology/government	• Offer basic educational messages to educate them on basic kind of scenarios	• Civic educate the customers	• Make people aware of technologies
Champion of mobile technology/government	• Service provider for mobile technology to government	• To offer technology to government	•
Compare Technology development with developed nations	• Almost at the same level using 3G, some of them are using 3.5G	• Technology is quite comparable to most of the countries. The 3G technology services rolled together at same time like some European countries • Differ in some of the services offered in other countries, they introduce applications that are well advanced and suits their environment	• Using WiMAX, GSM, CDMA
Customers stability	• Biggest market share in terms of registered customers about 65% • On retention there is a lot of cannibalism in this competitive market • Customers moving from one operator to other and vice-versa	• The mobile phone technology generally is loyalty kind of service • Customers are looking at mobile technology as a commodity • Get customers between 20% to 50 % & have campaigns for customer retention	• Affordability and cheap prices are self-customer retention • Good customer care services
Enablers	• Mobile technology and information are	• Readiness of government to be able to run	• Presence of mobile devices and

	both enabler services that are required by the government	government using mobile facilities • Partnership between government private sector • Technology is getting cheaper every time, tariffs are reducing, penetration is increasing • The mobile phone networks have been preparing for technology around the mobile phone for a very long time • Can easily learn from other mobile based services that have been roll up somewhere like the success story of how money moves through the mobile	mobile network • Government support to ICT utilisation in government and in the country in general • Continued vandalism on legacy network cables • Limitation of cable network infrastructure • Need for latest high-tech and value added services • Ever-increasing maintenance costs legacy technologies
Establishment of mobile technology	• Mobile technology is quite established in the country • Need more mobile service providers to exist	• Mobile technologies' penetration is going to be much higher than any other technology • The mobile service providers (organisations) seem to be ready to provide the service	• Coverage of mobile/ wireless is almost nationwide
Existing mobile systems implementing	• Develop the interface between the network and that platform so that application is able to connect to the network (UNICEF)	• Esoko	•
Functionality	•	• Installed a server and all the software and provided cell phones for the field officers	•
Individual registration	•	• No registration of individual identity against SIM card • The legislation does not cover that	•
Inhibitors and challenges	• Challenges in terms of economy (forex shortage and power shortage) • Security	• Infrastructure challenges like roads • Importing of equipments costly • Cost of access of initial connection to technology	• Global economic problems • Competition with other operators • Vandalism of network infrastructure • Some legislative changes such as tax and VAT revisions upwards
Leadership and political feelings	• There is leadership/political support	• There is political will in the country	• Sees government ready for mobile government
Managing risks	• Discover the risks of mobile government • Analyse risks such as economic, political, financial • Risk mitigation plan • Have Clear definition of the government business case	•	•
Mobile government knowledge	• Moving from legacy government systems or applications to more mobile oriented infrastructure • The government as a service provider is to perform service delivery to the citizens using mobile government	• Use of mobile technology in terms of running government affairs	• The extension of e-government to mobile platforms

Mobile phone problems	•	• Mobile technology contributes to crime such theft, • Castigating and threatening other people • Mobile device itself is source of crime	•
Mobile phone usage	• Voice and SMS, MMS communication • Internet browsing • Financial transaction – mobile banking	• Voice and SMS, MMS communication • Internet browsing • Financial transaction – mobile banking	• Voice, SMS, mobile banking, reservation bookings
Networking status	• Basic infrastructure in place, parts • Deploy such technology • Basically covered all areas in the country close 100%, still expanding	• Sufficient infrastructure • Close to 95 or 98 percent of the geography of Malawi is covered • 29 % penetration and concentration in mainly in urban areas	• Almost nationwide
Providers services	• Infrastructure for mobile technology • The skills and knowledge and experience required (intellectual property) to implement all these things. • Give government direction and maybe advice	• Infrastructure for mobile networks • Content development • Work hand in hand with organisations	• Mobile and land lines network
Security and privacy aspects	• Systems that we are using to monitor our towers to detect any criminal activities that have taken place on fraudulent activities • Have security people who have the mandate to and have got the right access to information • You tighten up the security measures the more the people tighten up the tactic	• Customers are guaranteed to be operating on a secure network using the normal security issues, security infrastructure provided in line with security design issues of network element • Compromises may come from external factors not from the network provider • There continued investment in security and privacy in the network	• Security mechanism activated through software • Cryptographic mechanisms • Power modulation techniques • Using the firewalls to filter traffic
Skilful human resource	• Very high qualified resources with engineering background for infrastructure deployment • High level skills or resources that understand mobile applications (IT) • Need people themselves that under government service delivery framework	• Work with content providers to connect with our network	• Technocrats to install, operate, manage and maintain the technology
Socio-economic aspects	• Economic development - foreign exchange • Budget, transport, power outage	• Economic – foreign exchange • Budget, transport, power outage	• Global economic problems affecting the purchase of spare parts from overseas
Software type	•	•	•
Suitable current application	• Payment system, health sector, education and agriculture	• Payment system, health sector, agriculture information, education	• mEducation, mHealth, mVoting, mPayment, mParticipation, mTourim
Mobile technology benefits	•	• The mobile technology provides convenience • Accessible anywhere and anytime • Brings confidence in people & ensure the	• Mobile technology is cheap and easy to set up • Conserves power

		security of other person	• Used everywhere
User knowledge mobile technology	•	• Use of mobile devices goes with literacy level • To start with basic educational kind of messages to educate them on basic to kind of scenario • Adaptation to mobile technology	• User application educators, market for awareness to general public
Working relationship	• A lot of competition and protect customers • Don't share information • Information is shared when the regulator pushes the submitted information • Work independently in silos	• An increase in collaboration in areas of infrastructure sharing among the players in the industry • Giving each other access is quite good operating relationships for customers' interaction of different operators • good relationship has shown working with other players whether they are providing complementary or competing services	• Co-sitting – accommodating in players sites • Interconnection modalities • Leasing some of the circuits from other players • Good working relationship with government

Appendix I Comparison of responses of categories of participants

Critical Aspects	Mobile Service Providers	Government Employees			Demonstrable Systems Citizens	
		ICT Officers	Non ICT Officers	Politicians	Mobile System Users	Ordinary Users
Awareness of mobile technology/government	basic educational messages to educate them on basic scenario	Exposure to mobile applications	Educating the masses	Civic education on cultural beliefs, Mobile government to Leadership & citizens and the network providers	Users in remote have to be trained	Make the people aware by educating them
Availability of mobile services/technologies	Data services, financial transaction products, mobile phones, mobile laptops, SMS technology, Internet technology & broadband technology on mobile phone	Mobile phones, laptops, tablets, smart phone & iPad	Mobile phones, laptops and dongles, iPad	Cell phones, laptops, dongles	SMS technology only using cell phones	Cell phones
Networking status	Sufficient mobile infrastructure covering great than 90% of the country & still expanding, 29 % penetration	The current setup of the companies for the mobile phones we have the infrastructure	Network infrastructure present Technology is there	Network infrastructure across the country Providers to roll out to cover the whole country with the network	Network coverage in most areas. Government should assist organisation to improve the infrastructure	There is network coverage in parts of the country but strong network in central and southern regions
Security and privacy aspects	Have systems to monitor towers to detect criminal activities, secure network using the normal security issues, No registration of individual identity against SIM card The law does not cover that	Prone to hacking and viruses No individual registration of SIM cards	No registration of individuals		Not secure due to many people are handling the results, Are using clinic codes and child id Issue of security ensuring that the data can be transmitted with high security	No security, people can hack and steal airtime, break the codes of phones to accept any SIM cards
Suitable current application	m-payment, health sector, agriculture, education	Agriculture market of details, public services, m-health services, student registration for MANEB, SMS system for notification to school & DEM	emergency, financial systems, HR systems, administrative issues Notification licence status, marketing tool, creating awareness, health, education, birth and death registration, agriculture	Voting, agriculture, health, security, trade, education,	m-health for child health care in rural areas, m-document – sharing of documents through mobile phone, e-mail	
Mobile phone usage	Voice, SMS, MMS, internet, financial transactions	Education, agriculture, e-mail, voice, SMSs	Phone calls, Send text message, Internet E-mails, listening to radio	SMSs, MMSs, e-mails, voice	Transmitting SMSs only, Internet, Facebook, voice	SMSs, internet, radio, music, games, video, voice, e-mail, learning
Champion of mobile	Service provider for mobile	Ownership and	Got to be championed by the	Government's	UNICEF	

technology/government	technology to government	championship in the context of government structures where does it fit.	players of services on some of the areas	responsibility to have mobile government	Donor	
Mobile government knowledge	Delivering services via mobile technology by government to citizens etc.	Some understanding mobile government	Mobile government transactions through cell phones and some other mobile technology	Government which is everywhere to provide information to people using mobile technology	Running government on using mobile technology	No aware, but if it can be deployed people would respond, consider airtime price sending messages to government
Skilful human resource	high qualified engineers for infrastructure deployment, high level mobile application skills (IT), people who know government service delivery framework	Have ICT skills but not mobile application development skills	Learn from existing systems	Number of officers to monitor	Offered training to cell phones users for the systems	
Cultural values		Bureaucratic tendencies, political within the organisation, individuals willingness, concern for confidentiality, mentality needs to be corrected in people, anonymity beyond normal service, security issues of the culture	People's beliefs that everybody knows what one is doing, traditional culture to resist new technology, difficulties to change mind-set to new things, authenticity of information, service is difficult to segment, bureaucracy, culture cannot stop use of mobile technology in modern world,	Culture hinders & developments, being policed and reproductive systems in their homes, phones may spoil young mind-set, no culture would stop anyone to access mobile world,	People may not trust the results from the phones, no thought of any culture that can affect mobile government readiness, culturally people value face to face communication, get content and consent from the people	Cell phones are both good & bad, castigate others, destroying culture with outside cultural values, no respect to elders
User knowledge mobile technology	Use of mobile devices goes with literacy level, basic education needed and adaptation to mobile technology	Probably 50-50 knowledge level from government of view, no competency and exposure apart from cell phones, national level still lugging behind in aspects of knowledge as well as technology	Generally people are able to use mobile technology, 60 to 65 competence level, old people are not very competent to use any type of mobile technology, Illiteracy rate in the country,	User knowledge is at 65% in organisations, as country still lugging behind	People are able to use mobile phones, at organisational people are competent when using mobile devices specially mobile phones, at national level are competent to use mobile phones	Most of them know how to use the cell phones
Leadership and political feelings	Leadership/political ready	The leader and political will is there	There is political will	Government can be ready for mobile	Politicians will be positive towards mobile technology	They can accept
Benefits mobile government		Cost effective, efficient, reach hard to reach areas, flexibility to collect information, makes government more open & more accountable, accessible information	Spontaneous, portable, reliable & cheaper, efficiency in service delivery, convenient to people & government, reach wide audience in short space of time, boost up economy, accessibility	users are informed, cheaper, get information anywhere & everywhere, people understand the world, Adds to e-readiness	rapid turn round time, reduce costs and cost of sustenance, government can monitor in real time data, access to services 24/7, improve efficiency of processes, time is saved to go rural areas,	Receive and send messages faster,

Benefits of mobile technology	provides convenience, accessible anywhere and anytime	Brings services to customers, advocate for payment of services remotely, easy to call, easy to deploy as it is wireless technology, cover more areas, reduced costs of reaching hard to reach areas, transmission information is instant, cheap for cell phones & SMS	user has privacy, easy access to information, convenient, work anywhere, promote participation of citizens, easier to communicate, cheaper handsets, rolling out of these ones is not difficult compared with wired one	users communicate and learn what is happening across the boarders, open up the country's gateway, the country becomes a civilised society	Cheap and fast to communicate	It is fast send message, people are constantly communicating, learn from other countries,
Existing mobile systems implementing	Develop the interface between the network and that platform so that application is able to connect to the network	Esoko, nutrition system – m-health	Website for information provision, SMS and calling on mobile phones for precautions, radios and mobile devises usage - platform to interlink the various technologies, current most rural people are reached by radio communication.		RapidSMS using open source for application and operating system – Linux, FrontlineSMS - donor initiated system - Using SMSs, small scale for calling or sending pictures - MMS	
Aspects of legislation and regulation	Regulates tariffs, protect the customers, submit monthly reports to regulator, regulates the telecommunications companies provide services to customers, sound regulatory environment, regulation challenges are resolved, always regular contacts between the regulator and operators, improved licencing for both fixed to mobile	No regulations, regulation registration of the company & get the frequencies MACRA regulates the mobile technologies, technology neutral kind of regulation, only law is Communications Act 1998 & room to improve it, access to information bill, need for policy issue for increasing accessibility	MACRA regulates information technology, some of the laws in Malawi are a quake, no Act for voice over internet, environment is cordial, policy for mobile government, people do not understand the regulations if any, had deregulation for telecommunications, regime licencing is not is criminating	It is regulated by the regulator to ensure quality service, laws and being revisited, need to pass access to information bill	Not aware of any laws that will affect the RapidSMS and consulted MACRA to seek any of opinion, Not aware of any laws to regulating FrontlineSMS, issues of policies on mobile technology deployment, regulated by MACRA but more that could be done,	Not aware of any laws regarding mobile technologies
Establishment of mobile technology	Mobile technology is quite established in the country, all have put infrastructure in place, need more mobile service providers, mobile technologies' penetration is going higher than probably any other technology, mobile service providers are ready to provide the service	Catalyst for transformational change, bring ICT services to the public to meet development process, encourage increased uptake of these mobile services, need more players in the industry to cover rural areas, key to mobile government roll out, offered by the private	mobile technology establishments in Airtel, TNM, MTL and access but are not enough and in its infancy, the use of mobile technology is only in place	network infrastructure over 85%, new mobile technologies are in rural areas, mobile technology providers need to be implicated	Service providers mobile technology available, several mobile telecommunication companies with their infrastructure	Not well established, only two providers, quality of services less than 50%

		sector and conducive environment by government				
Socio-economic aspects	Economic development Budget, transport				Not be costly to government – sustenance of the system/training	Airtime is expensive for people to afford
Working relationship	Lots of competition for customers, no information sharing, independently work on critical issues, collaboration in infrastructure sharing, giving access to one another, customers' interaction of different operators, nice relation with complementary or competing firm	None in terms of relation with the ministry, some of the NGOs bring the technology and they don't involve the ministry very much	Good working relationship with line ministries in government & partners		Working together with government, Ministry of health is involved – initiatives aim to assist government and work in partnership, no much cooperation from government but they have knowledge how the system is operating	
Challenges of mobile technology		Costs and training, no infrastructure in some areas and no wireless devices' signals could be affected by the atmospheric conditions, security, anonymity issue, what are the services to provide people and how to provide the services? managers personalise mobile facilities, security of documents & information	distort facts, not too cheap, not accessible to everyone in terms of finances, expensive for people to own like blackberry & laptops, no infrastructure for some wireless gadgets, difficult to know the message authenticity, prone to viruses and hackers, reduced confidentiality, poor knowledge of mobile gadgets			Watch bad, obscene films, castigating messages, causes brain cancer, spoils cultural like imitating dressing, way of speaking, selling faked devices, theft, no security, hack and steal airtime, phone without loading airtime
Mobile phone problems	Mobile technology contributes to crime, castigating & threatening	Cell phones their application can be limited		Absence of network	Disturbance when you need time to yourself	

Appendix J Nine steps involved in conducting interviews

Steps	Descriptions
Identifying the interviewees	Determine the most appropriate sampling strategy to achieve the research aims
Identifying the type of interview	Determine the most appropriate interview format to answer the research questions
Voice recording the interviews	Ensure that an accurate recording of the conversation is undertaken Use recording device suitable for both site, type of interview and participants
Locate a quiet, suitable place for conducting the interviews	Select a site that is likely to present minimal distractions and is suited to voice recording
Obtaining consent from interviewees	Have each interviewee complete an informed consent form before commencement (Appendix A2) prior to commencement of each interview, convey to participants the purpose of the study, the intended use of results and the availability of those results once completed
Take brief notes during the interview	Record notes and observations using interview protocol Use an abbreviated form of note taking to increase the proportion of the conversation that is recorded in this form
Have a plan, but be flexible	Adhere to the intended plan during the interview, but allow participant conversation to proceed unimpeded
Use probes to obtain additional information	Use probes (classifying and probing) to elicit more information about each question, to clarify points or ideas expressed by participants
End and exit the interviews	Thank the participants assuring them of the confidentiality of their responses, offer to provide summary of results once completed

Source: Creswell, 2008