UNIVERSITY OF TECHNOLOGY, SYDNEY

TOWARDS A UBIQUITOUS GOVERNMENT: THE MOVE TO MOBILE SERVICES AS PERCEIVED BY THE END USER

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CERTIFICATE OF AUTHORSHIP/ORIGINALITY

I certify that the work in this thesis has not previously been submitted for a degree nor has it been submitted as part of requirements for a degree.

I also certify that the thesis has been written by me. Any help that I have received in my research work and the preparation of the thesis itself has been acknowledged. In addition, I certify that all information sources and literature used are indicated in the thesis.

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Tarek El-Kiki



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ABSTRACT

Mobile technologies, by virtue of their pervasive and powerful existence, are relentlessly transforming the way in which people work and play as people become contactable anytime anywhere. Mobile devices are becoming indispensable tools of verbal and data communication at present, and will be even more essential to the following generations.

The use of mobile technologies offers governments the possibility to render their services to the end users (constituents) in a more effective and efficient fashion. There are numerous factors that influence the effectiveness of government mobile services. These factors can be viewed from a few perspectives such as financial, administrative, social and technological; this research thoroughly analyses the end users' perspective towards the effectiveness of mobile government services.

Mobile government services are those services rendered to end users, be they citizens or businesses, through the use of mobile communication technology within the government administration. The main research question is what does 'successful government mobile service' mean to the end user? Both qualitative and quantitative methodologies are employed to establish the answer to this question.

In order for such answer to be accomplished, an extensive review of the available literature was performed to highlight the research problem as the first step in the research process. Subsequently, experts in the fields of mobile government and electronic government were consulted through a web-based survey that also

worked as an online interview as several participants were willing to undertake further discussions on the survey findings. The findings of this survey were aligned and compared with the outcomes of the literature review resulting in a useful classification of the mobile service success factors as well as pinpointing the barriers to such success.

The following step was devising two mobile service effectiveness evaluation models which employed those classified success factors as evaluation metrics. These models formed the theoretical basis for a real-world survey, through which end-users' opinions about their needs for mobile service were collected and analysed. Once these needs are fulfilled by the mobile service, satisfaction is reached, and, accordingly, these needs are considered as real success factors for the mobile service from the end-users' perspective.

According to those two mobile service effectiveness evaluation models, these success factors must satisfy one perspective, which is the end-users' (citizens & businesses), from four perspectives: Citizens & Businesses, Operational & Internal Business, Innovation & Learning and Financial & Economic, if a comprehensive effectiveness evaluation is required.

In order to build a realistic picture about the practical rendering of effective mobile services by local governments, (if there were any), the researcher selected three local Sydney councils to conduct a case study.

The literature review, the experts and users surveys, as well as case studies have all contributed to a practical framework that represents a checklist for government mobile service providers to adopt and adapt according to their mobile services provisions. Accordingly, this study contributes with its outcomes,

such as mGovernment theoretical management framework, and the devised effectiveness evaluation tools, to enrich this novel field of work and research; the field of mobile government services.

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"New conditions impose new requirements on government and those who conduct government"

Franklin D. Roosevelt

CHAPTER 1

1. Introduction

This chapter introduces the work produced in this thesis about mobile government services and what their end users expect from such services. It synthesizes the main topics of the research which are elaborated on in their designated chapters, such as the research questions and methodology. It concludes with an overview of the content of this dissertation in the thesis outline section.

1.1. Research Overview

Mobile technologies, by their pervasive and powerful nature, are inexorably changing people's lifestyles as people become contactable anytime anywhere. Mobile devices are becoming indispensable tools of verbal and data communication at present, and will be even more essential to the following generations.

Governments are able to exploit the ubiquitous nature of mobile technologies in order to maintain their control over, and contact with, their constituents. Mobile technologies enable the citizens, businesses and government officials to effectively and efficiently access, manipulate and accomplish their needs through the rendered mobile services from anywhere, at any time. Mobile government is then the fruit of the government's efforts to utilise mobile technologies to communicate with, and offer services to, its end users via the mobile services.

Mobile services have an enormous potential to be one of the government's most effective tools to govern, control, and to administer community requirements and justice. In order for governments to offer acceptable and attainable mobile services, these services have to be successful. The preliminary question that provoked this study was: what is a successful government mobile service, or how can we judge its success? As government mobile services are a new field of work and research, there is a minimal amount of research and literature that could assist in discerning the success factors of such services.

As will be seen in Chapter 3, the literature review revealed a diversity of factors, which contributed to the success of electronic services and their newly born mobile services. Several perspectives could be detected by classifying or categorising these factors; for example, financial, administrative, social and technological. It seemed that the end-user's perspective was the least considered by researchers and practitioners when contemplating factors that could lead to the success of mobile service success.

The absence of a profound end-user's perspective in mobile government success factors research represented a gap that started emerging and becoming more

pronounced especially after conducting the experts' survey, which highlighted many factors that pertained to the mobile end user. Subsequently, the researcher's stance was to adopt end-user's perspective towards mobile services and thoroughly analyse it to its most minute possible detail. Accordingly the mobile end-user's survey was conducted on the basis of two interrelated models which were devised to especially extract and evaluate mobile service effectiveness from the end user's perspective.

On the other hand, in order to build a realistic picture about the practical rendering of mobile services in local governments (if there were any) and how effective these services are, or should be, three local councils were selected for case studies.

1.2. Scope of the Study

It is important to highlight the scope of this study as a preparatory step for defining the area where the research problem exists.

The provision of mobile government services may be classified in four dimensions: Mobile Communication, Mobile Service, Mobile Governance and Mobile Administration. These dimensions interact with three types of mobile government constituents: Citizens, Businesses and Government Officials. The relationships between the four dimensions and three constituents create a vast field of research. This research concentrates on the mobile service as a dimension and citizens and businesses (or end users) as constituents as per Figure 2-4. The other three dimensions and government officials as constituents are beyond the scope of this study.

Each of the 'end users' and 'government mobile services' represents a separate area of research which seamlessly interacts with the other. This study focuses on the effectiveness of mobile government services on one hand, and the end user, on the other. In other words, this study examines the effectiveness of the mobile services as viewed by the consumers.

Accordingly, the end users' needs and benefits are investigated by the use of a mobile service effectiveness evaluation model, as explained in Chapter 7. The model details four different perspectives that could be used when evaluating the effectiveness of mobile services. These include: Citizens & Businesses, Operational & Internal Business, Innovation & Learning, and Financial & Economic, however this study investigates only one perspective; which is that of the 'Citizens & Businesses' as mobile service end users. Each of the other three perspectives is out of the scope of this study, and necessitates a separate and thorough study.

Furthermore, this study does not handle the impact of mobile technology usage and its risks on the end user, nor does it discuss end user's readiness or adoption of mobile services. More details about the research limitations can be found in Section 9.6.

1.3. Research Questions

As mentioned above in the research overview section, the preliminary question that provoked this study was initiated by the author's pondering over the meaning of a successful government mobile service, or how to judge that success. In the course of the initial research investigations, this theme of thinking

was developed to be more focused on two topics which enabled forming the question of this research; mobile service effectiveness, and end users' needs or benefits.

For mobile services to be effective, and accordingly successful, they have to satisfy both the service provider's objectives on one hand, and the end user's objectives or needs on the other. Mobile service providers may consider the rendered mobile service as successful; meanwhile the end user may regard it as unsuccessful. The result of this way of thinking was the main question of the research, which is simply formed to be:

"What does 'successful government mobile service' mean to the end user?"

Subsequently, more detailed questions were raised which initiated the core work of this study as exhaustively explained in Chapter 3.

1.4. Research Objectives

Building upon the research question, the principal objective of this study is to reveal as many factors as possible that will lead to the success of mobile services as a result of their effectiveness in satisfying the service recipients' needs. Hence, the pervasive mobile service diffusion (on the macro-level or general level of use) and adoption (on the micro-level or individual level of use) which, in turn, contributes to empowering the government with complete ubiquity and control, for example when it comes to managing disasters, and fighting against corruption and terrorism.

1.5. Research Methodology

Due to the novelty of this research topic, constructivist, interpretive exploratory is adopted as the research methodology, which allows for a theoretical perspective to be expounded in the conceptual framework guiding the research process. The purpose of this methodology is to intensively investigate the phenomenon, success or failure of government mobile services, in order to find patterns and themes since the researcher has raised specific questions about the factors that control or affect the effectiveness, and accordingly the success, of the mobile services.

Subsequently, appropriate methods for this study were selected on the basis of the types of required data; qualitative for verbal data and quantitative for the numerical data. Diversifying the data collection methods is known as triangulation which allows a better understanding of the research phenomenon as multiple research methods increase the validity of the collected data and derived outcomes.

1.6. Research Implications

This study endeavoured to analyse the effectiveness of mobile government services from the viewpoint of the end user. It extracted various factors for mobile service success which can be adopted by any government service provider when designing or re-designing a new mobile service.

On one hand, this research has made a theoretical contribution to the existing understanding of mobile service success factors by focusing on end users' needs

as the basis or the model on which mobile service is built and customised. The developed theoretical model of mobile government service process management created a research environment from which more research can be triggered and launched.

The research provides mobile service providers with a practical and communicable checklist of contextual and conditional factors, which are seamlessly integrated, that cover the end user's perspectives which should be considered as the cornerstone for any mService project.

1.7. Research Significance

The research results are not confined to the Australian society or public, they rather apply to any human community since it studied the end users' generic needs for mobile services, regardless of the language or culture. This is supported through the use of triangulation, which combines both qualitative and quantitative methods to conciliate the generalisability limitations that naturally result from the qualitative methods. Moreover, this study represents a detailed guideline for mService providers, as mentioned earlier, which they can follow and apply according to the real scenarios of their services.

1.8. Research Motivation

The researcher approached the study with personal experiences and the belief that government mobile services projects should start from where they are ended at, i.e. end users. Being an ex-government executive, the researcher developed a

realistic judgement about how the citizen is taken for granted when there are new government projects, which are based on the concept that the citizen 'can't wait' to accept those projects and the 'solutions' they provide, merely because they are offered by the 'government'. The researcher has experienced firsthand government bureaucracy, which led to waste, inappropriate plans and unworkable projects. In other words, the least application of what is meant by transparency and accountability in this context.

Accordingly, the researcher decided to present, through this research, a new vision that will enhance the government's communication with its constituents, and enable the constituents to obtain what they really need.

In addition, the topic of the research is very novel and vital, which meant an exciting 'adventure' to the researcher. Because the mobile penetration is surpassing the Internet penetration, governments will soon have mobile channels with their citizens, which will certainly lead to government's ubiquity.

1.9. Thesis Outline

This section provides an overview of the entire contents of the thesis which starts with this chapter.

Chapter 2 reports on the literature review that explored the emergence of mobile government services as a natural development of electronic government maturity. It outlines the phases of mobile government emergence and discusses the types of electronic government features which have shaped the mobile government

mission and vision. It concludes by discussing the types of pressures facing governments which intend to implement mobile government services.

Chapter 3 reviews the roots of the research problem posed in this study. It starts with an explanation about mobile government goals and their types, which are in turn converted into objectives and strategies for initiating mobile government service projects. For these mobile service projects to be successful, their objectives have to reflect and satisfy the needs of mobile government constituents. Citizens and businesses are two types of constituents whose needs have to be reflected in the objectives of the mobile service project for it to be successful.

Subsequently, this chapter explores the related studies that handled success factors of service projects, in order to flesh out the research problem. As an essential step that assists in locating the problem, the mobile government generic framework was constituted and used.

Chapter 4 explains the way in which the research was conducted. It starts with the design which discusses the research philosophy and its underlying epistemology as constructivism, and the theoretical perspective as interpretivist. Subsequently, it explains the research methodology as descriptive exploratory, and the methods used followed by the rationale behind their choice. The details of the two phases in which the research was conducted are also explained. It concludes with describing the way the quality of this research was evaluated.

Chapter 5 describes in detail the methods used in collecting and analysing data. Extensive literature review, web-based surveys and case study were the three methods used in collecting data. Collected data were qualitatively and

quantitatively analysed in order to conciliate the generalisability limitations that naturally result from the qualitative methods.

Chapter 6 explains how data collected from the real-world expert survey were analysed quantitatively and qualitatively. Experts from nineteen countries around the world identified four types of barriers to the success of government mService projects in their answers to the survey. They however provided suggestions for overcoming only three types of these barriers. These suggestions were compared to the findings from an extensive literature review, resulting in a very close correspondence between them.

Chapter 7 discusses in detail the results of mService effectiveness and end user's survey results. mService effectiveness is the relationship between inputs and outcomes of the service provision process. Inputs are of the back office components, whilst outcomes are the beneficiaries' goals. From the perspective of the mobile end user, outcomes are the benefits that are gained from utilising an mService. mService effectiveness is analysed as viewed by end users through the analysis of their sought benefits.

For these benefits to be analysed as thoroughly as possible, EUSM (End User Satisfaction and Usage Analysis Model of mServices) was derived from the comprehensive MPE^{2}M-mG (Multi-Perspective Effectiveness Evaluation Methodology for mGovernment) that was devised in order to analyse the outcome benefits to their root components. As a result, benefits were grouped into four categories representing four perspectives: Citizens & Businesses, Operational & Internal Businesses, Innovation & Learning, and Financial & Economic.

EUSM represents citizens and businesses perspective and translates their benefits to questions in order to reach an overall mService satisfaction. ESUM was the basis on which the end user's survey was developed.

Chapter 8 presents the outcomes of interviews with three local councils which were selected from Sydney's suburban councils. Since implementing mobile technology in government means utilising it in all types of government; Local, State or Federal, these interviews investigated how mobile services are applied in Local Government, where each council's case was closely studied. As these three are mService providers, the perspective of these local councils is considered crucial in augmenting the results of this research.

Chapter 9 concludes this thesis by addressing the main contributions of this research and relating them to the research questions which were stated in Chapter 3. It then outlines the research outcomes and delves into their theoretical and practical implications. Finally, it highlights the strengths of this research, and then discusses the research limitations and further future work.

Chapters 2, 3, 4 and 5 describe this research problem, its background and how it is approached; **Chapters 6, 7 and 8** explain how the problem is manipulated. The literature review (Chapters 2 & 3) and expert survey (Chapter 6) were used to discover the barriers to the success of mobile service, and suggestions to overcome these barriers. The outcome was then viewed from the perspective of the mService end users', which led to another survey (Chapter 7) to determine the benefits that end users seek from using the mobile service. Additionally, the case study method was used in order to understand the practical rendering of mobile services in local governments (Chapter 8), if there were any, and how effective

these services are, or should be. Although Chapters 6, 7 and 8 produce useful results in themselves, they integrate to present an answer to the research question described earlier. Illustratively, Figure 1-1 casts an overview of this study.

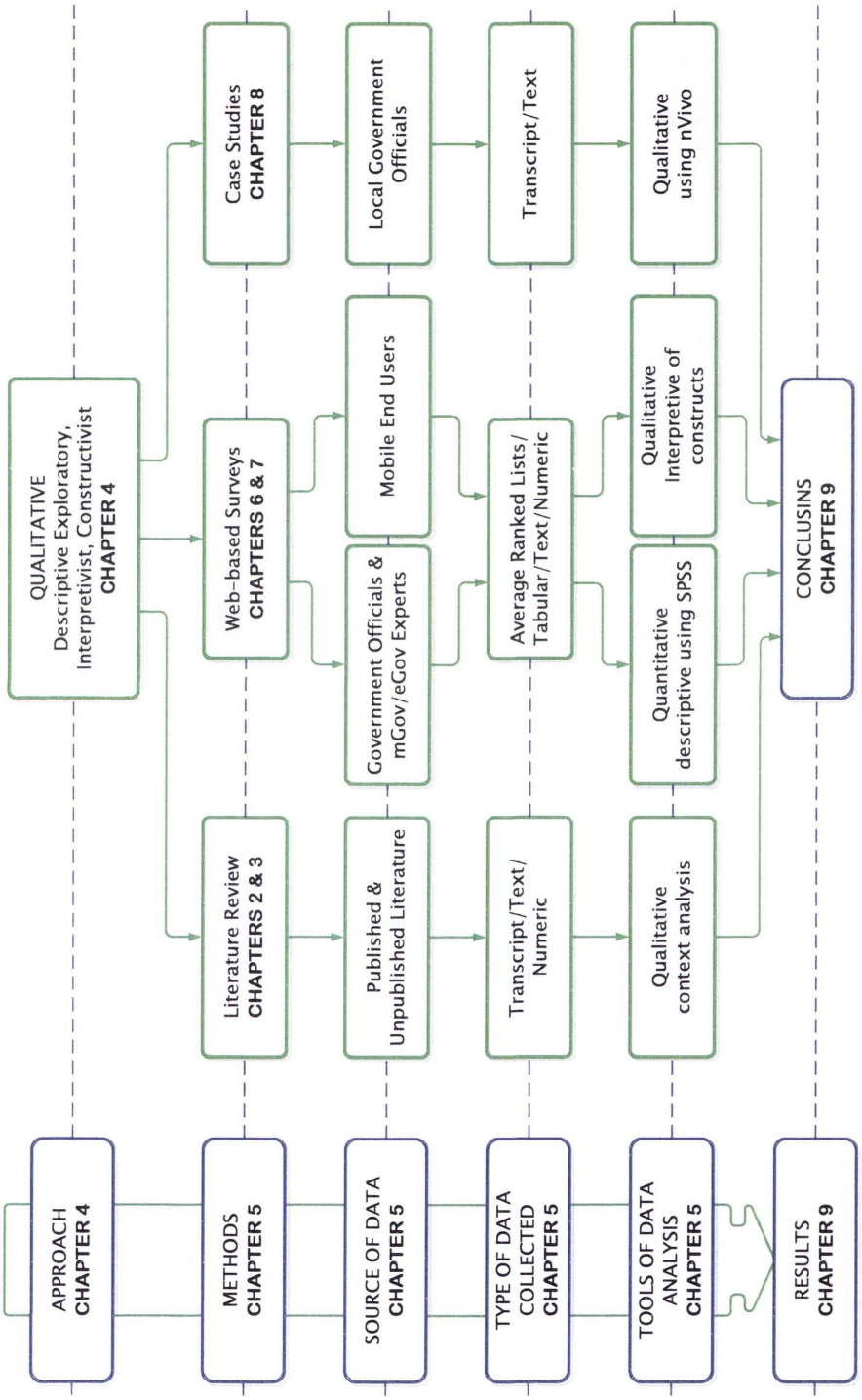


Figure 1-1: Study plan overview

1.10. Chapter Review

This chapter explained what is meant by government mobile services, and how effective they can be as a means of communication between the government and its constituents. It highlighted the gap that was represented in the absence of a profound end-user's perspective from which the effectiveness of government mobile service can be evaluated.

The scope of the study was described as a step towards defining the area where the research problem existed. Subsequently, the research questions were raised, as the objective of the study was stated.

The research underlying epistemology and methodology were briefly discussed in order to shed more light on the way data were collected and analysed. In addition, research scope, implications and significance were also handled before the study motivation and the thesis outline concluded this chapter.

The following chapter is the first step in this study. The literature review explores the emergence of mobile government services as a natural development of electronic government maturity.

CHAPTER 2

2. Fundamentals of mGovernment

This chapter reports on the literature review that explored the emergence of mobile government services as a natural development of electronic government maturity. It outlines the phases of mobile government emergence and discusses the types of electronic government features which have shaped the mobile government mission and vision. It concludes by discussing the types of pressures facing governments which intend to implement mobile government services.

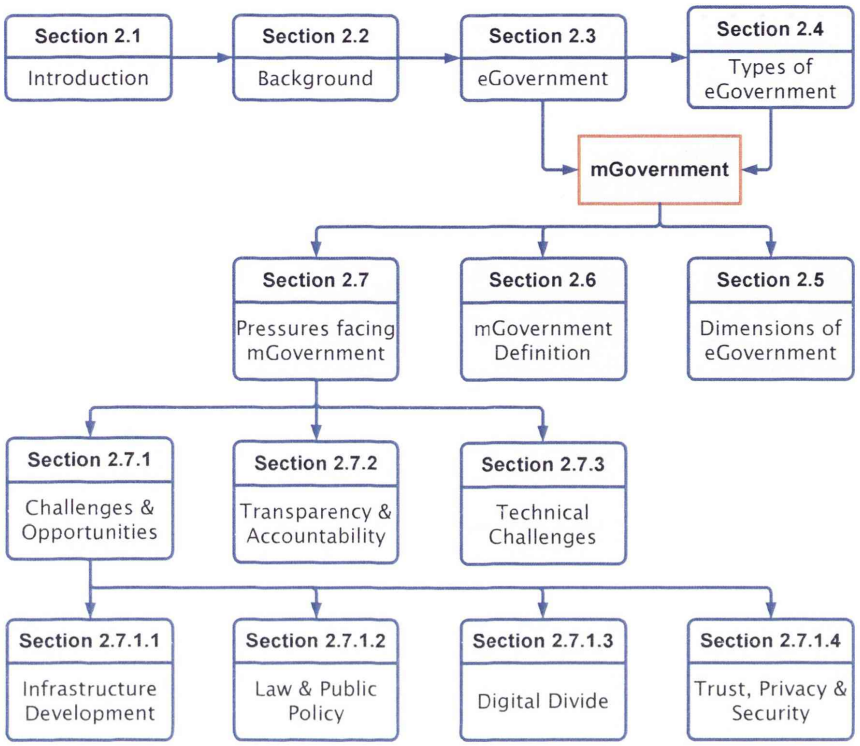


Figure 2-1: Chapter 2 outline

2.1. Introduction

This literature review is presented to contextualise the research conducted and concepts presented. Most of the available literature in regards to mobile government (mGovernment) topics views it from the perspective of electronic government (eGovernment), especially the success factors of government service projects. There is a vast expanse of eGovernment literature available and this review does not claim to cover it all; it rather focused on the research topic. It is found that there is no specific and comprehensive research that reports on the success factors of mGovernment service projects from the end user's. This means

that most mGovernment service projects, so far, have taken the same path of eGovernment projects implementation with their success and failure factors.

What is presented in this review is a compilation of information that was thought to be preparatory and of particular relevance to this specific research and the issues that it has raised. Considering the complexity of mGovernment service projects and the early stage of its development, it is helpful to present a way to structure thinking around this issue. Subsequently, queries were devised in order to institute a starting point for the literature review. This led to conceptualizing an overarching structure of mGovernment in a generic management framework (El-Kiki, Lawrence & Steele 2005), as discussed in detail in Chapter 3. Consequently, different perspectives, from which factors of success of mGovernment service (mService) projects are viewed, were found. Front office, back office, government employees, citizens and businesses are all examples of such perspectives, which have not yet been specifically adopted in mGovernment service research making it a very fertile field for research.

Accordingly, the literature study commenced by considering end users' perspectives on why mService projects succeed or fail.

2.2. Background

Government and its definition may be viewed from various perspectives. Whilst a government is considered the dynamic mixture of goals, structures and functions by which a community is ruled (Pardo 2000), it is also defined as an organisation that has the power to make and enforce laws for a certain territory (Wikipedia). A recent law writer (Meek 1999) defines government as that structure set up by the

constitution for regulating the society. Hence, a government is an organisation that has the power to enforce law for a certain territory implementing certain policies and strategies in order to achieve certain goals and functions.

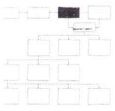
Before 1990 technology was used to automate the internal workings of government, focussing only on data processing. In early 1990s Internet technology and its standardized protocols attracted many governments to offer their public services and promote policies and political participation through World Wide Web (Moon 2002). Accordingly, information communication and technology (ICT) became available for both processing and communicating information. The rapid proliferation and development of ICT in the governmental sector created the eGovernment with specific initiatives to create new dimensions of economic and social progress (W'O Okot-Uma 2001) rendering its services to citizens, businesses and other government departments and employees. Therefore eGovernment is seen as a new shape for electronic governance or eGovernance. It is also seen as an electronic service delivery as Clarke (1999) notes that eGovernment is known as "electronic commerce in services, i.e. the provision of services with the assistance of telecommunications and telecommunications based tools".

In fact, there are many definitions of, and approaches to, eGovernment and eGovernance. Drucker (2001) argues that "in its simplest sense, eGovernance can be said to be about the use of emerging information and communications technologies to facilitate the processes of government and public administration. In reality, though, eGovernance is really about choice. It is about providing citizens with the ability to choose the manner in which they wish to interact with their governments. It is about the choices governments make about how

information and communication technologies will be deployed to support citizen choices". In addition, W'O Okot-Uma (2001) declares that "eGovernance seeks to realise processes and structures for harnessing the potentialities of information and communication technologies (ICTs) at various levels of government and the public sector and beyond, for the purpose of enhancing good governance".

On the other hand, eGovernment may also be seen as the on-line delivery of information and services related to a government entity, through the Internet or another digital outlet such as a public kiosk (West 2000). It is also defined as the use of technology to enhance the access to and delivery of government services to benefit citizens, business partners and employees (Deloitte Consulting and Deloitte & Touche 2000). Although eGovernment is viewed as an administrative rather than a policy reform (McNeal et al. 2003), McClure (2001) defines it as the use of technology, particularly Web-based Internet applications, to enhance the access to and delivery of government information and service to citizens, business partners, employees, other agencies, and entities. Similarly, the World Bank Group (2007) considers eGovernment as the use by government agencies of information technologies (such as Wide Area Networks, the Internet, and mobile computing) that have the ability to transform relations with citizens, businesses, and other arms of government. These technologies can serve a variety of different ends: better delivery of government services to citizens, improved interactions with business and industry, citizen empowerment through access to information, or more efficient government management. The resulting benefits could include less corruption, increased transparency, greater convenience, revenue growth, and/or cost reductions.

The common theme behind these definitions is that eGovernment involves the automation or computerization of existing paper-based procedures that will prompt new styles of leadership, new ways of debating and deciding strategies, new ways of transacting business, new ways of listening to citizens and communities, and new ways of organizing and delivering information (Gil-Garcia 2007; W'O Okot-Uma 2001). This is the exact definition that the researcher would have synthesised since it does gather, in a few words, all that is required through eGovernment and hence mGovernment implementation as clarified in the following sections.



2.3. eGovernment transforming phases and the emergence of mGovernment

A growth model for eGovernment was initiated by Layne & Lee (2001) which comprises of four stages of growth: cataloguing, transaction, vertical integration, and horizontal integration, as demonstrated in Figure 2-2. The model aims to decompose eGovernment initiatives into achievable developmental stages which outline the structural transformations of governments as they progress toward electronically-based government and how the Internet-based government models become amalgamated with traditional public administration, implying fundamental changes in the form of government.

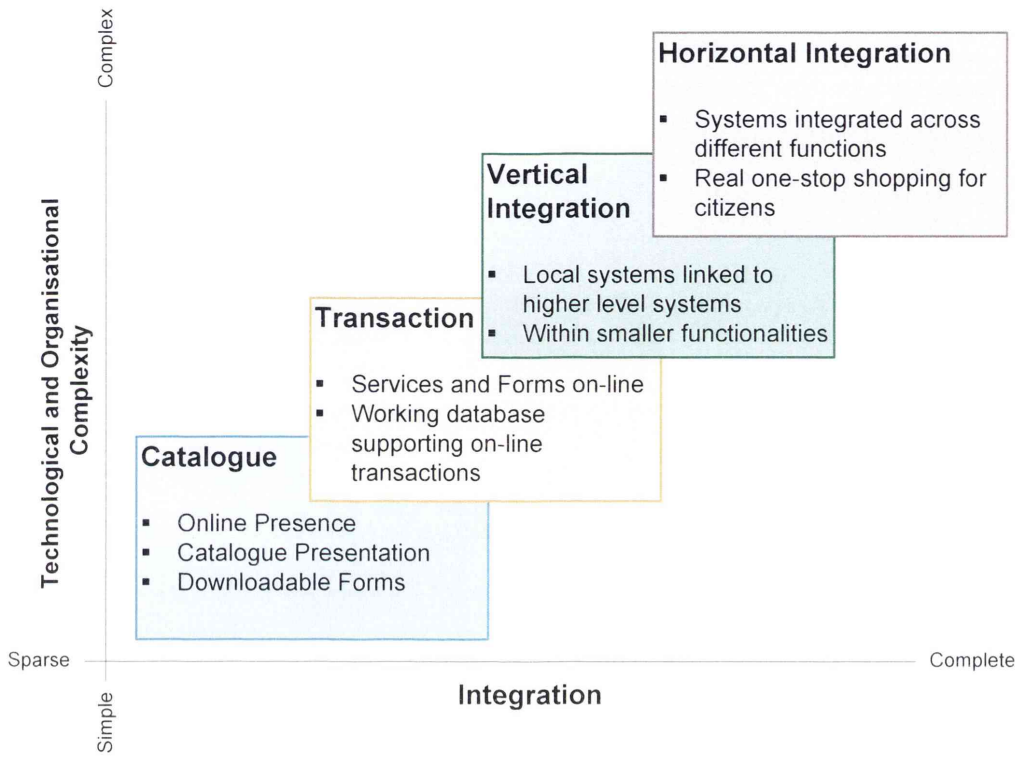


Figure 2-2: eGovernment transforming phases. Source: (Layne & Lee 2001)

The level of complexity and integration increases from cataloguing to horizontal integration. **Cataloguing** includes establishing an existence on-line through posted information and downloadable forms where stakeholders expect it. The functionality of cataloguing stage encompasses assisting stakeholders with the least amount of information, which can be classified according to government departments, services, events and actions. **Transaction** provides the real start of eGovernment as an entity influencing and persuading stakeholders to change their interaction with government through direct online dealing with live government databases. The functionality of transaction stage encompasses government response to be 'full-duplex' instead of 'half-duplex', i.e. an active respondent through a two-way communication where stakeholders fill out forms

and government responds with confirmation and receipts. Participating in online forums brings the role of citizens' to be more active. In addition, the existence of one-stop portals facilitates providing services from one location rather than traversing numerous sites in an attempt to find the correct information. **Vertical integration** means that local, state and federal government are connected, presumably transparently, for different functions and services. Hence the functionality of vertical integration comprises the three systems of the government to communicate together, with a central database or even a multi-tier database and, accordingly, integrate for cross checking and referencing. **Horizontal integration** enables seamless integration across different services and functions within the same level of government. Accordingly the functionality of horizontal integration includes databases across all the functional areas to communicate and share information.

Although the authors (Layne & Lee 2001) envisaged government as being in the business of service delivery claiming that their model aids government transformation, they did not refer to any of other authors on governing in the 'information age' such as Osborne & Gaebler (1992), Bellamy & Taylor (1994), Nye et al. (1997), Rosell (1999) or even Nolan (1973). It is known that Nolan (1973) laid the four-stage hypothesis for managing the computer which encompassed **initiation** stage (computer acquisition), **contagion** stage (intense system development), **control** stage (proliferation of controls), and **integration** stage (user/service orientation).

In 1979 Nolan enhanced his four-stage model to be a six-stage model as a result of further research. The extra two stages to his previous model are **Data Administration** and **Maturity**. Table 2-1 demonstrates the properties of each

stage with its characteristics that alter their attributes. These characteristics include the applications portfolio, data processing departmental organisation, data processing planning and control and user awareness.

	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5	Stage 6
Stage Characteristics	Initiation	Contagion	Control	Integration	Data Administration	Maturity
Applications portfolio	Functional cost reduction	Proliferation	Upgrade documentation and restructuring of existing applications	Retrofitting existing applications using database technologies	Organisation integration of applications	Application integration 'mirroring' information flows
Data processing organisation	Specialisation for techno-logical learning	User-oriented programmers	Middle management	Establish computer utility and end-user account teams	Data administration	Data resource management
Data processing planning and control	Lax	More lax	Formalised planning and control	Tailored planning and control systems	Shared data and common systems	Data resource strategic planning
User awareness	'Hands off'	Superficially enthusiastic	Arbitrarily held accountable	Accountability learning	Effectively accountable	Acceptance of joint user and data processing accountability

Table 2-1: Six stages of data processing growth. Source: (Nolan 1979, p. 117)

Based on Nolan's six-stage model, a recent research project by Jae Moon (2002) produced an eGovernment framework which consists of five stages, which are: **Information Dissemination/Cataloguing**, **Two-way Communications**, **Service and Financial transactions**, **Vertical and Horizontal Integration**, and **Political Participation**. Table 2-2 demonstrates the properties of each stage:

	Stage 1	Stage 2	Stage 3	Stage 4	Stage 5
	Information dissemination/ cataloguing	Two-way communication	Service and financial transaction	Vertical and horizontal integration	Political participation
Government to government	Agency filing requirements	Requests from local governments	Electronic funds transfers		
Government to public servants	Pay dates, Holiday information	Requests for employment benefits	Electronic funds transfer	One-stop job, grade vacation time	
Government to citizen - services	Description of medical benefits	Request and receive individual benefit information	Pay taxes online	All services and entitlements	
Government to citizen - political	Election dates	Receive election forms	Receive election funds	Register and vote	Vote online
Government to business - administrative	Regulations online	Statistical returns online	Pay taxes online	All regulatory Information online	Filing comments online
Government to business - marketplace	Posting requests for proposals	Request clarification of specifications	Online vouchers and payments	Marketplace for vendors	
Technologies used	Web technologies and bulletin boards	Electronic data interchange (EDI) and e-mail	EDI, electronic filing, digital signature, public key infrastructure, encryption	Integration of technologies from stages 1-3	Encryption, public key infrastructure, SMS mobile

Table 2-2: eGovernment framework with examples. Source: (Moon 2002, p. 426)

These transforming phases of eGovernment from different perspectives reflect the changes that must occur to any government implementing the ICTs aiming towards fully functioning eGovernment. It can be noted from Table 2 that 'technologies used' are changed and enhanced through every stage. SMS mobile technology is eminent at stage 5 reflecting the prominent and intensive use of mobile devices. Nevertheless, it was in the 1990s when governments started realizing the significance of the ICT as a vital tool in communicating with citizens. eGovernment initiatives at that decade were distinguishable from earlier applications and management of ICT in the public sector providing information and public services to other public agencies, businesses and citizens via the web. During the early ages of eGovernment adoption the focus was on the use of desktop PCs, web technologies, and network systems; which means that little attention was paid to the emerging mobile technology with its "devices such as pagers, mobile phones, remote-access laptops, wireless Internet hook-ups, and telematics" (Moon 2004).

A recent study by the researcher (El-Kiki & Lawrence 2007b) extended Moon's framework with a sixth stage; ubiquity, in order to take into account the massive existence and effects of wireless and mobile technologies in the past 3 years as detailed in Table 2-3. This is an essential step in supporting the objective of this study mentioned in Section 3.6. However, there are many issues that still need to be solved before the promise of ubiquity is fulfilled. Waldo (2001) notes that the ubiquitous computing will appear when something precipitates the phase change - such as the spreadsheet which was the killer application that seeded the explosive growth of the PC or the browser that led to the expansion of the Internet via the World Wide Web. Mobile government will need that as yet

unknown 'killer' application, which would be deliverable over the mobile infrastructure (UMTS/3G) (Millard 2003), to take advantage of the technology. In addition, Prihatmanto et al (2006) argue that ubiquity problems could be in the support for mobility, adaptability to various computing environments, capability and devices hardware design that hides its functionality.

The advent of third generation (3G) systems which supports the real-time transmission of multimedia data using the Universal Mobile Telecommunication System (UMTS), does achieve ubiquity. Moreover, through the fourth generation (4G) systems which integrate a number of existing technologies such as 3G, Digital Audio Broadcast (DAB) and Wireless LAN into heterogeneous wireless networks, prompt access to an ever-increasing range of services (Hui & Yeung 2003) will be globally available from nearly everywhere.

Mobility Value	Mobile Enterprise Spectrum	Stage 6: Ubiquity					
		IT infra-structure	Network Equipment	Wireless Networks	Mobile devices	Mobile users	Enterprise Applications
IP Infrastructure migration	IT & Telecom	✓	✓				
	Voice & Data	✓	✓				
	Wireline & Wireless	✓	✓				
	VoIP	✓	✓				
	Consolidation	✓	✓				
	IT & Telecom	✓	✓				
Wireless Enablement	Existing network		✓				✓
	Business applications		✓				✓
Multimodal Communications	Data, text, voice, sound, picture, video, multimedia		✓	✓	✓	✓	✓
Next-generation technologies	2.5G, 3G		✓	✓	✓	✓	✓
	WLAN & WiMax		✓	✓	✓	✓	✓
	Wireless broadband		✓	✓	✓	✓	✓
Interoperability & seamless roaming	Wi-Fi, GPRS, CDMA, GSM, UMTS & WiMAX		✓	✓			
Device Hardware	PDAs & Phones			✓	✓		✓
	More Functionality			✓	✓		✓
	Multimode devices			✓	✓		✓
Device Software	Evolving OS			✓	✓		✓
	More mobile applications			✓	✓		✓
Mobile Worker	More travel					✓	
	More flexible time					✓	
Life Style	Blurring of work & personal					✓	
	Less downtime					✓	

Table 2-3: Stage 6: Ubiquity. Source: (El-Kiki 2006, p. 42)

2.4. Types of eGovernment partnerships inherited by mGovernment shaping its mission and vision

Types, disciplines, applications or portfolios of eGovernment partnerships are all synonyms in this context. Several researchers such as Fang (2002), Pascual (2003), Realini (2004), Reddick (2004) and recently Saldhana (2007) agreed upon the possible types of those partnerships which are illustrated in Figure 2-3 and summarized into the following categories:

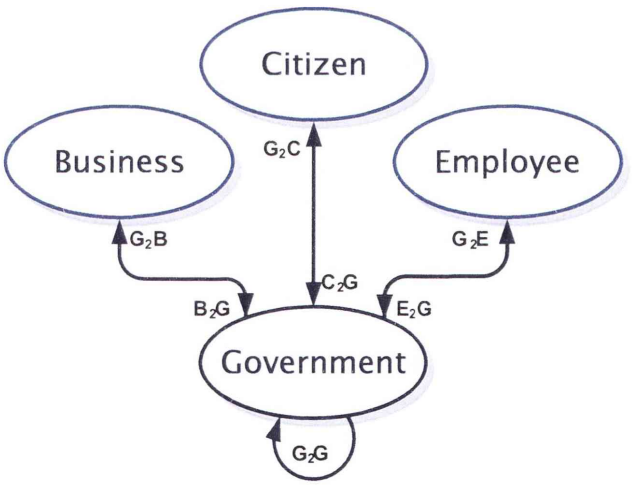


Figure 2-3: Types of eGovernment partnership

2.4.1. Government-to-Citizen (G2C) & Citizen-to-Government (C2G)

The majority of government services lie in this application which provides the impetus to put public services online, in particular through the electronic service delivery for offering information and communications to users through different options. An example of this is the Government Online (GOL) project in Canada that provides a client-centred service delivery across different delivery channels such as the internet, in person, and by telephone (OECD 2003).

2.4.2. Government-to-Business (G2B) & Business -to-Government (B2G)

This is the second major application of eGovernment where businesses carry out their transactions with the government, such as renewing registrations, lodging taxes and downloading renderers' information. Tourism portals are a good example of an eGovernment discipline that benefits both foreign and local businesses. As OECD (2003) mentioned, the Spanish government developed a multilingual tourism portal (www.spain.info) which gathers its information from different public and private sector databases in order to help tourists, and locals to plan and book holidays and accommodation packages with local businesses online. In favour of this discipline, Poon & Huang (2002) argued that G2B applications should be given the same focus and importance as those of G2C, and that government should work closely with businesses to develop effective e-government systems.

2.4.3. Government-to-Employee (G2E)

This is the least adopted eGovernment discipline, as it is considered an integral part of G2G discipline where employees can exchange information and services and interact with their seniors. One of the hindrances to the prevalent diffusion of this eGovernment application is in the low number of targeted employees when compared to external citizens or business (Ho, Yu & Lai 2005).

2.4.4. Government-to-Government (G2G)

Many government processes and transactions require collaboration and inputs from different public organisations. This discipline provides the government's departments or agencies cooperation and communication online base on mega database of government to have an impact on efficiency and effectiveness. The ultimate aim of the G2G application is to enhance inter-government organisations' processes by streamlining collaboration and coordination (Huang, Siau & Wei 2005).

2.5. Dimensions of mGovernment

According to Zálešák (2003) and Lallana (2004a), mGovernment exists to be applied to four main purposes or dimensions in the public sector:

1. **mCommunication**: Improving communication between government and citizens (mG2C, mC2G). Providing information to the public is the foundation of citizen empowerment to form intelligent opinions and act upon confronting issues meaningfully. Information is also needed not only to promote transparency but also accountability.

2. **mServices**: Mobile devices do not only provide a channel of communication between citizens and government, they also enable government-to-citizen transactions in the form of mTransactions and mPayments.

3. **mGovernance (mDemocracy)**: mVoting and the use of mobile devices for citizen input to political decision making is an mGovernment application with a tremendous potential to enhance democratic participation and involvement.

4. **mAdministration**: mGovernment also provides opportunities to improve the internal operation of public agencies through improving internal public sector operations.

These dimensions, in turn, decide mGovernment partnership portfolios (applications) as contained in Figure 2-3 and highlighted in Figure 2-4 as follows:

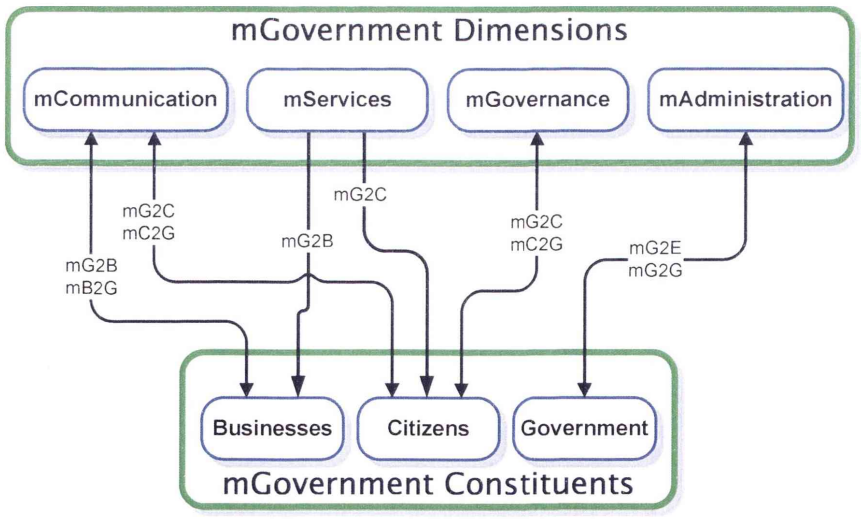


Figure 2-4: mGovernment dimensions and partnership portfolios

The direction of relationships between both mGovernment dimensions and constituents is decided by the type of partnership portfolio. For example, the

mCommunication dimension has to have a two-direction relationship with both businesses and citizens as mGovernment constituents, whilst there is a one-direction relationship between the same constituents and mServices dimension. This returns to the nature of mServices which are rendered by the government to the citizens under mG2C relationship.

These four dimensions of mGovernment shape its mission, which exists to fulfil them. The mission of mGovernment springs out of its vision. mGovernment vision means what the government wants to be and do with, and through, the implementation of wireless and mobile technology. A common vision is not a goal or objective in itself, but rather it reflects the broader goals and objectives of society to help promote inter-ministerial coordination, ensure balance and fairness and help to stay the course over a number of years. Hence, the inclusive participation of all stakeholders and political leaders is considered an essential input in drawing out the overarching picture of mGovernment vision. "While a vision statement is needed, it is still not enough, and the vision, the rationale and the validation for reform need to be communicated to the administration" (OECD 2003) in order to be translated into prioritized action plans.



2.6. mGovernment definition and its integration with eGovernment

mGovernment is seen as a subset of eGovernment, as it stands for the use of mobile and wireless communication technology within the government administration and in its delivery of services and information to citizens and firms (Östberg 2003). The concept of mGovernment is deeply related to the multi-channel (WAP, MMS, SMS,

Web, Satellite etc.) strategy of eGovernment services (Germanakos, Samaras & Christodoulou 2005; Jeong & Kim 2003).

On the other hand, mGovernment should not be viewed as a new type of government, rather a new 'tool' for government. mGovernment is a mix of complex strategies which is seen as a great method for improving efficiency of the traditional government tasks as it changes the working style of the government and enables establishing a favourable relationship between the government and the public (Guangzhou Xuanyuan Network & Engineering 2004).

From the employee's perspective, mGovernment provides a seamless environment for employees enabling them to communicate, go into a meeting to another office or on the road without the need to plug into a network interface, in addition to accessing their emails, calendars, maps and tasks. For example field workers, customs inspectors, immigration agents, medical, law enforcement and military personnel can all benefit from access to current data to make better and faster decisions (AFIRM 2002).

From the citizen's and business's perspective, mGovernment facilitates accessibility to government services and public information at anytime, anywhere; saving time, effort and money. Generally, computers do not travel with citizens, but information and public services can as mGovernment provides for instant availability of services and information, helping frequent travellers and people on the move to access government (Banerjee & Chau 2004).

For example, in Malaysia the citizen can use short message service (SMS) to verify his voting information, such as state and parliamentary constituencies, from wherever he is; this is in addition to receiving real-time information to his mobile device. Another

example is the state government in California, as they established a webpage for citizens in order to let them register if they desire receiving 'cell notification services' for traffic updates, energy alerts, lottery results and even papers from the Governor's press room. Citizens are also involved in the fight against crime and illegal drugs by using SMS (Heeks 2004a).

Matching between mGovernment definition and eGovernment definition mentioned at the end of Section 2.2, it can then be stated that both types integrate and complement each other prompting new pulse of effective and efficient services to citizens, businesses and government officials.

2.7. Pressures facing and leading to mGovernment

Both Kushchu & Kuscu (2003a) viewed that the major changes in the technological infrastructure and the advances in the mobile telecommunication services as the forces influencing the move from eGovernment to mGovernment.

One year later Yu & Kushchu (2004) added the pressures on public administration, which also include globalization in various government activities (Awan & Kushchu 2004), to these forces and classified them into three categories:

a) The pressures towards meeting increased expectations, which means that the more new services become available in the commercial sector, the more demanding citizens become for similar services in the public sector, which, in turn, requires more efficient government units with employees who need more accurate and timely information readily available.

b) Pressures towards adoption of new technologies, which return to the implementation of mobile Internet and the high level of mobile penetration (Sadeh 2002) all over the world. This enables the provision of more sophisticated mobile government applications and accordingly higher accessibility to government services than that through the wired Internet.

c) Pressures towards further improving eGovernment efforts to enable accessibility to government applications from anywhere. There are still applications that run only with mobile technology such as location dependent information delivery, and this is also affirmed by Cilinigir & Kushchu in the same year (2004).

On the other hand, Banerjee & Chau (2004) argued that the reason for the mGovernment evolution relates to the increase of number of people who could afford to have cell phone or other wireless device compared to those who have access to PCs. This was virtually confirmed by Púca (2004) who published a specialised mGovernment survey confirming that while 42% of the Irish population have access to an Internet connected computer, there are over 80% who have a mobile phones and 48% of their owners were interested in using their phones to access public sector services. This is also confirmed when taking into consideration the global penetration and growth rates of mobile technologies (Mohanty 2005) as illustrated in Table 2-4 and Figure 2-5.

	2005	2006	2007	2008
Western Europe	101.40%	106.30%	108.90%	110.30%
North America	67.60%	74.00%	79.40%	83.70%
Eastern Europe	63.60%	74.30%	79.30%	82.80%
Latin America	43.30%	50.70%	53.30%	55.00%
Middle East	38.00%	45.40%	50.90%	54.50%
Asia/Pacific & Japan	22.50%	26.20%	30.00%	33.90%
Africa	21.00%	27.30%	32.20%	36.00%

Table 2-4: Projected global mobile penetration levels. Source: (Taaffe 2006)

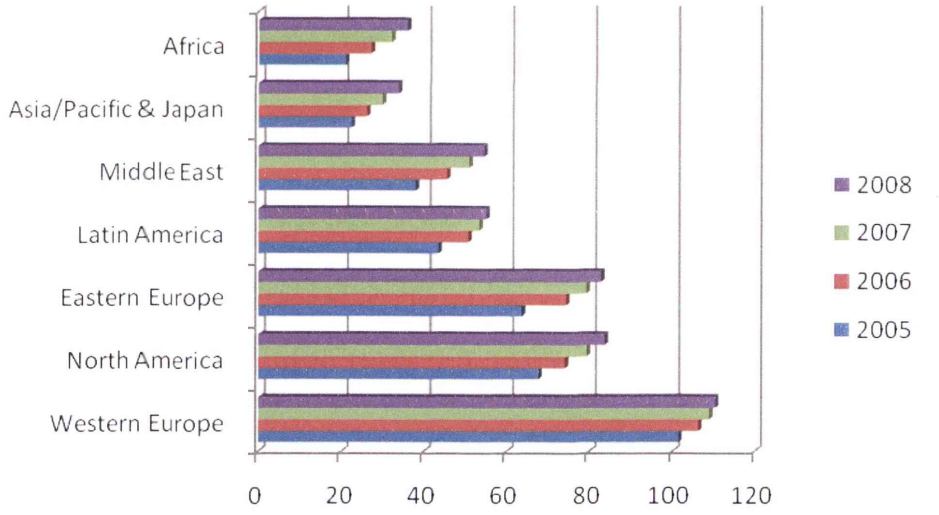


Figure 2-5: Projected global mobile penetration levels. Source: (Taaffe 2006)

These previous diversified opinions about pressures are deemed valid enticements to propel governments to adopt mobile service delivery. The result is a new initiative process for initiating mGovernment projects. This initiative process is illustrated in Figure 2-6 where pressures, their impacts and responses, are forming the

relationship among inputs, outputs and outcomes of such processes. This point will be elaborated on in the third chapter which handles the research problem in Section 3.7.

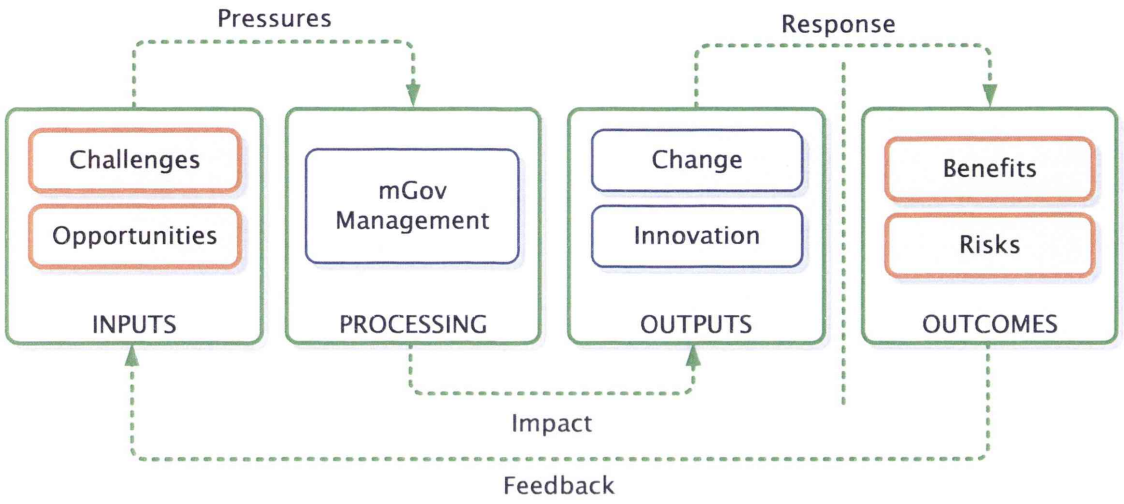


Figure 2-6: Generic mGovernment project process. Source: adapted from El-Kiki et al. (2005)

2.7.1. Challenges and Opportunities

Both challenges and opportunities represent another type of pressure on the government before and after adopting the mobile technologies. For the government to respond, i.e. take a proposed initiative into action, those challenges and opportunities should be manipulated or 'processed'. The type of challenge or opportunity determines the impact affecting the government and accordingly the type of response (El-Kiki, Lawrence & Steele 2005). For example, if the pressure is an "economic" opportunity to be seized, the outcome will be an economic project making use of such opportunity.

As a subset of eGovernment (El-Kiki 2006), mGovernment shares its original challenges and opportunities. Lanvin (2002) identifies numerous challenges and opportunities that should be considered by eGovernment management. Based on Lanvin's considerations, the following is a synthesized review comprising other researchers' opinions as well, with the focus on mGovernment.

2.7.1.1. Infrastructure Development

Infrastructure includes the cellular network backbone (communications and connectivity), middleware and development tools needed to support all kind of mobile applications. Examples are the 3G mobile communications infrastructure cdma20001x EV-DO and W-CDMA with transmitting speeds of up to 2.4 Mbps (Kim et al. 2004), and WAP, Bluetooth, Sun's Jini, and HP's JetSend, location-pinpointing technologies, 3G, and GPRS for connectivity infrastructure (Perry et al. 2001). This is in addition to customer relationship management system and back-office systems, to deliver greater speed, innovation, reliability and simplicity.

Infrastructure development is considered a barrier specifically in the context of mGovernment service access as it affirms the need to develop affordable, secure, and reliable information and communication infrastructure on a national level with an efficient connectivity to global networks (ESCWA 2003).

Poor infrastructure represents a challenge to mGovernment development (Moon 2004), in addition to its high cost (Sandy & McMillan 2005) which deeply affects its deployment (Mohanty 2005).

2.7.1.2. Law and Public Policy

Wireless and mobile technologies implementation breeds new methods for achieving regular tasks and transactions such as mPayment and mVoting. Rights and responsibilities of all constituents involved in mGovernment have yet to be decided in many countries around the world, which have already implemented, or contemplating to implement, wireless and mobile technologies. The legal stance of, for example, mobile signature, mobile identity verification, contracts concluded electronically (Gramlich 2005) or online taxable transactions is still vague as there is no clear legal status for these issues. Kushchu & Kuscu (2003a) summarize the legal challenge by saying that "many countries around the world have not yet adopted the Law of Fair Information Practices, which spells out the rights of data subjects (citizens) and the responsibilities of the data holders (government)".

There are many issues which are still pending for a legal resolution such as Multiple Digital Identities (MDI) where there are multiple digital identities for a person acting in different roles or using different applications. Each digital identity may reflect a person's actual or 'legal' name, or it may be pseudonymous (Blum, Gebel & Moench 2004; IST 2003; Kubicek, Westholm & Winkler 2003), and the use of online anonymity and privacy issues (Adam et al. 2005) such as privacy friendly concepts of Public Key Infrastructure and privacy friendly Digital Rights Management (DRM) (4th Generation Mobile Communications Committee 2004; IST 2003).

2.7.1.3. Digital Divide

The digital divide is an expression that indicates an overall (and world-wide) lack of electronic inclusion or 'eInclusion' (Clarke 2003).There have been various perspectives

from which digital divide is viewed and defined. In general, definitions describe the relationship between individuals and computer technology be it software or hardware. Molina (2004) defines digital divide as "a predominantly quantitative gap in access to ICTs, or, as an intrinsic element of the much wider and deeper problem of exclusion and relative poverty with all their manifestations". The National Electronic Commerce Coordinating Council (NECCC 2001b) defines the digital divide as "the gap in opportunities experienced by those with limited accessibility to technology especially, the Internet. This includes accessibility limitations in Social Issues (need to talk to a person, etc.), Cultural Issues (language barriers, etc.), Disability Issues (ADA, etc.), Economic Issues (access to technology devices), Learning Issues (marketing, overcoming unfamiliarity, changing habits)".

Digital divide perspectives differ depending on the approaches adopted by researchers. For example, Becchetti & Adriani (2003) and Compaine (2000) consider digital divide as a direct dichotomy between those who have access to computers and ICT, and those who do not have. Others such as Ferro et al. (2005), Mossberger et al. (2003) and Norris (2001) suggest multi-dimensional approaches which consider the global divide, the social divide, the democratic divide, the skills divide and the economic opportunity divide as the components which should be considered when analysing the digital divide.

The digital divide also occurs between nations as they differ in their capabilities for delivering, accessing and exchanging information in its digital structures. As an example, in 2004 Internet users (ITU 2004) constituted merely 1.76% of the population in Africa while the percentage was 74.06% in the United States, and 29.24% in Europe and 68.90% in Australia. According to the International Labour Organisation (ILO 2001) wireless and mobile telecommunications networks and applications

represent an opportunity for 'leapfrogging' solutions for developing nations in order to bridge their digital divide with other developing or developed nations; bypassing earlier investments in the time or cost of development.

Thus, mGovernment strategic goals are confronted with this challenge which is in fact twofold. To fully utilize the potential of wireless and mobile technologies to overcome some forms of social exclusion, whilst, on the other hand, ensuring that end users are not escaping from using those technologies due to their ICT illiteracy or incapability. In this concern, some researchers (Chang & Kannan 2002; Huijnen 2006) consider mobile technologies as a possible channel to decrease the digital divide caused by the fact that not everybody has access to a pc and/or internet connection.

2.7.1.4. Trust, Privacy and Security

a) **Trust** is defined by Mayer et al. (1995) as "the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control the other party".

Trust is a particularly important barrier to be addressed when developing an access strategy for mGovernment services. Lack of trust in online entities can prevent end users from providing personal information (Hoffman, Novak & Peralta 1999a) and hinder adoption of eCommerce (Bhattacherjee 2002b). End-users' trust in mServices springs out from understanding the implications of the mICT they use in terms of privacy, security and cyber-crime.

Chepatis (2002) highlighted the role of trust and information quality in a case study of Russia over a nine-year period. Lack of trust was demonstrated in

different ways including fraud and corruption which severely limited the reach of ICTs and the information to Russian citizens. Furthermore, Bernhardt et al. (2002) found lack of trust in many US government-sponsored websites. 'Building trust between governments and citizens is fundamental to good governance. ICT can help build trust by enabling citizen engagement in the policy process' (OECD 2003) as it is applied in the Philippines where soldiers are able to use SMS messages to communicate with their leaders if they suspect corruption in the ranks (El-Kiki, Lawrence & Steele 2005).

Trust and confidence are the mirror issues of the privacy and security discussion in the technology area (Macnaughton 2004). Hence, privacy and security are covered in the following two points.

b) **Privacy** is defined (Legnini 2006) as "the right to be left alone and to control the conditions under which information pertaining to you is collected, used and disseminated" . Privacy in the online (and wireless) arena is mostly concerned with the protection of information (Tootell, Alcock & Cooper 2003). The wireless data transmission could be eavesdropped or someone could track the user's position (Decker 2006), for example breaking through WEP (Wired Equivalent Privacy) which was the first encryption standard used for Wi-Fi even despite being properly configured. If users' privacy is not protected when using a mobile service, they simply will not use it again, making it very difficult to achieve critical mass. Users are becoming more aware of privacy issues and comparing the privacy policies of government sites with those of the private sector.

Privacy aspects in mGovernment are related to data security, email, virus, location based and transaction details (Sharma, Murthy & Sundar 2006). As outlined by Ng-Kruelle et al. (2002) a serious concern for the concept of "location/context awareness" is the confidentiality of information concerning a person's position. Indeed "misuse could lead to increased intrusion on privacy by exposing an individual's real-time movements with possible negative implications."

Citizens would normally react badly to such surveillance of their movements by a government, despite this, it is enabled so that emergency services can locate mobile phone users (El-Kiki & Lawrence 2006b); another challenge added to the emerging mGovernment.

c) **Security** is protection from intended and unintended breaches that would result in the loss or dissemination of data (NECCC 2001a). Security is not just about installing the latest security devices and deploying the most modern security technologies. Information security is a combination of business, management and technical measures on an ongoing basis.

In a 2005 study by Quocirca, two thirds of IT professionals rated data falling into the wrong hands by theft or loss of a device as the most important mobile security issue (Bamworth 2006). If the material contained mobile voting records, the effect could be catastrophic for governments. There are options for bolstering security, but there are no fool-proof solutions because of the physical characteristics of wireless media.

Nevertheless, Al-Saraireh et al. (2006) introduced a new technique to protected user identity by encrypting user international mobile subscriber

identity (IMSI) to provide user confidentiality and consequently the IMSI cannot be eavesdropped, and to ensure the confidentiality of user data and signalling traffic by preventing localizing and tracking of a mobile station.

2.7.2. Transparency and Accountability

a) **Transparency** means openness of decisions and actions taken by civil servants to the public who would seek to hold them accountable (Heeks 2004b). Citizens too rarely understand how government decisions are made. This lack of transparency prevents the public from actively participating in government and from raising questions or protesting unfair or ill-advised decisions, and it can conceal official graft or favouritism (Reffat 2003).

This is confirmed in a recent study in Macedonia by Antovski & Gusev (2006) in an attempt to test the user's readiness to adopt the mGovernment channels as they found that 84% of participants did not think that mGovernment will enable transparency. mGovernment as a subset of Government (El-Kiki 2006) is no different; mServices should provide transparency to their mobile users.

b) **Accountability**, on the other hand, is an immediate issue as mGovernment services must be accountable to their mobile users, i.e. assure that mobile users can tell who did what and when, and are convinced that the system keeps its security promises. The issue of accountability is, therefore, one of the themes in this monograph (AGIMO & IPAA 2004).

As per Christensen and Laegreid (2002) "The success of market-oriented accountability is dependent on citizens having sufficient resources to make their preferences felt in the market and upon the perfect realization of the

> notoriously unrealistic conditions that characterize the economist's 'ideal market'." "A preoccupation with efficiency tends to overvalue the need for managerial accountability rather than promoting political responsibility. Efficiency is no guarantor of good political and social judgment, which are essential in securing genuine political responsibility and legitimacy in a democracy" (ibid, 2002). In addition, the use of private sector partnerships must not reduce accountability.

Thus, many researchers (Accenture 2003; CPSI 2003; Government of Italy & United Nations 2003; Martin & Byrne 2003; Millard 2004; Millard et al. 2004; Pascual 2003; Realini 2004) state that transparency and accountability can be achieved by eGovernance (or eDemocracy). Gronlund (2003), however, considers accountability as a base for "thin" democracy, which is still vague and impractical to achieve, in contrast to "strong" democracy. Earlier Altman (2002) raised suspicions about the ability of eGovernment to have a positive effect on democratic accountability. On the other hand, Heeks & Lallana (2004) consider accountability, publication, openness, transactions and reporting as examples of the types of transparency that eGovernment offers. The difference among researchers in defining each element of eGovernance makes it difficult to precisely achieve each element in reality, adding more barriers to the success of the mService projects.

2.7.3. Technical Challenges

Technical barriers, such as low priority for ICT, interoperability/roaming issues and scalability (Guijarro 2003; Millard 2004; Prisma Project Team 2003a), are considered major challenges facing mGovernment. The proliferation of tools and mobile networks is a huge challenge to governments as they try to evaluate the business case

for implementing mGovernment services. There are issues with 'bandwidth and the small screen size of mobile devices' and the lack of availability of 'context aware information'.

It is found that many private and government organizations which have adopted new technologies have often regretted the decision (Wyatt 2005). In fact, technology fatigue is often a barrier to the adoption of new technology so governments must check carefully before committing to mGovernment projects. Elaborating on this, one promising technology, Near Field Communication (NFC), is already starting to revolutionise the way people use their mobile phones. NFC uses a short range wireless chip that can be placed into mobile phones to enable them to transfer all sorts of data (including credit card details and bus timetables) once the user touches his phone to a NFC paypoint (Flynn Vencat 2006). This is just one technology that could prove attractive to government officials - for example citizens could pay their parking fees and click through to pay for train tickets, at NFC paypoints, both of which are often controlled by government authorities. The downside, of course, is the infrastructure costs of setting up the NFC paypoints. However, industry pundits are predicting the mobile will replace the wallet by 2010; will that represent an incentive or a challenge for government to adopt mITC?

2.8. Chapter Review

This chapter set out the foundations of mGovernment. It explored the phases of eGovernment transforming and the emergence of mGovernment, which actually occurred when wireless and mobile technologies were firstly utilized in eGovernment initiating a new sixth stage added by the researcher to the five stages proposed in the literature which was identified as "ubiquity" (El-Kiki 2006).

As a subset of eGovernment, mGovernment's relationship between its dimensions (purposes) and constituents (beneficiaries) contributed to shaping its mission, vision and strategies. Consequently, its goals were determined depending on the level of mGovernment implementation, be it at national, ministry, agency or project level. Goals in turn were interpreted into objectives depending on the intended partnership portfolio (mG2C, mG2B, mG2E or mG2G).

Different types of pressure, which led to mGovernment, were discussed. Challenges and opportunities, transparency and accountability, and technical challenges were just a few examples of such pressures.

Having established a clear picture of the roots and evolution of mGovernment, the researcher, in the following chapter, reviews in detail the literature that examines factors that influence the success and failure of eGovernment service projects. It then reports on the influence of those factors on mGovernment services projects leading to and locating the research questions.

CHAPTER 3

3. Research Problem

This chapter reviews the roots of the research problem posed in this study. It starts with an explanation about mGovernment goals and their types, which are in turn converted into objectives and strategies for initiating mGovernment service projects. For these mobile service projects to be successful, their objectives have to reflect and satisfy the needs of mGovernment constituents. Citizens and businesses are two types of constituents whose needs have to be reflected in the objectives of the mobile service project for it to be successful.

Subsequently, this chapter explores the related studies that handled success factors of service projects, in order to flesh out the research problem. As an essential step that assists in locating the problem, the mGovernment generic framework was constituted and used.

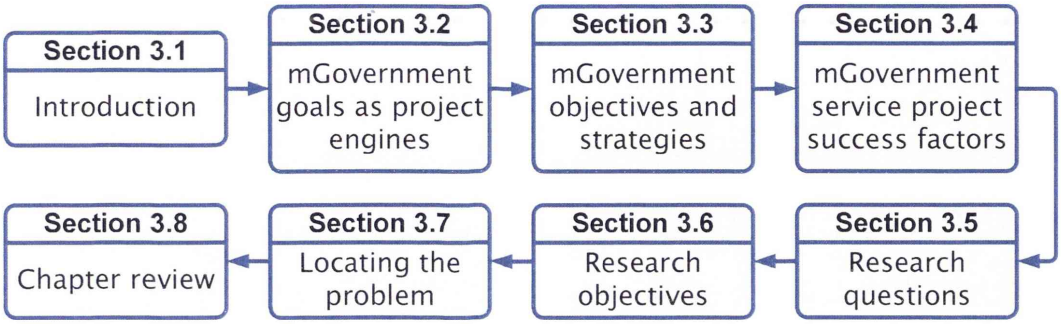


Figure 3-1: Chapter 3 outline

3.1. Introduction

Section 2.5 discussed that mGovernment vision means what the government wants to be and do with, and through, the implementation of wireless and mobile technology. Of this vision, mGovernment mission springs out. In order for mGovernment mission to be successful, it has to have realistic goals which reflect the reality with all its problems. mService project is created to solve a real problem, or satisfy an existing need. When the solution of a problem creates other problems or does not satisfy a need, it is then considered as a failure. Numerous reasons, or factors, from different perspectives, could be behind mService project's failure. In this study, mService project implies any new mService to be offered, and/or current mService which is to be re-engineered. Because this study is focused on the mService, the word 'project' may be omitted after this chapter, lest it distracts the reader to the 'project of mService' rather than the 'mService as a service'.

In the following sections, this chapter explores the types of mGovernment goals which are translated into objectives which are, in turn, taken into mService

projects. Success factors as mentioned and viewed by other researchers in both mGovernment and eGovernment fields are also explored. The investigation of those factors revealed that user's needs were amongst the least considered success factors; which is the factor at which the problem of the research was found.

3.2. mGovernment goals as project engines

Goals are the interpretation of the mission and vision of mGovernment. There are many goals for mGovernment implementation; most of them spring out from the eGovernment implementation goals with some adaptations necessitated by the "mobility" characteristic. mGovernment goals differ from one country to another depending on each country's needs context. Pascual (2003, p. 10) mentions five categories of eGovernment goals identified by The Working Group (WGeGDW 2002), which are used as generic goals for mGovernment:

1. Creating a better business environment.
2. Serving customers online (anywhere, anytime), not in line.
3. Strengthening good governance and broadening public participation.
4. Improving the productivity and efficiency of government agencies.
5. Improving the quality of life for disadvantaged communities.

From generic to national, ministry or agency levels, goals are set taking into account the specificity of each sector or organisation (OECD 2003); mGovernment goals at the national level can be used to:

1. Secure support, involvement and responsibility from the top political and management level in all ministries.
2. Ensure the necessary legislation and central funding.
3. Create useful co-ordination and co-operation mechanisms.
4. Ensure motivation/incentives for cross-administration projects.
5. Ensure that targets are integrated into performance and budget management processes to create/facilitate ministerial steering mechanisms.
6. Ensure ownership/responsibility at the central level for overall co-ordination, monitoring and evaluation of national strategy.
7. Ensure that the steering of the national vertical strategy is integrated with the horizontal steering of administrative fields (to address the decentralisation/centralisation dilemma).

The following goals included in the Government of Italy & United Nations' (2003) report pertaining to utilizing eGovernment for development, are mentioned as examples of mGovernment national goals:

1. Government as a catalytic force of social and economic development, empowering its institutions through the use of ICT to work together with civil society to meet the needs expressed by its constituency.
2. Accountable, efficient and effective processes for performing government administration, reducing transaction costs and enhancing policy coordination between the different government entities.

3. Effective delivery of public services through efficient administrative and financial systems, ensuring quality, accessibility, affordability and sustainability.

4. Increased capacity of Government to engage in participatory and consultative decision-making processes, by simplifying and increasing the interaction and transaction between citizens, the private sector and government through the provision of on-line services and channels of participation.

3.3. mGovernment objectives and strategies

These goals are further detailed into objectives. Objectives in turn are clustered according to the perspective from which they are viewed. For example, in their report, Asia Oceania Electronic Marketplace Association (AOEMA 2004) determined sectoral objectives which depend on the eGovernment partnership portfolios, which are in turn inherited by mGovernment. Broad sectoral objectives for mG2C and mG2B are adapted and cited as examples, as follows:

3.3.1. mG2C (mGovernment-to-Citizen)

mG2C represents a relationship between one of the mGovernment dimensions and the citizen as a constituent, and the following goals are set from the government's perspective:

1. Provide on-line, instant access to information and services to individuals. Citizens should be able to find what they need quickly and easily, and access information in minutes or seconds, instead of days or hours.

2. Delivering services that are citizen, not agency focused.
3. Disintermediation of civil service staff — delivering services directly to citizens.
4. Building and enhancing trust, which is one of the main success factors for mobile services.

3.3.2. mG2B (mGovernment-to-Business)

mG2B represents a relationship between one of the mGovernment dimensions and the business as a constituent, where also the following goals are set from the government's perspective:

1. Reduce burdens on business by providing instant access to information to facilitate business development. Eliminate the need to report the same data multiple times to multiple agencies. Streamline reporting requirements by creating more efficient ways for business to interact with government.
2. A national economy with flexibility and competitiveness within the global markets.
3. Skilled, IT literate and flexible citizens for the labour market.

Considering these seven objectives are what the mGovernment agency or department wants to achieve for both citizens and businesses when they utilise mService, then these objectives should be investigated or detailed from the perspective of those constituents as end users in order for mService to be successful.

Investigating these objectives from the perspective of the constituents' means revealing their own objectives and needs, making the mGovernment's objectives match with and satisfy the end users' needs. It shall be meaningless for the government to render an mService just because they have its infrastructure or the technology, while it is not satisfying end user's real and existing needs. Figure 3-2 illustrates the relationship between mGovernment vision and its projects.

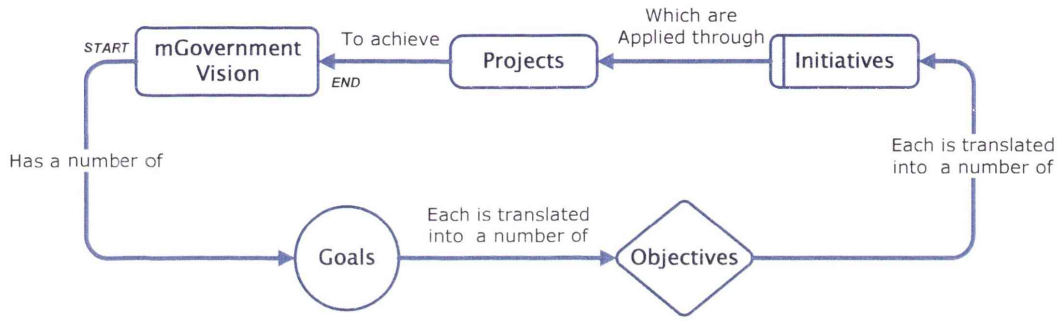


Figure 3-2: The relationship between mGovernment vision and its projects

According to Boyton and Zmund (1984), project success factors "are those few things that must go well to ensure success for manager or an organisation, and, therefore, they represent those managerial or enterprise areas that must be given special and continual attention to bring about high performance". The following section endeavours to investigate "those few things" that relate to mGovernment service projects, in order to find out more about the research problem.

3.4. mGovernment service project's success factors

Due to the novelty of mGovernment as an area of research, there are very few studies which handled success factors of mService projects, so exploratory

research is adopted as a legitimate methodology in such a case (Hussey & Hussey 1997). Such exploratory or investigative research assists in establishing the theoretical foundation for further examination and has been vital in developing a viable, theoretical framework (Sekaran 2003).

Using the keyword search method to search for success factors, different combinations of words, such as success, failure, factors, elements, were used to search in titles and abstracts of entries of many online databases such as EBSCO and IEEE Explore as mentioned in Section 5.2.1. The scope of the search included IT, Social Sciences and Business fields in order to cover a wide range of topics. A preliminary review of the results indicated that the search retrieved success factors for a variety of topics that did not relate to mGovernment or eGovernment. Filtering the search results using keyword such as mGovernment, m-Government, mobile government, wireless government, mobile electronic government, electronic government, etc. enabled focusing the returned results to the study topic.

Returned results were still in need to be sorted out due to the variety of perspectives influencing those success factors. Tables 3-1 and 3-2 summarise eGovernment and mGovernment success factors as they were found in their related studies, where some factors are long sentences and others are single words. The researcher preferred including them as 'raw' as they are, in order to highlight the diversion of opinions and perspectives in this regard. These tables are the preparatory step assisting in finding the research problem, which will then be viewed from the end user's perspective.

eGovernment Success factors	Reference
1. Critical success factors (CSF) approach that focuses on individual chief executives and managers and their hard and soft information needs.	(Rockart 1979)
2. Another study that investigates the perceptions of staff in regard to CSFs for successful business process re-engineering (BPR) implementation in the public sector, which shows that many of the key CSFs identified for BPR in the private sector are equally relevant to the success of BPR in the public domain. These factors are: top management support, commitment and understanding of BPR; communication; empowerment; and alleviation of downsizing fears.	(McAdam & Donaghy 1999)
For leaders to succeed, they must: 3. Focus on how IT can reshape work and public-sector strategies. 4. Use IT for strategic innovation, not simply tactical automation. 5. Use best practices for implementing IT initiatives. 6. Improve budgeting and financing. 7. Protect privacy and security. 8. Prepare for digital democracy.	(Mechling 2000)
Success factors are: 9. The positioning of e-government strategies, official responsibilities and authorities within government. 10. Stronger inter-agency cooperation is essential to making e-government work effectively across the enterprise of government. 11. The implications of 24/7 government on the structures and practices of government must be addressed. 12. Recognising the impact that e-government has on the operating cultures of government organisations. 13. Balancing the information access and privacy protection priorities requires careful attention to corporate information management	(Culbertson 2002)

strategies.	
14. The CSFs are derived from the market, and are not automatically manageable and controllable. Therefore, the CSFs method relates the CSFs to critical business processes (CBPs), and proceeds from these business processes to critical control variables (CCVs).	(van Veen-Dirks & Wijn 2002)
15. For a municipality's collaborative projects to work, relationship-building with project partners is the most significant success factor.	(Lenihan & Hanna 2002)
16. Balancing between the benefits of the ICT, such as the new digital opportunities for the inclusion of socially disadvantaged people, and its risks, such as the exclusion of those who are "digitally illiterate", is considered a critical success factor for the ICT in the information society.	(Clarke 2003)
A case study that tackles success factors in adopting electronic services in the Department of Commercial Registration (DCR), which verifies the adoption from different dimensions: 17. Information 18. Technology 19. Processes 20. Objectives &Values 21. Staffing and Skills 22. Management and Structure 23. Other Resources Dimension	(Varavithya, Esichaikul & Koedkanmag 2003)
The development of Electronic Government projects presents various challenges, which, at the same time, can be success factors: 24. Web Portal design with a high usability degree 25. Production of contents adjusted to the users' cultural, linguistic and intellectual background. 26. Simplification or reengineering of services management process, in	(Valenti, Anta & Bendersky 2003)

order to reach fast and simple services.	
Four critical success factors for eGovernment: 27. Leadership, 28. Governance, 29. Competency and 30. Technology *Combining another three elements:* 31. improving organisation performance, 32. improving service delivery, and 33. improving participation and citizen engagement.	(CIBS & CCICMT 2003)
34. Trust is a critical success factor of e-government	(Lee & Rao 2003)
35. In addition to expert legal knowledge and skills in ICT disciplines, a crucial factor for success is managing eGovernment as a project within each government agency.	(OECD 2003)
36. External pressure 37. Internal political desire 38. Overall vision and strategy 39. Effective project management 40. Effective change management 41. Effective design 42. Requisite competencies 43. Adequate technological infrastructure	(Chowdhury, Habib & Kushchu 2006)
CSFs are: 44. Privacy and transparency for the "clients". 45. Project governance 46. Agreed upon standards	(Millard et al. 2004)

47. Business requirements should be the driver 48. Parallel running of manual and electronic systems in a "live" environment 49. Early identification of any new legislation 50. Corporate commitment 51. Prior back-end system integration 52. Having adequate funding 53. Effective marketing 54. Training 55. Necessary legislation in place	
Drawing on the experience of various eGovernment projects, certain critical success factors are being revealed: 56. The role of advanced technology within the entire scope of objectives. 57. Adequate funding and public-private partnerships 58. Strategic frameworks based on cost-benefit analysis 59. A supportive legal and regulatory environment 60. Change management and the ability to deal with implementation problems.	(Leitner 2004)
61. Community awareness and training programs are often key success factors for successful introduction and acceptance of new online service channels. 62. Strong leadership as a key success factor for e-government development.	(AOEMA 2004)
63. Organizational responsibility for eGovernment 64. eGovernment awareness 65. Budgetary funding 66. Organizational Change	(Becker et al. 2004)

Five categories summarize key success strategies for government IT initiatives: 67. Information and data 68. Information technology 69. Organizational and managerial 70. Legal and regulatory 71. Environmental or institutional	(Gil-Garcia & Pardo 2005)
72. Internal political desire 73. Overall vision and strategy 74. Dominance of politics/ Self interest 75. Strong change management 76. Effective project 77. Competencies among the officials involve with this project 78. Adequate technological infrastructure	(Chowdhury, Habib & Kushchu 2006)
79. Executive support has long been regarded as a critical IT success factor.	(Gil-Garcia, Pardo & Burke 2007)

Table 3-1: Summarised eGovernment success factors

mGovernment Success factors	Reference
Key success factors for service adoption: 80. Usability 81. Privacy 82. Quality of service 83. Interoperability 84. Pricing 85. Security	(Wohltorf & Albayrak 2003)

86. Content	
87. Designing and developing usable and useful mobile applications 88. Selecting optimal mobile business process candidates 89. Ensuring data security	(Basole 2004)
90. A success factors model for mGovernment service delivery which comprises of six elements: 91. Cost 92. Business Re-engineering 93. Education 94. Acceptance 95. Security 96. Access	(Sandy & McMillan 2005)
97. Providing high quality information is an important success factor for MGovernment. 98. mGovernment partnership with private Mobile Operators as a success factor in order to make up for the lack of GPS receivers in most of mobile phones.	(Al-khamayseh et al. 2006; Stanoevska-Slabeva & Hongisto 2006)
99. Privacy and Security 100. Infrastructure 101. User needs and preferences 102. Quality and user friendly applications 103. E-government 104. Acceptance 105. Cost 106. Standards and data exchange protocols 107. Coherent m-government framework 108. High mobile penetration	(Al-khamayseh & Lawrence 2006)

109. Infrastructure management 110. M-government awareness 111. Access 112. Strategy 113. IT literacy 114. M-government portal and exclusive gateway 115. Partnership with private sector 116. Legal issues: liberalisation of telecommunication sector	
117. Interoperability 118. Security 119. Openness 120. Flexibility 121. Scalability	(Antovski & Gusev 2006)

Table 3-2: Summarised mGovernment success factors

These factors were consequently sorted and filtered out in order to acquire realistic frequency for each factor as shown in Figure 3-3. This process was accomplished using the similarity of meanings among factors even if different words were used.

A close look at Figure 3-3 reveals that user needs dominate most of the extracted factors such as Access, Pricing, Training, Usability, Privacy, Security, etc. On the other hand, and for once, 'User Needs' was mentioned as a success factor by itself, meanwhile it should be the heading for many factors in the list. This confusion returns to the assumption that these factors were not considered as end user's needs since 'User Needs' was mentioned as one of the success factors on its own.

While 'Effective Management' was the factor that gained most of the researchers' emphasis, other factors such as Leadership, Strategic Innovation, Effective Project Management and Business Process Re-engineering are all factors for effective management itself.

Accordingly, these two points, 'user needs' and 'effective management', triggered the research question, which is discussed in the following section, that necessitated devising the theoretical framework for mGovernment management as mentioned in Section 3.7.

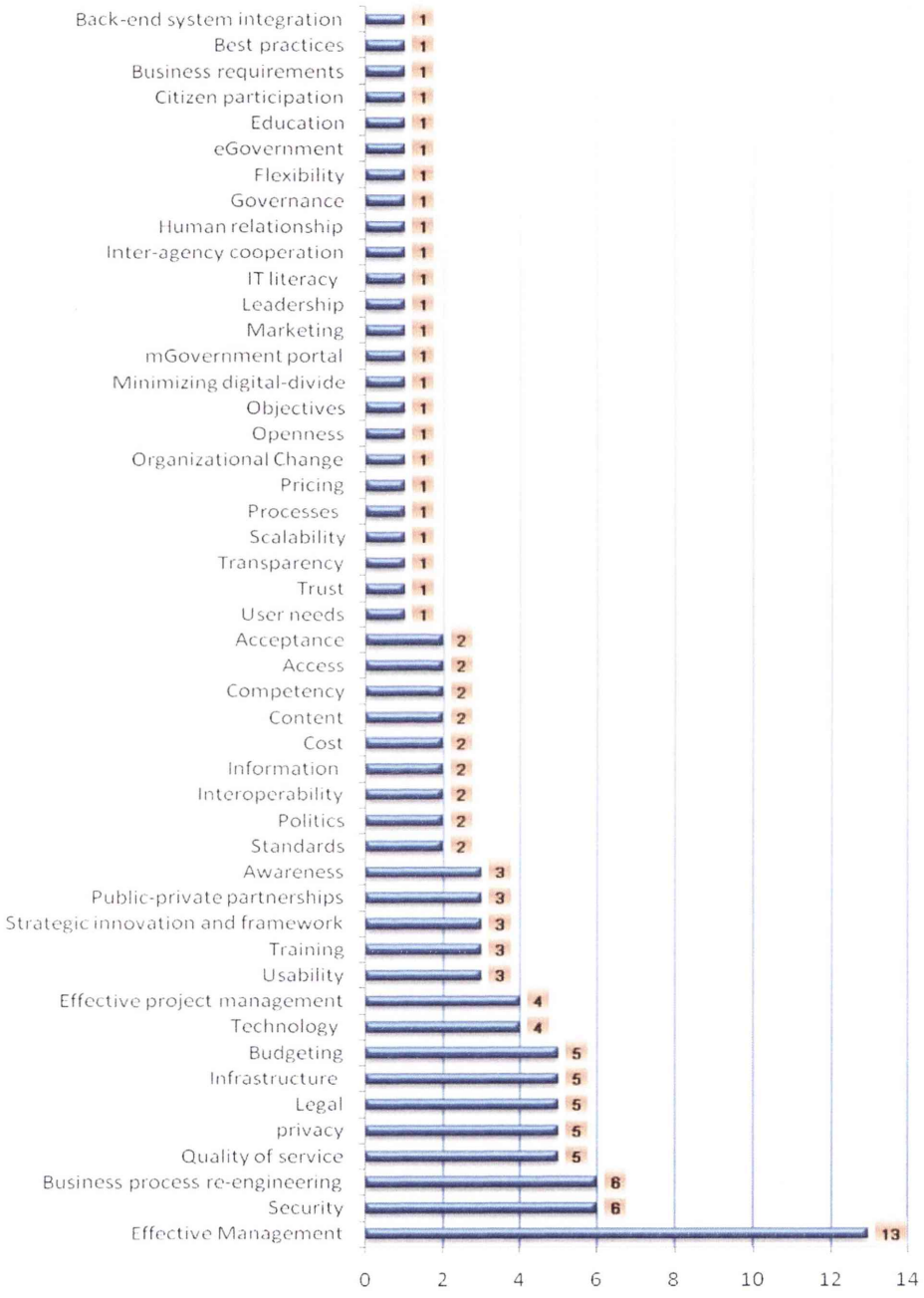


Figure 3-3: Summary of success factors literature review

3.5. Research Questions

Since effective management is the focus of researchers in both mGovernment and eGovernment fields, it is considered the basis of this research. For mService management to be effective, the mService has to achieve the service provider's objectives on one hand, and the end user's objectives or needs on the other, and accordingly is considered successful. mService management may consider the rendered mobile service successful, meanwhile the end user may regard it as unsuccessful. The result of this way of thinking was the main question of the research, which is simply formed to be:

"What does 'successful government mobile service' mean to the end user?"

Consequently, more questions were raised triggering the research process, such as:

- What are the barriers to the success of mGovernment service projects?
- What issues need to be addressed before successful initiatives are dispatched?
- Who are the end users?
- What are their needs?
- How can we classify these needs?
- What is the relationship between end user's satisfaction and mService effectiveness?
- What is mService effectiveness, then?
- How can this effectiveness be measured?

- Where can efficiency be located in the context of mService management?
- How can efficiency be measured?
- What is the relationship between effectiveness and efficiency in the same context?
- What will urge the government, e.g. local government, to adopt mICT as a successful means of communicating or dealing with end users?

These questions detailed the main question, underpinning this research, which shaped its objectives as described next.

3.6. Research Objectives

Building upon the research question, the principal objective of this study is to reveal as many factors as possible that will lead to the success of mServices as a result of their effectiveness in satisfying the service recipients' needs. Hence, the pervasive mServices adoption (on the macro-level or general level of use) and adoption (on the micro-level or individual level of use), which, in turn, contribute to empowering the government with complete ubiquity and control, for example when it comes to managing disasters, and fighting against corruption and terrorism. Ubiquity, in this regard, is illustrated in Figure 3-4, and earlier in Table 2-3 it was highlighted as the sixth stage in mGovernment growth.

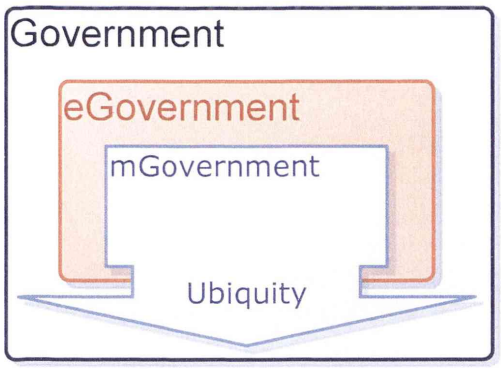


Figure 3-4: mGovernment's ubiquity empowering the government

3.7. Locating the Problem

In order to locate the problem, a profound literature review was undertaken which resulted in devising the theoretical framework for mGovernment management (El-Kiki, Lawrence & Steele 2005).

Figure 3-5 demonstrates the four main management functions for local, state and federal governments. These functions, which are planning, organising, leading and controlling, are detailed according to the three levels of management: strategic, managerial and operational as they were firstly proposed by Anthony (1965).

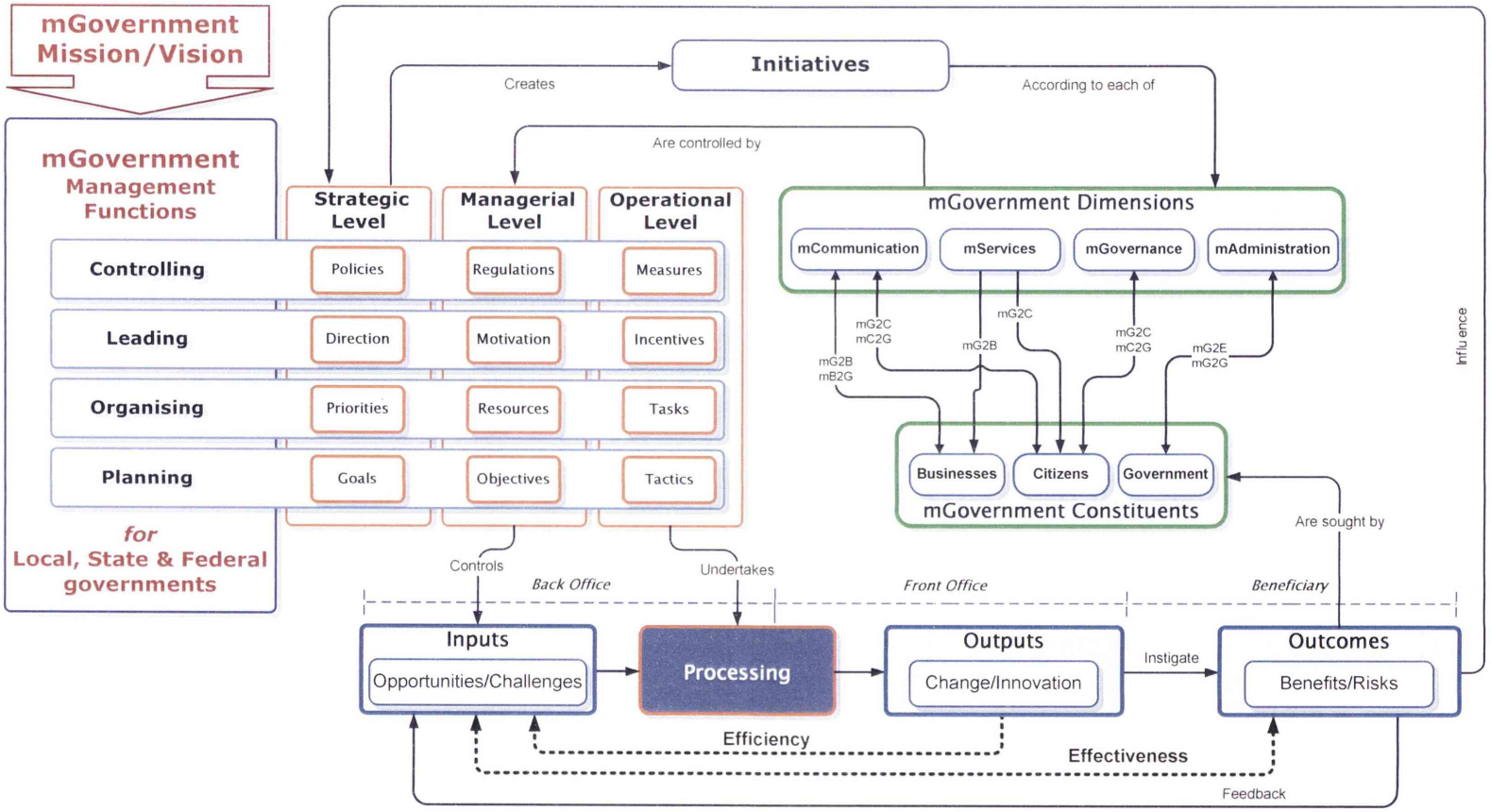


Figure 3-5: mGovernment theoretical management framework

3.7.1. Strategic Level

The strategic level decides on broad objectives, creates initiatives, as explained and shown in Figure 3-6 above, according to the mGovernment administration's vision and goals. The type of the initiative is decided by the mGovernment dimension which could be: mCommunication, mService, mGovernance or mAdministration. The beneficiaries of these types of initiative are the mGovernment constituents who are: businesses, citizens and government officials themselves. The partnership between mGovernment constituents and its dimensions is mGovernment portfolio or discipline, where constituents are the receivers or seekers of mService benefits.

3.7.2. Managerial Level

Managerial level's structure is usually one of a hierarchical nature and elaborates strategic objectives in a top-down way until operational tasks, which are needed to realize the objectives, are identified for the operational level (Anthony 1965). At this level the available, acquired or provided resources such as finance, human capital, software and hardware utilities, tax deferral, facilities management, marketing and communications, are all utilised. These resources are the *inputs* to the process of the mService provision project creating new opportunities and confronting challenges. Inputs are practically manipulated at the 'back office'.

a) Examples of the new opportunities could be more employment, infrastructure development, establishing new public-private partnership, creating new 'mApplications' that necessitate 'mLearning' breeding 'mCommunity' with new 'mCulture' (El-Kiki, Lawrence & Steele 2005). Elaborating on this, Chang & Kannan (2002) set four factors for the successful adoption of wireless and

mobile technologies, which, in turn, will create a number of challenges and opportunities: extent of mobility in the target segment, information access needs, security/privacy requirements of the application, and technology readiness of the target segment.

b) On the other hand, challenges could be the lack of: institutional guidance, inter-agency cooperation or strategic thinking and innovation. As an example of mGovernment challenges, modern governments may face the pressure of contacting or connecting with their new, young constituents via mobile devices as the younger generations do not rely on newspapers as did previous generations. The youth are now seen to be driving the mobile market as they are eager to test and quick to adopt new technology - their views and opinions are now valued as never before. In parallel, teens' social networks are reflected in their communication patterns. Some interesting studies and research have been conducted in various countries around the world, such as Finland, Norway, Italy and France (Giaglis 2004). The researcher proposes that Governments, in order to process this pressure, must initially analyse it to understand the types of challenges and opportunities this pressure exerts before considering it as an input.

3.7.3. Operational Level

Operational level is where objectives are translated into tactics which are carried out and assigned as detailed tasks in order to undertake the processing of inputs. Continuing with our young constituents above, in order to process mobile communications with them, mGovernment representatives will need to define the goals, strategies and tactics when planning for serving these persons. Setting

priorities, utilizing resources and achieving tasks will be the main functions of organizing the implementation of the plan. Leading and controlling functions dominate the entire processing phase throughout the management hierarchy.

3.7.4. Outputs

Outputs are the impact of inputs processing such as an increased number of activities or services, or a better-educated workforce. Outputs are presented by the 'front office' and take the shape of change and/or innovation. Bartol and Martin (1994) define change as 'an alteration to the status quo', whilst innovation is 'a new idea applied to initiating or improving a process, product or service'. Innovation can be considered a special type of change that introduces something new or original, and with which more complexity and risk are bred. The following two points explain what is meant by change and innovation in the context of mGovernment:

3.7.4.1. Change:

Adapting what Hirst & Norton (1998) think about the ICT impact on eGovernment, the change, from the perspective of the government, can be seen as internal, external or relational. These types of change will create both benefits and risks as outcomes which are handled in Section 3.7.5:

i) *Internal Change:* Improving the efficiency and effectiveness of the mGovernment internal functions and processes by reducing processing time, eliminating long, bureaucratic inefficient procedures and reforming the organisational structure, is one example for what an internal change can be.

ii) *External Change:* External change can be obvious when more opportunities for public-private partnership and collaboration among different governmental institutions occur (Bartol et al. 2001).

iii) *Relational Change:* As mentioned above in Section 3.3, mG2C, mG2B, mG2E and mG2G are the portfolios or disciplines that shape the relationship between mGovernment dimensions and its constituents; which is a relational change that can be gained as an outcome.

3.7.4.2. Innovation:

Since all types of inputs are interrelated, an innovation in one of them will necessitate another innovation in other types. For example, McCarthy & Miller (2003) state that "any technological innovation must be accompanied by political, social and cultural innovation, and by an enabling regulatory framework, if it is to reach its potential". Innovation in mGovernment requires new research and technological networks, developing human resources and talent pools, and developing a creative and innovative mCulture.

Back to our young constituents, the output of that example could be the action undertaken by the government. That action may necessitate either or both of change and innovation, which could be represented in modifying a certain procedure, employing specialized skills, procuring certain equipment and devices, building new mobile portals, etc. True mobile innovation will arise when today's adolescents become working adults as they represent the most adaptive user base that learns to assimilate new technologies in unique ways (Giaglis 2004).

3.7.5. Outcomes

Outcomes are not a stage in the management process of mService provision project; they are rather the instigated results of that process of the project. The relationship between the outcomes and the inputs is *recursive*. Any input will affect the outcome, whilst any outcome will influence the input. Outcomes can take any or both of two shapes: benefits and/or risks, each should be well planned and calculated before taking the plunge into implementing wireless and mobile technologies in the public sector (El-Kiki, Lawrence & Steele 2005).

3.7.5.1. Benefits:

The response represented in the change and/or innovation will produce benefits, which are, or should be, the goals targeted from implementing wireless and mobile technologies. For certain, as mentioned above, goals are defined in advance and considered as 'drivers' for mGovernment. Hence, benefits will affect the entire nation; the government, corporate, citizens and community. Heeks & Lallana (2004) view the core benefit of mGovernment in its potential of boundary-breaking and immediacy which allow working on anywhere, anytime-basis creating digital nervous system for government. This core benefit can be detailed into more benefits which affect public servants performance and productivity, citizens' interaction and involvement with government, and even the variety of services rendered by government. Benefits are derived from the needs of mGovernment constituents; be they businesses, citizens or government officials. Benefits influence the strategic level thinking.

3.7.5.2. Risks:

As with benefits, risks are another type of result of a change or an innovation. Risks may be acceptable once they are offset by the targeted benefits, but for the sake of maximizing benefits, risks have to be minimized. The novelty of mGovernment services represents a risk on its own, as "users are likely to favour proven solutions rather than new technology" (Lion 2004). Government may see it less risky to wait until a mobile technology is successfully implemented in the private sector before starting it in the public sector (Rannu 2003) and this is another risk of wasting an opportunity for development.

Current mGovernment services are exposed to potential risks of serious security breaches (Chang & Kannan 2002; Goldstuck 2003; IAB 2001; Murakami 2003; Nava & Dávila 2005; Sharma & Gupta 2004) because they are based on platforms of private service providers (Kim et al. 2004). Data loss is another type of risks that is attributed to the nature of the mobile devices regarding their small size and portability. Accordingly, they can be easily stolen or lost and the stored data may fall into the wrong hands (Perry et al. 2001). Carroll (2005) highlighted the failure of users to accept and use the mobile technology with government in the long run as a risk, which results from the mGovernment management technical approach that focuses on "the capabilities of the technology and perceived advantages for 'vested interests' such as management, technology vendors or marketers" disregarding users' real needs. On the other hand, Davy et al. (2005) view the number and diversity of available services as a risk, since users may be dissuaded from searching for services they require because of the difficulty of identifying those services which are most appropriate to their needs.

Carrying on the young constituents' example, the mere fulfilling of their needs by being in touch with the government through their mobile devices will bring certain benefits such as minimizing the digital divide amongst them in addition to keeping a constant communication channel with the government. On the other hand, this type of communication may raise a very prickly issue about transparency and accountability (Bartol et al. 2001). Young constituents will expect a free flow of information about decisions and actions from the government, and this is transparency; meanwhile decision makers (e.g. civil servants and politicians) are perceived as distant or immune to being held accountable. Transparency is part of, and cannot be separated from, accountability; risks will arise when one of them is applied and the other is neglected.

3.7.6. Problem location

Subsequently, in order to find out how an mService can be successful as a result of effective management that takes end user's needs into perspective, **outcomes** have to be assessed in relation to **inputs**. Outcomes in turn should be particularized to their minute details from the perspective of the end user, who happens to be one type or more of mGovernment constituents (citizens & businesses). Figure 3.6 magnifies a part of Figure 3-5 highlighting where the problem is located in the relation between inputs and outcomes represented in mService **effectiveness**.

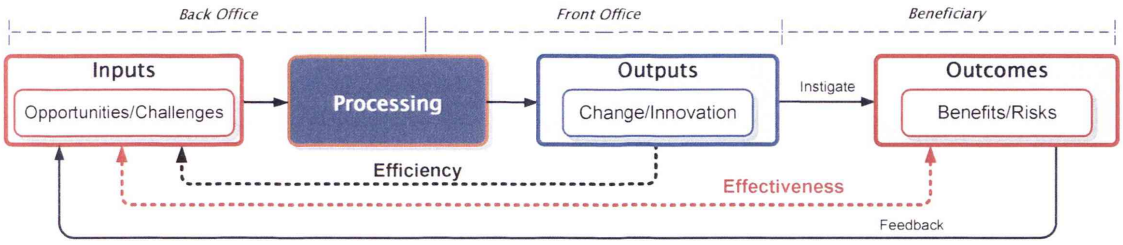


Figure 3-6: Problem location

Lastly, it is worth mentioning that mService efficiency, as shown in Figure 3-6, is a quantitative relationship between outputs and inputs. The researcher studied that relationship and concocted a new mathematical methodology (El-Kiki & Lawrence 2006a) which calculates efficiency of mServices as per Appendix A.

Since mService efficiency was found not *directly* related to end users' needs, as it is measured by the relationship between outputs *over* inputs; and because it necessitates quantitative, positivist research epistemology, which is not the philosophy adopted for this research, the research was attained into effectiveness path as exhaustively explained in Chapter 7.

3.8. Chapter Review

This chapter started with discussing the goals of mGovernment as project engines. It handled the different types of these goals, which are generally created at the strategic level of management. It then explained that goals are to be interpreted into objectives and strategies in order to form the mGovernment service projects.

The success factors of service project were reviewed from different researches and studies that relate to both eGovernment and mGovernment so as to encapsulate the research problem, and explain its objectives.

With the aim of locating the problem, mGovernment generic framework was drawn out as a result of a profound literature review. As the problem was located, the path to its solution was also perceptible through finding out more about mService effectiveness which is the product of the relationship between outcomes and inputs of the process of the mService provision project.

The following chapter endeavours to identify a research framework that would be most suitable to both the problem and the objectives.

CHAPTER 4

4. Research Methodology

This chapter explains the way in which the research was conducted. It starts with the design which discusses the research philosophy and its underlying epistemology as constructivism, and the theoretical perspective as interpretivist. Subsequently, it explains the research methodology as descriptive exploratory, and the methods used followed by the rationale behind their choice. The details of the two phases in which the research was conducted are also explained. It concludes with describing the way the quality of this research was evaluated.

4.1. Introduction

The diversity of success factors reviewed in Chapter 3, coupled with the limited number of studies of their implementation in mobile government service projects context from an end user's perspective, and the fact that they can be generalized to any type of project in different fields, have made a clear systematic analysis and documentation of mService project process a complex task. The result

therefore, is that any inquiry into mGovernment service processes could best be served by an exploratory study.

The theoretical framework developed in Chapter 3 defined the location or the scope of the problem under study and set its boundaries. The current chapter discusses the study set up i.e. the research design and process, and the research quality evaluation.

4.2. Research Design

The researcher views the research design as the entire entity of the research architecture which includes the research philosophy, theoretical paradigm, methodology and methods. According to Yin (1994), the research design is "the logical sequence that connects the empirical data to a study's initial research questions and, ultimately, to its conclusion". An appropriate research design is essential as it determines the type of data, data collection technique, the sampling methodology, the schedule and the budget (Hair, Bush & Ortinau 2003).

Following Bouma's (1996) recommendations, the author's selection of this research design aims to answer the research questions and meet the research objectives mentioned in Chapter 3. The researcher commenced by defining theoretical concepts and aims through the utilization of the methods defined in this chapter to test and review such concepts.

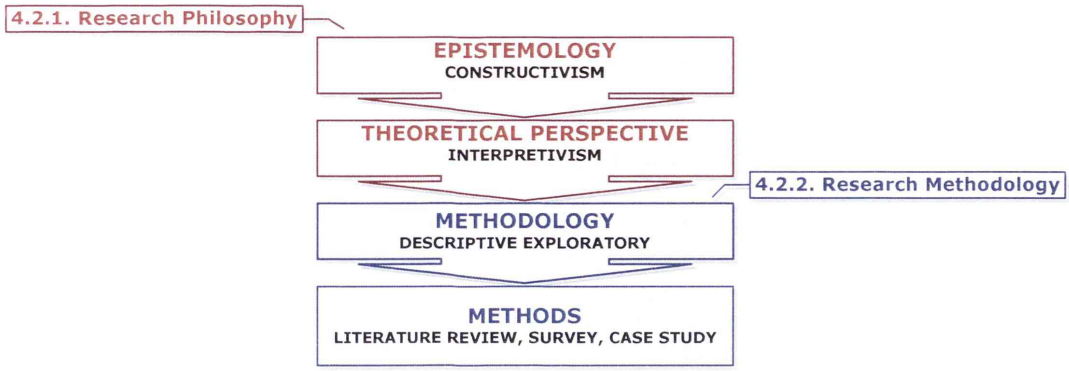


Figure 4-1: Research design components

As illustrated in Figure 4-1, there are four intertwined components of this research that form its design: epistemology, theoretical perspective or paradigm, methodology and methods (Crotty 1998). Each is handled in detail in the following sections.

4.2.1. Research Philosophy

The research philosophy is the conviction about the way with which data about a phenomenon should be gathered and analysed. It can be understood as the science of analysing the way human beings comprehend knowledge about what is perceived to exist (Burrell & Morgan 1979; Niehaves 2005). von Krogh et al. (1994) interpreted epistemology as it "is concerned with understanding the origin, nature and validity of knowledge: it seeks to provide knowledge about knowledge". The term epistemology (what is known to be true) as opposed to doxology (what is believed to be true) encompasses the philosophy of this research approach which aims to transforming believed things into known things, or doxa to episteme i.e. to arrive at 'true' cognition. However, the researcher needs to identify, explain, and justify the epistemological stance he has adopted,

because the epistemology provides a philosophical grounding for the decision on what kinds of knowledge are possible, and how it can be ensured that they are both adequate and legitimate (Crotty 1998).

The philosophy of this research is based on constructionism as its epistemology which includes methods based on interpretivism (Galliers 1991) as its main theoretical paradigm, which is elaborated on in the following points.

4.2.1.1. Constructionism as the Epistemology

Constructionism is "the view that all knowledge, and therefore all meaningful reality as such, is contingent upon human practices, being constructed in and out of interaction between human beings and their world, and developed and transmitted within an essentially social context" (Crotty 1998, p. 42).

From the perspective of the constructionist, there is no meaning or truth inherited in objects that can be simply described as 'objective'. On the other hand, constructionism cannot also be described as 'subjective'. In order to clarify this, Crotty (1998) sets an example of a tree as an object which is considered to be a tree whether anyone is aware of its existence or not, and this is how an objectivist perceives it. In contrast, a subjectivist will negate the existence of that tree as an object as long as it does not make any contribution to generate a meaning.

Explaining perception, Merleau-Ponty (1962) pointed out that the world and objects in it are indeterminate, as they bear potential meanings which emerge only when consciousness engages with them. Therefore meanings of objects are only realized with a conscious human mind which ties objectivity and subjectivity

together, or, in other words, build a relationship between them by "constructionism". Crotty (1998) contends that constructionists not only believe that no object can be adequately described in isolation from the conscious being experiencing it, but also that no subject's experience can be described in isolation from its object.

Accordingly, in order to study success factors (which are the meaning or truth) of mServices (which is the object), they have to be associated to mGovernment constituents (who are the subject), or, in particular, end users who are defined in Section 7.3.1. Aspects of meaning are only derived from individuals' perceptions and their interpretations of social interactions (Guba & Lincoln 1994). mService as an object implies every particle that participates in producing it such as procedures, applications and used mobile devices which are (to be) experienced by the subjects.

4.2.1.2. Interpretivist as the Theoretical Paradigm

A paradigm is described as a holistic approach underlying a research methodology (Kassim 2001). Burrell and Morgan (1979) defined four paradigms for the analysis of social theory: radical humanist, radical structuralist, interpretivist and functionalist as a result of combining two principal dichotomies: one is based on the ontological distinction between objective and subjective meanings or realities, whilst the other, is based on the distinction between those who see the world as inherently stable and ordered and who seek to pursue a path of regulation (The Sociology Regulation), and those who see the world as predominantly concerned with conflict and exploitation, and therefore seek to

pursue radical change (The Sociology of Radical Change), as illustrated in Figure 4-2.

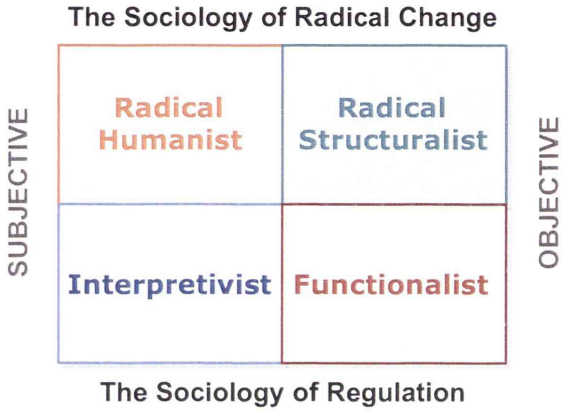


Figure 4-2: Four Paradigms of Social Research. Source: (Burrell & Morgan 1979)

The nature of this research tends to be more towards subjectivist orientation; interpretivist in particular as it seeks "explanation within the realm of individual consciousness and subjectivity, within the frame of reference of the participant as opposed to the observer of action" (Burrell & Morgan 1979). Interpretive studies in general endeavour to understand phenomena through social constructions such as language, consciousness and shared meanings that people assign to them (Myers 1997). Myres (1997) argues that interpretive methods of research in information systems are "aimed at producing an understanding of the context of the information system, and the process whereby the information system influences and is influenced by the context" (Walsham 1993).

Interpretive research does not predefine dependent and independent variables, but focuses on the full complexity of human sense making as the situation emerges (Kaplan & Maxwell 1994). According to Crotty (1998) all the

interpretivist stances are based on the belief that any understanding of causation comes through an interpretative understanding of social action and involves an explanation of relevant antecedent phenomena as meaning-complexes. The interpretative approach looks for culturally derived and historically situated interpretations of the social life world (Crotty 1998) and suggests that the human sciences centre around Verstehen (understanding). Interpretivists admit that there might be many interpretations of reality, but claim that these interpretations are in themselves a part of the scientific knowledge they are trailing.

Becker & Niehaves (2007) examined 1893 information systems papers published in the American or European journals between 1991 and 2001 and found that 49% of papers published in the European journals apply qualitative methods. Thirty-four percent (34%) of these tend to be much more receptive to interpretivist research.

Since this study concerns mGovernment constituents' perceptions, and it does not necessitate searching questions about the exact nature of reality, "attempt to map reality or outlook for a singly phenomenon of interest" (Orlikowski & Baroudi 1991), or find uni-directional causal relationships, therefore it does require interpretive theoretical paradigm. The very notion of studying constituents' perceptions means it is devious to adopt positivist or objectivist notions of meaning or truth. This truth about perceptions revolves around discovering what people, end users, assign to the phenomenon being studied, factors that will affect success of mService project and its effectiveness, with the full intricacy of the situation. Hence, the interpretivist approach is considered correct for this study, despite using a 'mix' of qualitative and quantitative methods, as clarified by Creswell (1994) that "the study may begin with a quantitative method in which

theories or concepts are tested, to be followed by a qualitative method involving detailed exploration of a few cases or individuals". Denzin & Lincoln (1994) assert "the use of multiple methods, or triangulation, reflects an attempt to secure an in-depth understanding of the phenomenon in question".

4.2.2. Research Methodology

Methodology is merely the study of a particular method, or methods, for reaching a desired end. A research methodology is a continuing process; it is a continuum that is ever changing and developing (Leedy & Jeanie 1993).

Descriptive exploratory is adopted as the research methodology, which allows for a theoretical perspective to be expounded in the conceptual framework guiding the research process. The purpose of this methodology is to intensively investigate the phenomenon, success or failure of mService projects, in order to find patterns and themes since the researcher has raised specific questions about the factors that control or affect the success or failure of these projects. This methodology is generally phenomenological because it describes experiences, feelings, thoughts and opinions of study participants as they are, and accordingly relates several empirical observations of phenomena to each other, in a way which is consistent with fundamental theory but is not derived from the theory (Saunders, Lewis & Thornhill 2000). Mobile government service end users' needs are researched generically in this study and this is actually the reason that place, country or time zone were not required in the end users' online survey which is discussed in Chapter 7.

Nonetheless, a research method is a strategy of inquiry which moves from the underlying philosophical assumptions to research design and data collection (Myers 1997).

Appropriate methods for this study were selected on the basis of the types of required data as Leedy & Jeannie (1993) argue that the nature of the data dictates the method, i.e. if the data are verbal, the method is qualitative, and if data are numerical, the method is quantitative. Kaplan and Duchon (1988, p. 575), on the other hand, suggested that "collecting different kinds of data by different methods from different sources provides a wider range of coverage that may result in a fuller picture of the research problem", and added "it provides a richer, contextual basis for interpreting and validating results".

To confirm this point Robson (1993), Silverman (2000), and Leedy and Ormrod (2001) suggest use of triangulation of the methods used to collect data. In addition, Wisker (2001) comments that triangulation is a common approach which is merely using both qualitative and quantitative methods together. Triangulation allows a better understanding regarding the research phenomenon as multiple research methods used increase the validity of the collected data and derived findings, as mentioned above.

This section discusses both of the qualitative and quantitative methods, and the rationale behind using them in this research.

4.2.2.1. Qualitative Research Methods

Qualitative research largely relies on the interpretive and critical approach to social science (Neuman 1991). "Qualitative research has always been a viable

mode of investigation. It is carried out when one wishes to understand meanings, or look at, describe and understand experiences, ideas, beliefs and values. The research deals with the data in the form of words or pictures" (Creswell 1994). Strauss & Corbin (1998) highlighted that qualitative research refers to research about persons' lives, lived experiences, behaviours, emotions and feelings, but also about organizational functioning, social movements, or cultural phenomena. Recently, Auerbach and Silverstein (2003) defined qualitative research to be the research that is based on analysis and interpretation of texts and interviews in order to discover meaningful patterns descriptive of a particular phenomenon.

This research applies two qualitative methods: Literature Review and Case Study, as follows:

1) Literature review: The literature review is a process that encompasses reading, understanding and finding information about the topic being studied, in other previous or current researches. In order for the researcher to expand his understanding (Verstehen) about this research problem, a continuous literature review with a hermeneutical and speculative stance (Cooper 1989) was assumed. Knight (2002, p. 11) posits "a knowledge of the literature gives you ideas about what you would be alert for; the changes that other people have had success with; the ways in which those changes might best be introduced; and methods for evaluating the outcomes". On the other hand, Rowley & Slack (2004) assert that the strength of literature review lies in the fact that it assesses the strengths and weaknesses of existing evidence in an inclusive approach. Nevertheless, Lofthouse and Whiteside (1994) supported the use of literature review in order to:

a) delimit the research problem,

b) seek new approaches,

c) give insight into methods, and

d) provide recommendations for institutionally based evaluation and further research on the topic.

As a result, an extensive literature review enabled the researcher to publish several papers which revolved around mGovernment enterprises and which provided the groundwork for this research.

2) Case studies: According to Myers and Avison (2002), case studies are a common method for data collection in the field of information systems. Case study is defined by Yin (1994) as "an empirical inquiry that investigates a real-life phenomenon within its real life context, especially when the boundaries between phenomenon and context are not clearly evident". Case studies may be positivist or interpretivist in nature, depending on the approach of the researcher, the data collected and the analytical techniques employed; case study is used in this research as a qualitative method. Reality can be captured in greater detail by an observer-researcher, with the analysis of more variables than is typically possible in experimental and survey research (Benbasat, Goldstein & Mead 1987).

The case study is deemed viable by Benbasat et al. (1987, p. 370) for three reasons:

a) It is necessary to study the phenomenon in its natural setting, and this goes very well with the phenomenological methodology adopted in this study;

b) The researcher can ask "how" and "why" questions (Yin 1994), so as to understand the nature and complexity of the processes taking place, and this matches the qualitative research as a choice for this study (Miles & Huberman 1994); and

c) Research is being conducted in an area where few, if any, previous studies have been undertaken, which is the case with mGovernment as a research field which necessitates exploratory type of study.

Exploratory studies are generally better served by single cases, i.e. where there is no previous theory. Multiple cases are preferable when the purpose of the research is to describe phenomena, develop and test theories (Lee 1989).

Case studies may require multiple data collection methods in order to establish case construct validity. Yin (1984) categorized these methods to include:

a) Direct observation of activities and phenomena and their environment;

b) Indirect observation or measurement of process related phenomena;

c) Interviews - structured or unstructured;

d) Documentation, such as written, printed or electronic information about the company and its operations; also newspaper cuttings; and

e) Records and charts about previous use of technology relevant to the case.

Subsequently, interviews are the method that is used to investigate the application of Mobile Information and Communication Technology (mICT) in local government as discussed in Chapter 8.

4.2.2.2. Quantitative Research Methods

Quantitative research methods include questionnaires and surveys in a study that deals with the collection of data in a numerical form. Theories are used deductively and placed towards the beginning of the plan for the quantitative research (Creswell 1994). The quantitative methods are used to conciliate the generalisability limitations that naturally result from the qualitative methods; which is the case in this research.

This research applies one quantitative method: Surveys, as follows:

3) Surveys: Surveys enable the researcher to obtain data about views, situations or practices at one point in time through questionnaires or interviews. Quantitative analytical techniques are subsequently used to extract conjectures from this data regarding existing relationships and entities. The use of surveys permits a researcher to study more variables at one time whilst data can be collected about real-world environments.

4.2.2.3. Discussion and Rationale for Choice of Approach

As Benbasat et al. (1987) observed that no single research methodology is essentially better than any other one, many authors called for a mix of research

methods so as to improve the quality of research such as Kaplan and Duchon (1988), Mingers (2001), Creswell (2003), Chen and Hirschheim (2004), and Mingers and Willcocks (2004). Based on the subjective-interpretivist theoretical paradigm adopted by this study as mentioned above, the qualitative methodology is the most appropriate to use. Resorting to using this methodology does not mean insisting on using single research method or what is known as methodological monism. The survey as a quantitative method is also used at the second phase of the research process, as it assisted in acquiring some statistical data. This does not mean an inability to decide between the merits and demerits of the available alternatives. Instead, the researcher believes that all methods are valuable if used appropriately and managed carefully. Thus, the dominant concern is that this study should be both relevant to the research questions set out in Chapter 3, and rigorous in its operationalisation as handled in Chapter 5.

This study attempts to discover the factors that will make mService projects successful. It suggests that mService effectiveness results from satisfying end users' needs. The following points augment the researcher's stance to use qualitative research methods for this study:

1. Due to the novelty of mGovernment as an area of research, there are very few heterogeneous complete studies which handle success factors of mService projects, thus exploratory research is adopted as a legitimate methodology in such a case (Hussey & Hussey 1997), paving the way to qualitative methods to be used for creating hypotheses. Quantitative methods are used to test hypotheses not to create them (Creswell 1994).

2. Since the provision of mobile government services as a research field is still at its early stages of maturity, qualitative research is the most appropriate approach in this case as it allows for discovery of new ideas (Gorman & Clayton 2005).

3. This study started with literature review in order to find the gap in, and collect evidence about, success factors of mService projects, as a preparatory step to create the research hypotheses. Gorman & Clayton (2005) support this step by stating that qualitative research is more likely to begin with evidence, but no theory.

4. Although there are pieces of evidence there is a gap in the studies which adopt end users' perspectives when initiating a mobile service project. The researcher still does not have enough information to put forward meaningful hypotheses. In such a situation, Auerbach and Silverstein (2003) advise that qualitative research is more suitable especially where we do not know enough to propound meaningful hypotheses.

5. This study attempts to discover the truth about mServices end users' wishes, experiences, and ideas formed in their needs, which are considered unquantifiable, subjective opinions. Qualitative research, as stated by Burns (1997), reveals the truth as the participants perceive it; which is subjective not objective truth. Subjective truth means the interpretivist perspective which aims to "understand a phenomenon from the points of view of the participants and its particular social and institutional context" (Kaplan & Maxwell 1994). Interpretivism in this context seeks to understand the world as it is, within the realm of

subjective experience and from the viewpoint of the participant rather than the observer (Burrell & Morgan 1979), where the later may cause the study perspective to change erratically.

6. This study's main question starts with "what"; qualitative research allows the researcher to go beyond asking the "what" questions to asking the "how" and "why" questions and to be able to assess causality as it actually plays out in a particular setting (Miles & Huberman 1994). Accordingly, and still building on the novelty of the mGovernment research field, qualitative methods allow for exploration, discovery and creation of meaningful hypotheses.

Building on these reasons:

7. The quantitative methods will not assist in delving into end users' wishes, experiences, and ideas in quest for the truth (Strauss & Corbin 1998) since they must be measured numerically (Auerbach & Silverstein 2003).

8. The quantitative methods may reveal whether end users accept or reject an mService, but will not be able to discover "why" it is accepted or rejected, or "how" this rejection can be corrected due to the subjectivity of these factors or reasons which cannot be quantifiable.

4.3. Research Process

The study progressed in two phases adopting the interpretivist theoretical paradigm with both qualitative and quantitative methods employed. The literature

review was a continuous process throughout the research as illustrated in Figure 4-3:

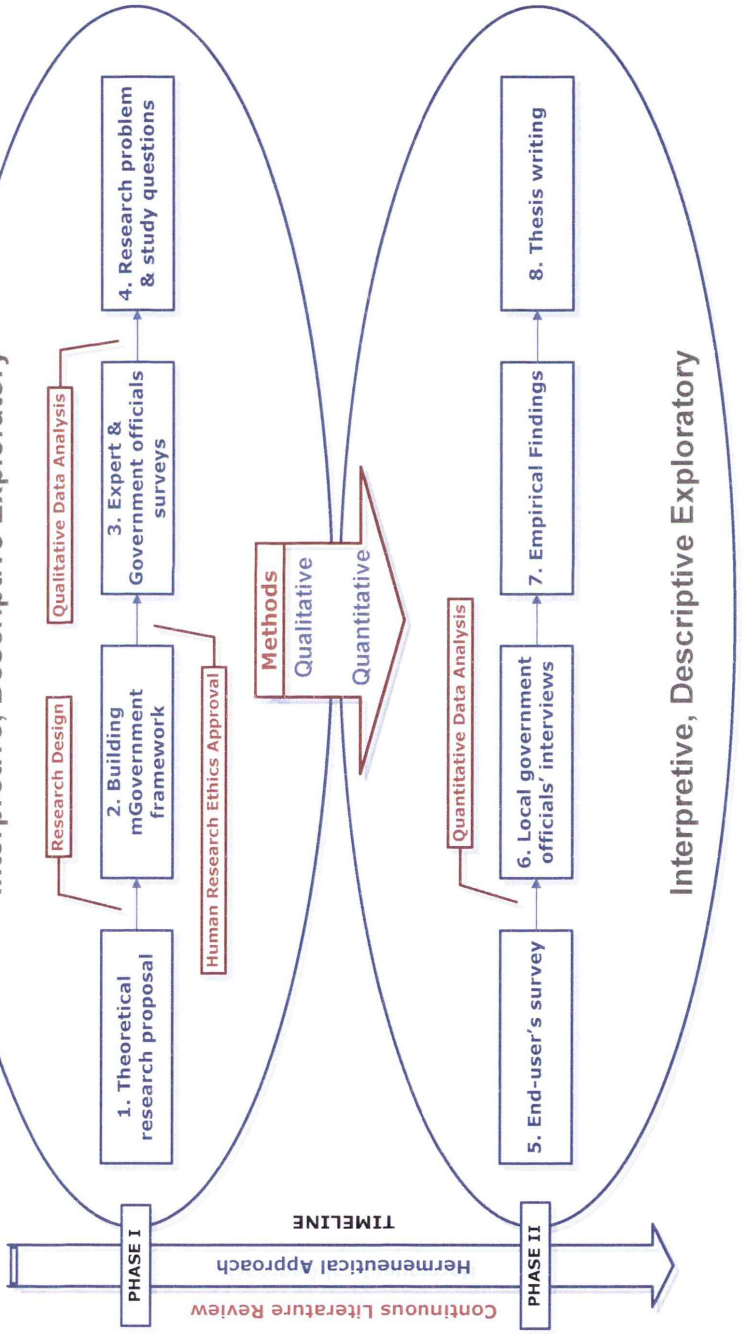


Figure 4-3: Research process

4.3.1.1. Phase I

1. Theoretical research proposal:

   Since Crotty (1998) suggested that the human sciences centre around "Verstehen" i.e. understanding, the researcher, from the very beginning of this study, has been vigilant to achieve a thorough understanding of mService project success factors by hermeneutically interpreting the textual data obtained from the continuous literature review throughout the study, and later from transcripts of local government officials' interviews.

   Accordingly, as a result of the initial literature review, the research proposal which represented the primary foundation for this study was prepared, and, in turn, the research design was sketched out.

2. Building mGovernment framework:

   Building a framework that describes the mGovernment management process was an essential step in order to draw an overarching picture about the area of study and then to locate and conceptualize the research problem. The framework did reduce complexity of mGovernment by breaking the management process into distinguishable activities: inputs, processing and outputs; the three activities for any information system.

   Simultaneously, while working on this framework, the application of Human Ethics Research Approval was in progress. This was an essential regulatory as well as academic procedure since many writers in research methods (Bryman 2004; Gorman & Clayton 2005; Liamputtong 2005;

Myers 1997; Punch 2005; Ritchie & Lews 2003) agree that researchers should answer four major questions when designing their researches:

1) Is there any potential of harm to the participants?
2) Are participants acting on informed consent?
3) Does the research involve an invasion of privacy?
4) Does the research involve deception?

These issues are detailed in the University of Technology, Sydney (UTS) Ethics Committee's policy guidelines for researchers, which this research has meticulously followed. As a result, the research ethics clearance number HREC REF NO. 2006-74A was granted by the UTS.

3. Running expert and government officials survey:

Researchers were seen as an important source of knowledge as their work requires familiarity with all the developments in the field (Zmijewska & Lawrence 2005). As mentioned in Chapter 3, an extensive review of literature was conducted in order to:

1) list most of the opinions about barriers, and
2) identify leading mGovernment and eGovernment researchers.

The selection criterion for researchers and academics was at least one peer-reviewed journal or conference publication regarding mobile and electronic government. References were accessed through the use of different academic databases such as Proquest, ACM Digital Library and IEEE Explore. Industry experts were sourced from different areas such as communication companies, mobile phone suppliers, application developers and consultants. The researcher also attended eGovernment

and mGovernment conferences and trade shows to source likely experts. As Zmijewska & Lawrence (2005) stated, such stakeholders, due to their first-hand experience, are likely to know exactly what helps and hinders successful diffusion of mobile services government.

As a result, a specially designed web-based survey was deployed, and experts were invited to participate anonymously and/or by providing their contacts for further elaboration. This survey tool was chosen as the most efficient, and economic, method to collect global experts' opinions. More details on this point are discussed in Section 5.1.2.1.

Qualitative data analysis commenced as soon as the data from experts were collected, and two conference papers referencing the results were published.

4. Comprising research problem & instituting study questions:

This step was virtually concurrent with the previous one, because the outcome of the experts' survey was compared to the findings from the extensive literature review to ascertain close correspondence between the literature study and the opinions of the experts. This principally assisted in locating the problem, and hence designing and running the end-users' online survey which initiated the research second phase.

4.3.1.2. Phase II

5. Running End User's Survey:

In order to achieve as precise a measurement as possible, mobile services were analysed from the perspective of the mGovernment end users.

Mobile-user-centric mGovernment makes satisfying citizen and business needs the centrepiece in its planning so as to create communities of networked users, not just portals, for individual users. This survey analysed and extracted facts, the sought truths, which are used as metrics to measure the effectiveness of existing or proposed mServices.

Quantitative data analysis commenced as soon as data from end users were collected, and four conference papers were published accordingly. Statistical Package for the Social Sciences (SPSS) was used in this analysis.

6. Conducting Local Government Officials' Interviews:

As stated by Gorman & Clayton (2005), interviewing can obtain detailed, in-depth information from subjects who know a great deal about their personal perceptions of events, which is aligned to the objective of this study. Thus, in order to gain further insights (Fontana & Frey 1994) and reveal some detail about current and near future implementation of mobile services in the Government, the author conducted interviews with official executives in charge of information systems, eGovernment and telecommunications from three local governments, which had been selected to be examined as case studies.

7. Analysing data and deriving findings:

All the data at this step were ready to be synthesized into empirical findings and recommendations. In addition, research limitations, future directions and strengths of this research were highlighted.

8. Thesis writing:

   The last four months of this research were dedicated to writing the final thesis, which compiled all the work, published and unpublished, into one dissertation.

4.4. Research Quality Evaluation

To corroborate the quality of the research outcomes and conclusions, a number of factors were taken into consideration at the early stages of research design.

4.4.1. Quality of the qualitative study

Because of the nature of the qualitative methods and epistemological assumptions of an interpretivist study, which in fact promote the uniqueness of such study, quality verification methods of qualitative research are very different and less recognized than those used in quantitative research. Creswell (1998, p. 16) indicated that qualitative research "shares good company with the most rigorous quantitative research, and it should not be viewed as an easy substitute for a statistical or quantitative study".

Accordingly, discerning the quality of qualitative research, many scholars (see e.g. Beck 1993; Burns 1997; Guba & Lincoln 1989; Gummesson 1991; Keen 1991; Mason 1996; Rubin & Rubin 1995) tried, for several years, to define and bring together a plethora of quality terms and dimensions thought to constitute good and valid qualitative research. Eventually they conclude that "after all this effort, we seem to be no closer to establishing a consensus on quality criteria, or even

on whether it is appropriate to try to establish such a consensus" (Sandelowski & Barroso 2002, p. 2).

This situation led to synthesising a method from a diversity of quality terms and dimensions, which were set by other scholars and researchers, into guidelines to verify the rigour and quality of this research. The researcher came to an understanding that "trustworthiness" is an accepted quality check dimension, and it is composed of four important elements: credibility, transferability, dependability, and conformability (Marshall & Rossman 1989). "Trustworthiness is established in a naturalistic inquiry by the use of techniques that provide truth value through credibility, applicability through transferability, consistency through dependability, and neutrality through conformability" (Erlandson et al. 1993, p. 132). These four elements of trustworthiness are judged and controlled by the researcher. Building on these four elements, the researcher added "rigour" as a second dimension which comprises four more elements: subjectivity (Leedy & Ormrod 2001), transparency, communicability, and coherence as proposed by Auerbach and Silverstein (2003). These four elements of rigour are judged by the readers of this study. Figure 4-4 illustrates the developed guidelines which are handled in detail in the following sections:

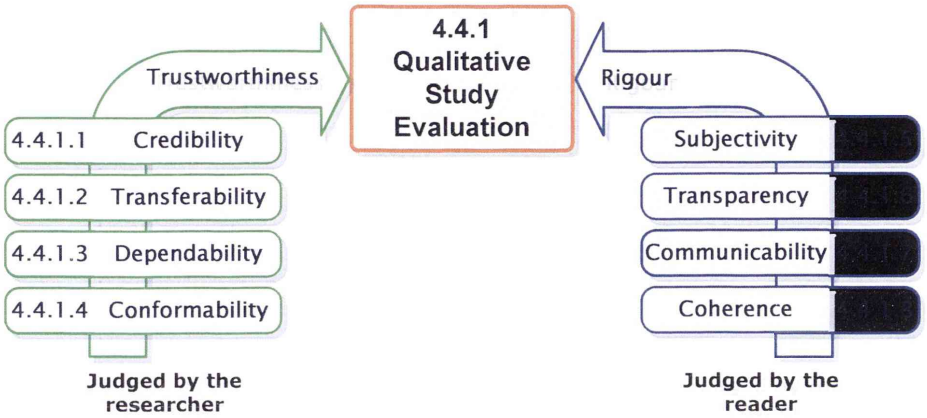


Figure 4-4: Research Quality Evaluation Guideline

4.4.1.1. Credibility or Internal Validity

The Credibility, or internal validity, of the study refers to the extent to which its design and the data that it yields allow the researcher to draw accurate conclusions (Leedy & Ormrod 2001), without any bias. Findings of the qualitative research have to be credible and authentic (Miles & Huberman 1994), or in other words believable from the perspective of the participants in the research (Beck 1993). The issue of representativeness of these findings threatens the validity of the analysis and conclusions drawn from the study (Leedy & Ormrod 2001).

Therefore, the researcher needs to be clear about ensuring that this research is 'good' research (Arksey & Knight 1999; King, Keohane & Verba 1994; Maxwell 2005; Ritchie & Lews 2003). According to Sedlacek and Stanley (1992) there is no ideal way of establishing internal validity. Which method is chosen depends on the purpose of the research and what, in terms of theory and external measures, is available to the researcher. Accordingly, the researcher applied the following measures:

a) Member checking: Denzin & Lincoln (1994, p. 216) stated that "we may cross-check our work through member checks and audit trails. As a rule, in writing up the narrative, the qualitative researcher must decide what form the member check will take". Certainly, member check "is the single most critical technique for establishing credibility" (Guba & Lincoln 1989, p. 239).

The researcher provided segments from the raw data to his doctoral cohort members for analysing. In addition, segments from the findings were provided to the participants (researchers, government officials and some end users) in order to confirm the findings and make sure that this was what they really meant from their responses.

b) Triangulation: As previously mentioned, a number of researchers such as Denzin & Lincoln (1994), Burns (1997), Maxwell (2005), and Wisker (2001) viewed triangulation as the use of two or more methods of collecting data which reflects an attempt to secure an in-depth understanding of the phenomenon in question, and enhance the interpretability of its findings.

The researcher triangulated data from different sources; web-based surveys, interviews and hermeneutical data, in order to eliminate any bias or distortion in data, and produce different themes and results. In addition, the researcher used quantitative data to complement qualitative data. According to Gorman & Clayton (2005), competent researchers nowadays realize that confining an investigation to a particular approach does not provide the fullest understanding of a

phenomenon. As two or more methods are utilized, different aspects of the same research question can be addressed.

c) Journal: The researcher used the journal during data analysis to refer to certain data and tie the ideas and concepts together. The memos or notes taken during the local government official interviews proved very useful especially when checking and correcting any garbled data resulting from the digital recording artefact.

4.4.1.2. Transferability or External Validity

Transferability, or external validity, refers to the degree or extent to which the results of qualitative study can be applied to situations beyond the study itself, i.e. the extent to which they can be generalised to other contexts or settings similar to the one in which the study occurred (Hoyle, Harris & Judd 2002; Leedy & Ormrod 2001; Silverman 2000).

As Leedy and Ormrod (2001) viewed it, the external validity of a research can be enhanced by the use of real-life settings and replication to a different context. The researcher applied these measures through:

a) Conducting interviews and surveys in the real-life settings of the participants;

b) Comparing previous studies, though very few, heterogeneous and incomplete, with the current study, through the hermeneutical literature review. This assisted in identifying patterns and similarities in settings, outcomes and conclusions.

Although the researcher could not specify the transferability of the findings, he could still provide adequate information to help other researchers determine whether the findings are applicable to a new situation.

4.4.1.3. Dependability or Reliability

Dependability, or reliability, is the extent to which findings can be replicated, or reproduced by another inquirer (Silverman 2000). While in qualitative studies replication of data is very unlikely, it is then emphasized that the researcher needs to account for the ever-changing context within which such study occurs. According to Miles & Huberman (1994), the principal issue is whether the process of the study is consistent, reasonably stable over time and across researchers and/or methods.

The researcher was responsible for describing and accounting for the changes that occurred in the study settings and how these changes affected the way this study was handled. The researcher enhanced the dependability of the study through:

a) The use of an interview guide that allowed for some consistency regarding the way the interview was conducted. A copy of this guide is included in Appendix C.

b) Conducting interviews at the day and time requested by the interviewees so as to let them pay full attention and be adequately prepared for interviewing.

c) Sending some literature about the study issues to the interviewees prior to the interviews, so as to maintain a reasonable level of understanding of the topics handled in the interview, and accordingly increasing consistency.

d) Reducing, if not eliminating, the effect of bias from several researchers by having the researcher conducting the interviews himself.

e) The researcher's 'external auditors', who actually were the two supervisors, worked on the theoretical assumptions of the study, its methodological infrastructure, and data collection. This is in addition to the peer-reviewing that occurred for several research papers which were widely published, as a result.

f) The use of the direct or verbatim quotes, extensively when reporting the research findings. Referring to descriptions phrased very close to the participants' accounts and researchers' field notes (Johnson 1997) is a commonly used type of low inference descriptors.

4.4.1.4. Conformability or Objectivity

While Robson (1993) defines objectivity as the inter-subjective agreement on what multiple observers agree to as a phenomenon, Sliverman (2000) defines it as the extent to which findings are free from bias. Bias in this context is any

influence, condition, or sets of conditions that singly or together distort data (Leedy & Ormrod 2001).

In order to increase conformability and reduce bias, the researcher:

a) documented the procedure of checking and rechecking the data through the research using quotes, providing detailed description of the research design, methodology and process, and making data interpretation sequential, logical and clear.

b) presented collected and interpreted data for peer-reviewing.

c) highlighted consistency between collected data and their interpretations through the use of NVivo.

d) used the triangulation method to collect data in order to minimise own personal bias, as Maxwell (2005) mentioned that it "reduces the risk that conclusions will reflect only the systematic biases or limitations of a specific source or method, and allows you to gain a broader and more secure understanding of the issues". Personal bias is acknowledged in the following section depicting the true picture about the researcher's stance in this study.

4.4.1.5. Subjectivity

It is recognized that in an interpretive research the researcher is not an independent observer analysing a situation objectively, because he is the primary

instrument for the research process (Janesick 2000). Hence, the researcher is inevitably involved in the research process, instilling his individual mindset, biases, skills and experiences. This is not something to be feeling guilty about or it would invalidate the research, rather it must be acknowledged and addressed. Referring to Leedy and Ormrod (2001) subjectivity is the extent to which a judgment is based on individual personal impressions, feelings, assumptions, beliefs, values and opinions rather than external facts.

The researcher approached the study with personal experiences and the belief that government mobile services projects should start from where they are ended at, i.e. end users. Being an ex-government executive, the researcher developed a realistic judgement about how the citizen is taken for granted when there are new government projects, which are based on the concept that the citizen 'can't wait' to accept those projects and the 'solutions' they provide, merely because they are offered by the 'government'. The researcher has experienced firsthand government bureaucracy, which led to waste, inappropriate plans and unworkable projects. In other words, the least application of what is meant by transparency and accountability in this context.

Such perceptions and experiences would have its effect on the researcher's management of this research. Data may be collected and analysed with unintended misinterpretation of what respondents meant to say. Not only this, words and phrases used in surveys, the tone and inflections of voice during interviews, and even accentuations of particular words could not only introduce bias but may also have affected how the respondents answered questions (Hughes 2002; Zikmund 1999).

Being aware and sensitive towards these possible sources of bias and the personal experiences which could be brought to the study, the researcher sought to ensure that such biases were minimised as much as possible through actualizing trustworthiness, as his controlled measure, and strengthening the rigour, as the reader's measure, in order to get to genuine and realistic outcomes and conclusions.

4.4.1.6. Transparency

According to Rubin and Rubin (1995, p. 85) "Transparency means that a reader of a qualitative research report is able to see the basic processes of data collection", in other words it means that the process of data collection and analysis is valid and justifiable. Earlier Shipman (1982) and Sandelowski (1986) referred to this process as "auditability", or "leaving a decision trail", so that the readers would be able to determine for themselves whether the conclusions drawn from the research are valid, credible and justified. In a practical sense, this means giving details about how the ethical procedures were followed and how interviews or surveys were conducted. Transparency of data collection and analysis is clearly explained in Chapter 5.

4.4.1.7. Communicability

Adopting and adapting what Benbasat and Zmud (1999) thought, the research should be presented in a way that professionals understand and would enjoy reading. Rubin and Rubin conferred the communicability of research and highlighted that "The portrait of the research arena that you present should feel real to the participants and to readers of your research report" (1995, p. 91).

Accordingly, communicability means understandability and accessibility of the research by others. For this reason, this research is enriched with tables, illustrations, figures and screenshots, in addition to numerous examples for a better understanding (communicability) of the coding process.

4.4.1.8. Coherence

In order for the researcher to provide an accurate explanation of the phenomenon, Auerbach and Silverstein state that "the theoretical constructs must fit together" (2003, p. 85) which they call 'coherence'. In other words, the patterns, themes, concepts and dimensions must all fit together to create the constructs, which, in turn, thoroughly depicts the phenomena. Coherence is demonstrated in the ability to present the research outcomes and conclusions in a well-structured narrative in Chapters 9.

4.4.2. Quality of the quantitative study

The quality of the quantitative study is represented in the end-users' survey validity and reliability of the constructs. The researcher preferred including the details of this section at the end of the quantitative analysis in Section 7.4.3, in order to maintain consistency of the analysis.

4.5. Chapter Review

This chapter handled in detail the underpinning methodology of the research. It discussed the study set up through three main sections: the research design, the research process, and the research quality evaluation:

a) Research design conferred:

- the research philosophy, which is based on constructionism as its epistemology and interpretivism as its theoretical paradigm, and
- the research methodology, which is based on the descriptive exploratory type of methodology that utilizes literature review, surveys and case studies as its methods.

b) Research process described that the study progressed in two phases adopting the interpretivist theoretical paradigm with both qualitative and quantitative methods employed in order to conciliate the generalisability limitations that naturally result from the qualitative methods, while literature review was a continuous process throughout the research.

c) Research quality evaluation wrapped eight items into two evaluation categories; trustworthiness and rigour in a guideline which the researcher followed in order to actualize the highest possible quality for this research.

This chapter prepared for the following chapter, Chapter 5, which discusses data collection and analysis procedure in detail.

CHAPTER 5

5. Data Collection & Analysis

This chapter presents in detail the methods used in collecting and analysing data. Extensive literature review, web-based surveys and case study were the three methods used in collecting data. Collected data were qualitatively and quantitatively analysed in order to conciliate the generalisability limitations that naturally result from the qualitative methods.

5.1. Introduction

mGovernment's theoretical framework, which was detailed in Chapter 3, enabled defining and locating the problem under study and set its boundaries. Methodological investigations, explained in Chapter 4, rationalized the use of three methods: Literature Review, Web-based Surveys and Case Studies. In order to utilize these methods, a mix of, or triangulated, qualitative and quantitative 'tools' came into use. The research now aims to analyse and thoroughly study mobile service effectiveness, as viewed and estimated by its end user.

Figure 5-1 illustrates that both of literature review and expert survey were used to discover the barriers to the success of mobile service, and suggestions to overcome these barriers. The outcome was then viewed from the perspective of the mService end users', which led to another survey to determine the benefits that end users seek from using the mobile service. Once these benefits are gained, as exactly as desired by the end user, service satisfaction and usage are reached, which consequently lead to the effectiveness of the service. Additionally, the case study method was used in order to understand the practical rendering of mobile services in local governments, if there were any, and how effective these services are, or should be. This chapter looks into how data are collected by these three methods, and the strategy adopted for data analysis.

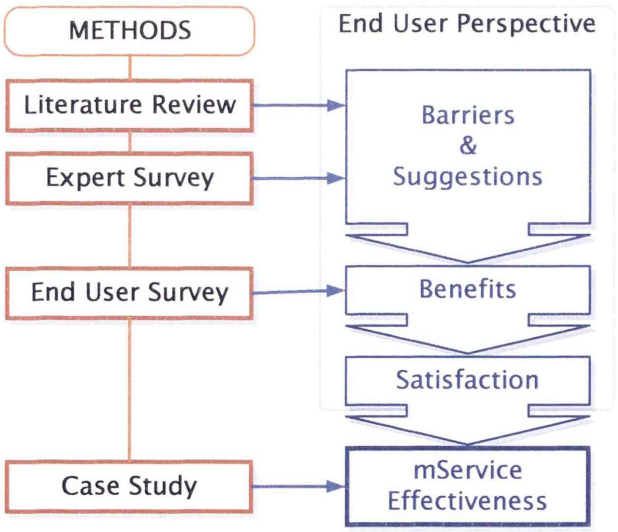


Figure 5-1: Data collection and analysis process

5.2. Data collection

As previously revealed in Chapter 4 in regards to the theoretical background and methodology, this research is based on interpretivist descriptive exploratory stance which necessitates employing a variety of data collection methods. Data collection aims to broadly cover issues based on the research questions that are narrowed down as the concurrent data collection and analysis progress. The rationale behind choosing and utilising each of: Literature Review, Web-based Surveys, and Case Study, as data collection methods, is detailed in the following sections. In addition, data were also collected by other methods which are considered secondary such as email messages, posted or faxed documentation e.g. professional magazines, annual reports, newsletters and brochures.

5.2.1. Literature Review

Extending section 4.2.2.1 pertaining to the literature review method, literature search was necessitated as a primary data collection method. As a result, the literature search was comprehensive to include both printed and electronic materials; both published or unpublished. These materials comprised books, reports, dissertations, statistics, manuscripts, dictionaries, conference proceedings, handbooks and periodicals i.e. journals, magazines and newspapers.

In order to access these materials, various online databases were used. These databases included:

1) Academic Search Elite (EBSCO)

2) Australian Public Affairs - Full Text (APA-FT) (Informit)

3) Business Source Premier(EBSCO)

4) Computer and Information Systems Abstracts (CSA)

5) Computer Science Index (EBSCO)

6) Computer Source (EBSCO)

7) Expanded Academic ASAP (Gale)

8) IEEE Explore

9) INSPEC (OVID)

10) JSTOR

11) Project Muse

12) ProQuest 5000 1999 to CURRENT

13) Science Direct

14) Wiley Interscience

This selection has ensured as comprehensive coverage of the topic as possible. As mentioned in Chapter 4, the literature review has been a continuous process, which started at Phase I with gathering information about:

1) eGovernment as an entity,

2) mGovernment evolution and the type of relationship with eGovernment,

3) eGovernment and mGovernment services success and failure factors, and barriers to the success of their projects.

Gathered information, collated in Chapters 2 and 3, was used to develop the theoretical research proposal underlining the research objectives and questions. Later a focused literature search was conducted on mobile end users' needs in order to narrow down the project scope and refine the research questions. Moreover, the literature review principally assisted in forming and enhancing the web-based surveys.

5.2.2. Web-based Surveys

According to Kent and Lee (1999, p. 10) a web-based survey is defined as a HTML form with some navigation guidance; the respondents are usually invited to participate by e-mail or directly asked on the site itself.

The web-based survey instrument was utilised to serve two surveys: Experts' & Government Officials' Survey, and Mobile End-Users' Survey. The choice of web-based survey instrument is based on a number of factors which can be summarized in the following seven points:

1) Acceptability: Web-based surveys are becoming commonly used as a data collection method (Joinson & Reips 2007), by both academics and practitioners (Couper 2000). In addition, respondents tend to respond only on topics in which they are interested, which facilitates targeting the intended participants. For example, mobile communities around the world were requested to post the end-user survey invitation on their web sites and discussion forums in an attempt to target those mobile users who are interested in mService.

2) Cost: Except for starting costs of the web-based survey, which is mainly human labour, the cost is very minimal (Cobanoglu, Warde & Moreo 2001; Kaplowitz, Hadlock & Levine 2004). Although being difficult to estimate, Watt (1999) reports a detailed examination of the real cost of the web-based survey method compared to other survey methods as low as $0.65 per 10,000 respondents. In other words, the web-based survey is distributed to all potential respondents at almost no cost (Cobanoglu, Warde & Moreo 2001; Satmetrix 2001). Indeed, because it was a PhD study cost was an essential factor to be considered and kept as low as possible.

3) Quality: Appreciating quality must be done in regards of the type, form, and function of the web-based survey (Couper, Traugott & Lamias 2001). However, Schonlau et al. (2002) noted that there is some evidence that data collected via Internet tools are of a slightly higher degree of completeness and quality than data collected via other traditional methods. In the same context, the appearance of the web-based survey can also cause a statistically significant impact on response rates (Tourangeau & Peytchev 2005). As per Figures 5-2 and 5-3 the researcher produced two good quality surveys with simple and attractive appearance.

4) Self-Administration: Web-based survey is self-administered which means providing a sense of privacy and anonymity to respondents, allowing for sensitive questions to be asked (Satmetrix 2001). Due to anonymity and ease of completion, response rate is often high. Contrary to non self-administered face-to-face surveys, web-based surveys have no issues on respondents trying to give socially desirable answers as defined by the culture that the researcher is assumed to represent (de Leeuw 1992). Subsequently, this

factor added to the quality of the research since it reduced, if not eliminated, the effect of bias from the researcher.

5) Promptness: Due to using the web technology programming script and online databases, a web-based survey can be dynamic (Tingling, Parent & Wade 2003), thus providing statistical results of the survey, in addition to feedback to the respondents' answers as soon as the survey has been completed with high internal consistency and predictive validity (Sethuraman, Kerin & Cron 2005). All responses are delivered instantly and kept in the researcher's Web server automatically, where they can be accessed for data analysis. This factor enabled the researcher to log in frequently to the web server to check the progress of the survey participation, especially after having an invitation posted on one of the mobile community forums.

6) Manageability: A Web-based survey does not necessitate an experienced researcher since different reports can be generated automatically, e.g. the number of respondents completing the survey at a certain time or on predefined time intervals. This factor enabled in saving the researcher's time and effort, especially when there was a prompt need a copy of the responses report.

7) Availability: Web-based survey does not confine respondents to any time or place constraints. Respondents from all over the world, with different time zones, can fill in such survey in their own chosen time, wherever they like, which indeed provides convenience to them. This was especially important in this study since it was crucial to reach not only Australian end users, but also end users from all over the world.

The following sections provide more detail about these two web-based surveys:

5.2.2.1. Experts' & Government Officials' Survey

Based on the outcomes of literature review which enabled locating the research problem as explained in Chapter 3, the subsequent step was to explore the reality; find out what mGovernment and eGovernment experts, and the government officials think about the factors that affect a mobile service success. In fact this survey can be considered as an online interview since it contained open questions which were comfortably and amply answered at the time decided by the participant expert.

The survey was prepared using the UTS Online Survey Manager tool provided by the University's Institute for Interactive Media and Learning. The researcher was careful to adopt simplicity in the survey layout, and straightforwardness in its questions. Each question was carefully formed after consultation with the supervisor and survey experts to make sure that the survey would gather the correct data and be able to contribute to this study. This survey's data analysis is handled in Sections 6.3 and 6.4. However, the survey design as a data collection method is explained in the following points:

1. Sequence of Questions:

   The snapshot in Figure 5-2 shows that the experts' survey contained two sections; the first elicited demographic information in questions 1 - 5, whilst questions 6 - 11 covered mobile government services awareness and usage. The second section included two open ended questions about the main barriers to success in mobile service projects and suggestions to overcome them. These open ended questions complied with the strategy that Johnson (1997) suggested to promote the validity of qualitative research, which aims

to "probe for deeper understanding rather than examining surface features" (Johnson 1995). Verbatims (direct quotes, as noted in Section 4.4.3-F) are also used to improve validity of the research. Such examples of data not only validate the conclusions, but also provide rich illustrations of the topic (Zmijewska & Lawrence 2005).

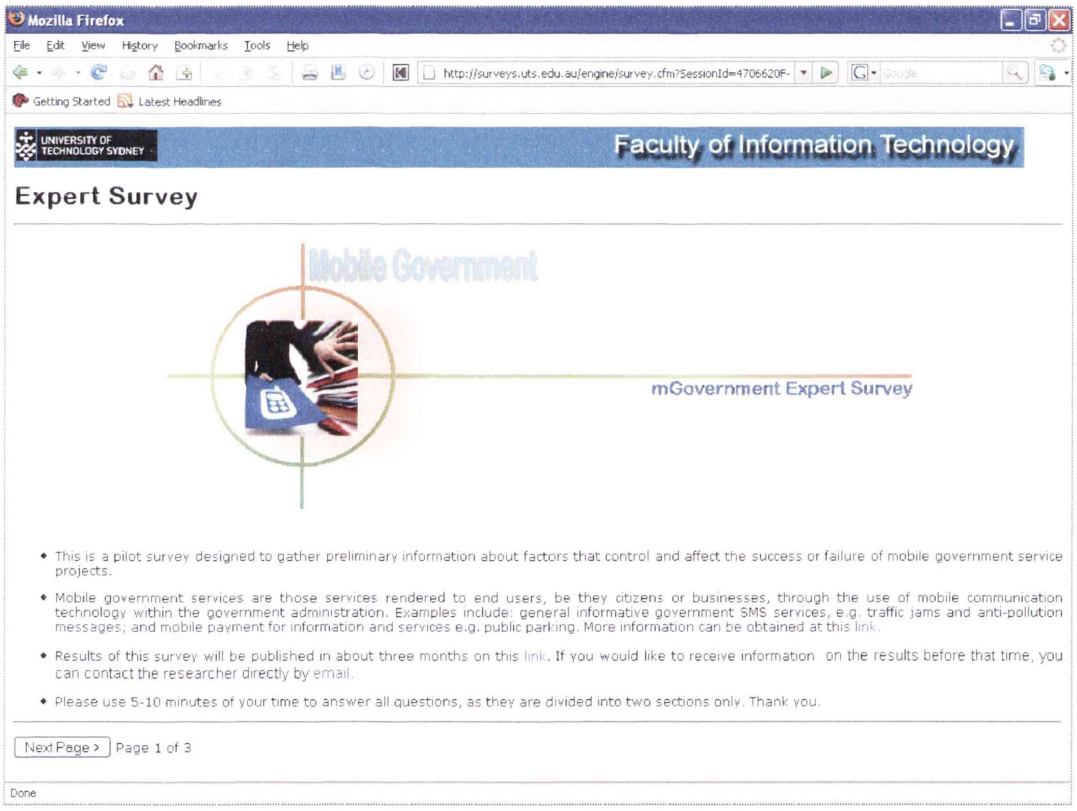


Figure 5-2: Expert survey front page screenshot

2. Response Format:

Besides open-ended type of response, two more types were used; forced choice and summative.

The forced choice format is a "response format in which respondents must choose between discrete and mutually exclusive options" (Dane 1990, p. 266); it is a nominal type of scale. As an example, the question: "Have you been involved in developing a mobile government service?" should be answered as yes or no. The nominal scale was administered using: Radio buttons; Yes / No selections; Check boxes; and Data fields.

The summative format, which is also well-known as Likert scale (Likert 1932), is an ordinal scale that consists of items reflecting extreme positions on a continuum, i.e. items which respondents are expected to agree or disagree with. As for the number of scale points, the researcher did not find a clear rule indicating an ideal number. Nevertheless, many researchers acknowledged that opinions can be captured with five to seven point scale, indicating that a five-point scale is sufficient such as Sekaran (2003) and Parasuraman et al (1988). Sufficient means that an increase in scale will not improve the reliability of the ratings (Elmore & Beggs 1975) and may cause confusion to the respondents (Hair, Bush & Ortinau 2003) Accordingly, a five-point Likert scale was used in this survey. As an example, the question: "How would you rate the mobile service you were involved with?" should be answered as one of these five options selected: Very Successful, Successful, Neutral, Unsuccessful and Very Unsuccessful. As Dane (1990, p. 272) suggested, each of these five options is given a value, e.g. from 1 to 5, corresponding to its position on the scale; which is further used for data analysis. The ordinal scale was administered using radio buttons.

3. Sampling Technique:

This study was based upon theoretical stratified purposive sampling technique, which is often used in qualitative exploratory research; where participants are deliberately chosen because of their knowledge and experiences. The stratified sampling is defined by Fink (1995, p. 11) as "one in which the population is divided into subgroups or 'strata,' and a random sample is then selected from each subgroup". This sampling technique enables gathering of a variety of opinions and perspectives (Gorman & Clayton 2005), in addition to enhancing the credibility of data collected from several sources. This is critical to the theory under consideration because these several resources may be able to illuminate complexities or details that could not be achieved using representative, systematic sampling (Ritchie & Lews 2003).

Accordingly, because it is not used to generalise to the large population, this sampling technique does not need to be statistically representative. Stratified purposive sampling aims to create rich, in-depth information (Zmijewska & Lawrence 2005), and should be used to the point of redundancy (Liamputtong 2005), where the sample size, which is the number of participants, is less important than the richness of data. Therefore, redundancy is the primary criterion that will determine when the sampling in this study should terminate.

4. Participants:

Researchers were seen as an important source of knowledge as their work requires familiarity with all the developments in the field (Zmijewska &

Lawrence 2005). The extensive review of literature enabled listing most of the opinions about mService project success factors and barriers (as mentioned in Section 3.4), in addition to identifying leading mGovernment and eGovernment researchers. The selection criterion for researchers and academics was set to be at least one peer-reviewed journal or conference publication regarding mobile and electronic government. References were accessed through the use of various academic databases as mentioned above in Section 5.2.1.

Government officials and industry experts were sourced from various areas such as local governments around Australia, communication companies, mobile phone suppliers, application developers and consultants. The researcher also attended international eGovernment and mGovernment conferences and trade shows inside and outside Australia to source likely experts. As Zmijewska & Lawrence (2005) stated, such stakeholders, due to their first-hand experience, are likely to know exactly what helps and hinders successful diffusion of mobile government.

Data were collected anonymously although all the survey potential participants were invited via personalized e-mail messages that explained and defined the purpose of the study.

5. Pilot Test:

Upon completion of the survey design a pilot study was conducted to establish the final version of the survey. It aimed to determine whether respondents would be able to view and access and successfully complete the survey. This step follows Dillman (2000) who suggested the testing process.

As feedback was collected from seven colleagues and doctoral cohort members, it enabled the final enhancement of the survey which successfully provided an uncorrupted Excel® data file.

5.2.2.2. End-users' Survey

Based on the multi-perspective effectiveness evaluation methodology for mGovernment (MPE²M-mG) which was devised by the researcher (El-Kiki & Lawrence 2005), the researcher developed end user satisfaction analysis model of mServices (EUSM) in order to analyse mobile end-users' satisfaction of mGovernment services (El-Kiki & Lawrence 2006b).

As discussed in Section 7.3.3, ESUM has two dimensions; GQM (Goal/Question/Metric) with its three levels: Conceptual, Operational and Interpretive, and BSA (Balanced Scorecard Approach) with one perspective of 'Citizens/Businesses'. The operational level contains indicators, such as 'Pricing' and 'Content', for each conceptual level construct, such as 'Value for Money'. In turn, the interpretive level contains items, which are questions in this context, which interpret each indicator at the operational level, for example there are three questions investigating the 'Pricing' indicator.

Subsequently, the ESUM's interpretive level was used to interpret the mobile end user's needs into questions as a necessary step to ensuring satisfaction with the rendered mService. These questions were fed into the end-users' survey to be answered by the participants.

Figure 5-3 illustrates the introductory page of the survey.

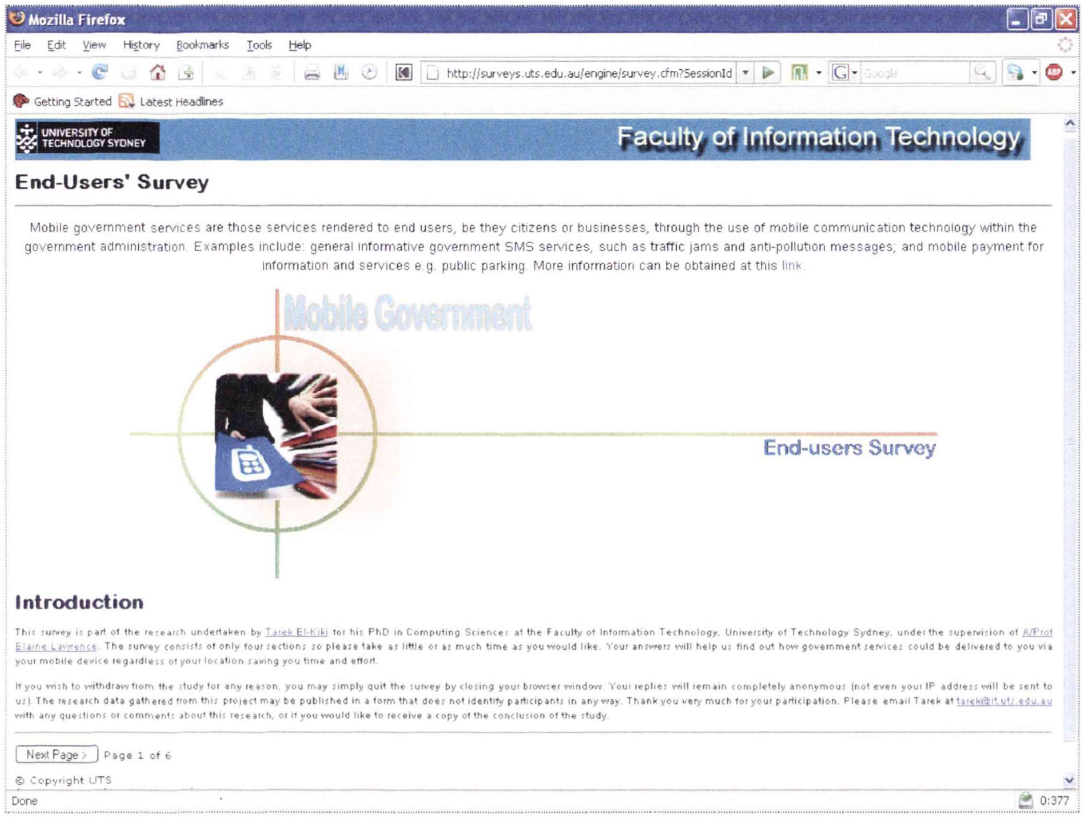


Figure 5-3: End user's survey introductory page

A full explanation about MPE²M-mG and the descendant model EUSM is handled in Chapter 7, which also encloses the analysis of data collected by this end-users' survey method. Accordingly, in order to take that theoretically structured model EUSM into real-world implementation, this end-users' survey was designed and run as detailed in the following points:

1. Sequence of Questions:

   The survey began with less complex questions and moved forwards to opinion-sought questions where the respondents were asked to indicate their opinions on the various dimensions of the variables being studied. Each

question was carefully formed after consultation with the supervisor and the statistics instructor to make sure that the survey would gather the correct data and be able to contribute to this study.

The end users' survey was divided into four main sections:

First Section: for enquiring about mobile devices and their usage details, which were covered by four questions:

- Q1. Which type of mobile device do you usually use? (Types of devices - Multiple choice)
- Q2. If you are using another mobile device that was not mentioned in the above question, please tell us what it is:
- Q3. You are using mobile devices for: (Duration of time - Multiple choice)
- Q4. Your skills of using a mobile device can be assessed as: (Single choice)

Second Section: this was used for enquiring about the familiarity with existing mServices which divided users into active and passive users. Active users are those who use or have used a government mService, whilst passive users are those who have not yet used any mService and are expected to once they get the opportunity or learn about the existence of mServices. This section was covered by six questions:

- Q5. When did you first become aware of mobile government services? (Multiple choice)
- Q6. Are you currently using a government mobile service? (Yes/No)

- Q7. If you are currently using a government mobile service, how long have you been using it for? (Multiple choice)
- Q8. Which government mobile service you are currently using or interested in?
- Q49. What are the best 3 (three) things about mobile government services?
- Q50. What are the worst 3 (three) things about mobile government services?

Third Section: for enquiring about demographic details: Gender, Age, Education, Occupation, and Income categories.

Fourth Section: this was developed for enquiring about the core of the survey; benefits as generically viewed by end users. The basis for this section was the EUSM's GQM conceptual level, as explained in Section 7.3, which is consisted of four constructs (Value for Money, Quality of Service, Efficient Transactions, and Strategic Data) with a total of sixteen indicators. Each indicator was detailed into items or questions. Those questions formed the pool from which the survey statements Q8 - Q42 were derived, (as per Table 7-3 in Chapter 7), which in turn were transformed into question statements (Q8 - Q 42).

In order to develop construct items that best capture the sphere of each construct, items from other instruments (Powell & Dent-Micallef 1997; Welbourne & Wright 1997) were reviewed and modified to fit the context of mGovernment service end users. Additional open questions regarding their views about mServices were developed based on literature review and experts'

survey findings. Needs and expectations items were measured on a one-to-five Likert ordinal scale ("strongly agree" to "strongly disagree").

Each type of users had its own set of the core statements which differed grammatically and contextually from the other. For example, one of the statements investigating pricing from an active user perspective would read:

- I **think** using government mobile services costs less than using the same traditional government one.

Whereas a passive users' statement would read:

- I **expect** using government mobile services costs less than using the same traditional government one.

2. Question Content and Wording:

Regarding question content and wording, Frazer and Lawley (2000) argued that surveys should be simple and easy to read; the questions, therefore, were designed to be short, simple and comprehensible, avoiding ambiguous, vague, estimation, generalization, leading, double barrelled and presumptuous questions (Kassim 2001). In addition, items did not exceed medium-length of 16-24 words (Andrews 1984; Oppenheim 1986).

3. Response Format:

Two types of response format were used: dichotomous close-ended and labelled scales. In order to obtain information pertaining to respondents' demographics, mobile devices used and mService use, a dichotomous close-ended question format was applied. In order to obtain respondents perception towards mService benefits, labelled scale response format was

used. Labelled Likert scales were appropriate to measure responses with five points as explained above in the expert's survey.

4. Measurement Scales:

As this survey aimed to explore end users' targeted benefits from utilising a government mobile service, multiple-item scales were regarded appropriate in order to encompass EUSM contents. Nominal scales were used for identification purposes because they have no numeric value. For example, respondents were asked to select the mobile device they mostly use. Ordinal scales, on the other hand, were used to rank end users' age group and income level. Furthermore, interval scales were used to implement GQM conceptual level of EUSM by measuring the respondents' subjective opinions about the benefits from mService. For example, respondents were asked about their thoughts in relation to value for money and quality of service.

5. Sampling Technique:

Due to the novelty of mService, it was obviously difficult reaching those end users since there are no lists, associations or bodies that represent them. Hence, the only way was to spread a universal invitation to participate in this survey. Accordingly, email invitations were sent to most of wireless and mobile communities around the world with the request to post the invitation on their web sites and discussion forums. According to Fought et al (2004), respondents of e-surveys tend to respond only on topics in which they are interested, and this is how they were filtered out and reached to participate in this survey. As a result, 184 responses were received, cleansed and analysed forming the core of this study.

6. Participants:

Based upon the previous point, participants were ordinary citizens and business personnel who have used, or have interest in using, mServices from all over the world. As previously mentioned in Chapter 4, mService end users' needs are researched in this study as generically as they are, and this is the reason that place, country or time zone were not required to be provided in this web-based survey.

7. Pilot Test:

The instrument was subjected to a pre-test procedure where selected individuals - five academics and seventeen potential respondents - were verbally invited to complete the survey and provide comments. The aim of the pilot testing was to make sure that the questions were eliciting the required responses, uncovering any ambiguous wording or errors before the survey was publicly launched. When refining the survey, all the comments were applied such as overlapping questions were dropped and some constructs were merged shortening the length of the survey. Reliability was tested by Cronbach's alpha score through SPSS package, as explained in Section 7.4.3.3, which proved satisfactory for all used constructs as essential components in the EUSM model.

5.2.3. Case Studies

Due to the novelty of mGovernment, as previously noted in Section 4.2.2.1, as a new area of research, case study is a legitimate exploratory data collection method (Hussey & Hussey 1997) in order to answer questions starting with "how"

or "why" (Yin 1994). For example: 'how do you see mobile services changing the way work accomplished by the council?'.

Local governments' case studies are essential elements of this research, as they address barriers to mGovernment take-up compared to eGovernment previous adoption, in order to discover the elements of mService effectiveness which affect the success of its projects. Chapter 8 discusses the full details of three local government councils' case studies. However, the following points briefly handle how these case studies were designed and used.

5.2.3.1. Selection of the Samples

Three local councils were chosen from the focused segment of seventeen councils in the Sydney Outer (SO), representing a stratified sample according to Bryman and Cramer (1990). In fact, all seventeen councils have implemented eGovernment services online, but only seven councils did take some serious actions towards implementing mICT, from which those three were selected for studying their cases. The objective of such step was to collect data for generating categories, patterns and themes about mGovernment implementation. It was important to collect data from councils where some real steps in implementing mICT have been taken, and accordingly, these were considered to be in the best position to provide the required information; certainly this situation has implied some judgement sampling. Therefore, the choice of these three councils implied a combination of purposive sampling and judgement sampling.

5.2.3.2. Design of the Telephone Interview

The principal objective of interviews was to investigate plans, accomplishments and barriers encountered in implementing and providing eGovernment and mGovernment services, direct from the local government officials. Accordingly, the results of such interviews were used in augmenting the other surveys' results.

Combining Feyerabend's (1993) thoughts for using a plural and creative approach to data collection methodology and Wagner's et al (2004) inclination towards using narrative analysis, semi-structured interviews were found indispensable for comparison, especially as they also require less in the way of interviewing skills (Kumar 1996). Therefore, this type of interview was chosen for the local councils case studies.

According to Patton (2002), the interview guide approach was adopted since it determines in advance the outline of the topics that would be covered in the interview, as the interviewer decides the sequence and wording of the questions through the course of the interview. The advantage of this approach is that it escalates the comprehensiveness of the data, in addition to making data collection more systematic (Patton 2002). Moreover, it allows for interviews to be kept conversational where logical gaps in data can be closed during the course of interview (Patton 2002).

Subsequently, a fixed set of questions was prepared in order to estimate the time required for the entire interview. Undoubtedly, this assisted in making appointments with interviewees, as the list of questions was required to be attached to the interview preliminary invitation message (Robson 1993; Zikmund

1999) which outlined the nature of the interview, the anticipated duration, and requested the participation at the study. Interviewees were nominated by their local councils as they were in charge of, or involved in, IT, eGovernment management and implementations, and Council's mobile services. The interviewees were informed of the significance of answering all the questions; however they were informed that they did not have to answer any question they did not want to for whatsoever reason.

The semi-structured interview schedule consisted of six sections with a total of eleven open and closed-ended questions, where open-ended questions were asked in order to allow the interviewee to move the conversation flow to areas of importance. (A copy of the interview sheet is in Appendix C). The six sections addressed the following aspects:

1. The council's current electronic service.
2. The council's current mobile services.
3. Impact of mobile technology on the council's internal and external operations.
4. Problems in using the mobile technologies.
5. The council's opinion about research outcomes.
6. Impact or reaction of applying mobile services at the council.

5.2.3.3. Data recording and management

Interview data were digitally recorded with the permission of the interviewees. They were also assured of confidentiality and anonymity and were provided with the research Official Ethics Clearance number.

Detailed recording is an essential component of interviews since it represents the basis for analysing the data. Each of the local councils' three telephone interviews was transcribed by independent transcriptionist from digitally recorded files. Raw data were transcribed in full, including word-for-word quotations of the interviewee's responses as well as the interviewer's comments. Half way through two digital recordings the conversation sounded garbled; this is where the interviewer's notes proved useful to patch up the transcript.

The main advantages of this transcription method were its completeness and the opportunity it offers for the interviewer to remain attentive and focused during the interview (Patton 1990). On the other hand, this method did consume time, effort and money to produce complete three transcriptions.

5.3. Data Analysis

As a result of utilising both qualitative and quantitative data collection methods, a large amount and variety of data were collected making the data analysis process a real challenge (Berdie, Anderson & Niebuhr 1986; Yin 1994). The data for this research were analysed primarily using interpretive research techniques (Ellis 1994).

Results of the quantitative analysis assisted in explaining and proving the findings of the qualitative analysis (Creswell 2003). The use of statistics provided for the necessary explicitness hence giving greater protection against bias in the interpretation of qualitative data (Robson 1993). Quantitative data analysis was therefore limited to the extent that it provided objectivity to the qualitative data (Gillham 2000). Furthermore, Miles & Huberman (1994, p. 41) stated that on one

hand quantitative studies "persuade" the reader through de-emphasising individual judgement leading to more precise and generalisable results. On the other hand, qualitative research persuades through rich depiction and strategic comparison across cases, thereby overcoming the "abstraction inherent in quantitative studies."

5.3.1. Qualitative Analysis Strategy

Qualitative data analysis refers to a "process which entails an effort to formally identify themes and to construct hypotheses (ideas) as they are suggested by data and an attempt to demonstrate support for those themes and hypotheses" (Bogdan & Taylor 1975, cited in Tesch 1990, p. 113). Miles and Huberman (1994) viewed data analysis as consisted of three concurrent flows of activity: data reduction, data display and conclusion drawing. According to this view qualitative data analysis is a continuous and complex process which is done in constant interaction with the data.

This section discusses the strategy adopted in analysing the data of the local councils' case studies which were collected through telephone interviews. The outcomes of the data analysis are exhaustively discussed in Chapter 8.

Having the interviews transcripts ready in hand, the QSR NVivo software was then used and the researcher proceeded through the coding processes. Using software for qualitative data analysis is not only the researcher's personal preference, but also a profoundly debated topic among qualitative researchers (Charmaz 2000; Miles & Weitzman 1994) since it is believed to improve the efficiency and accuracy of the qualitative analysis in comparison to the manual methods.

NVivo is a Computer Assisted Qualitative Data Analysis Package (CAQDAP) developed by QSR international (Bazeley & Richards 2000). It provides functions which support the coding and retrieval of text and also provides functions for researchers to write down their research memos during the analysis process (Gibbs 2002).

In order to enable the common elements and issues to emerge from the interviews, each interview's professionally produced transcript was saved in a separate word processor document. Maintaining the richness of the interviews data, these individual documents were imported in NVivo for reading, analysis and coding.

5.3.1.1. Codification Processes

Codification allows the linking of different segments of data to create conceptual categories of data which have common elements in order to facilitate the classification of the observations. The assigning of observations to categories is known as coding (Boisot 1998) which links the data segments to particular ideas or concepts (Coffey & Atkinson 1996). The fewer the observations that are categorised, the lower the level of codification (Boisot 1998).

The actual analysis of qualitative data occurred in the process of establishing and pondering over the relevant codes and linkages. As coding allows for ordering and re-ordering data in new ways, therefore new issues and themes are expected to transpire.

The researcher used two types of coding; open and selective. According to Gibbs (2002, p. 167) open coding is used to "examine the text for salient categories of

information by making comparisons and asking questions. These categories are labelled". Assessment of service market, Back end readiness, Defining the service consumer, and Getting supporting technology are all examples of open coding which is represented as free nodes in NVivo package.

Selective coding was used "where the core category, or central category that ties all other categories in the theory together into a story, is identified and related to other categories" (ibid). In this research, it was the identification of common themes and patterns both within and across the local councils. Conditions of success, End-user's benefits, and successful mService characteristics are all examples of the selective coding which is represented in tree nodes in the NVivo package.

Thematic analysis of interviews followed Auerbach's (2003) four steps for coding procedure as guidelines:

1) Identifying relevant text;

2) Discovering repeating ideas in the relevant text;

3) Organizing repeating ideas into themes, and

4) Organizing themes into larger, more abstract ideas - theoretical constructs.

These four steps are practically applied through the following processes:

Process 1: The transcript of the three interviews was checked in order to describe each council's case in addition to identifying the descriptive themes that dominate each council's way of thinking. The descriptive themes for each council

are the trends of the answers to the interview questions. Accordingly, questions were used as section headings under which all answers to each question were gathered as a preparatory step for open coding.

Process 2: The descriptive themes were fed into NVivo as free nodes. A Node is a physical location where the groups of ideas that would be coded are stored. Free nodes represent an unstructured, non-hierarchical collection of nodes (Bazeley & Richards 2000); a few examples are mentioned above. In fact, both Process 1 and Process 2 represent the first conceptual stage in codification, where both data accuracy and data reduction are accomplished, as illustrated in Figure 5-4. Data reduction refers to the process of selecting, simplifying and transforming data that appear in the original documents (Miles & Huberman 1994, p. 10).

Process 3: The resultant free nodes were further treated to be categorised into tree nodes. Tree nodes result from organising free nodes into hierarchies by moving them from a general category at the top to more specific categories down the bottom (Bazeley & Richards 2000); examples of free nodes are mentioned above. Process 3 represents the second conceptual stage in codification, where open coding is carried out.

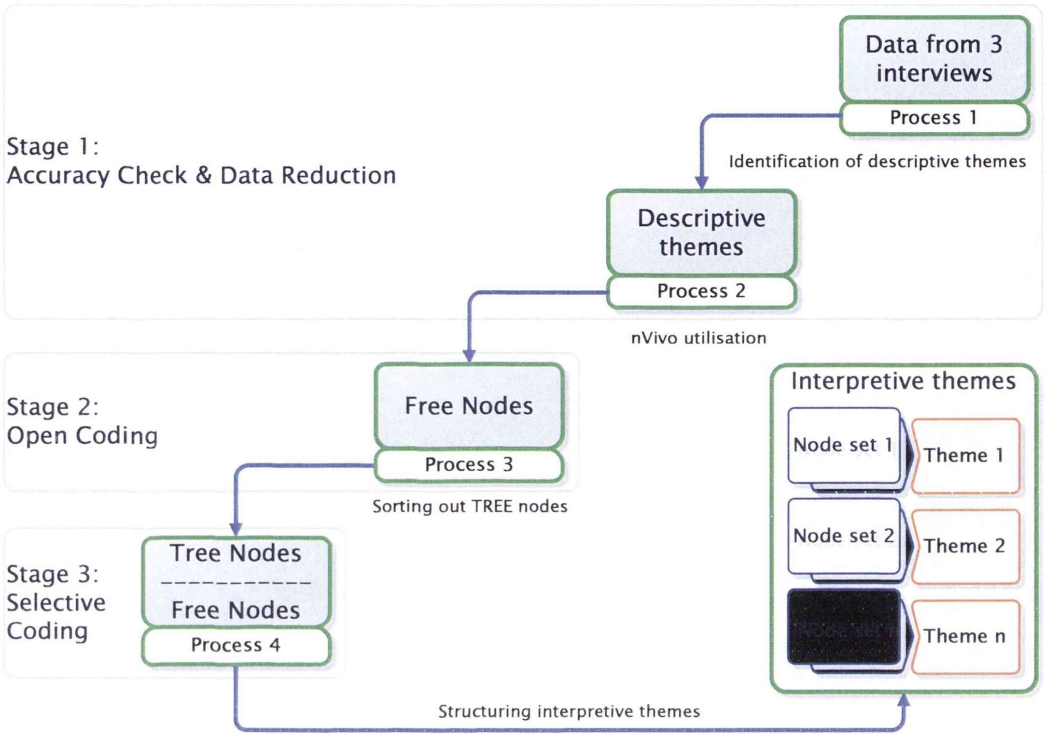


Figure 5-4: Qualitative data analysis processes

Process 4: The interpretive themes were structured by extracting the tree nodes from the free nodes, and regrouping them with each other into node sets. In this study the interpretive themes were used to find patterns amongst descriptive theme identified in the first process; examples of tree nodes are mentioned above. Process 4 represents the third conceptual stage in codification where selective coding is performed.

The outcomes of the local government interviews are discussed according to these three conceptual stages in Section 8.5.

5.3.1.2. Refining Coding Scheme

The coding scheme was refined during the previous four processes whenever it was needed. For example, during process 3, some of the free nodes were renamed and then clustered as tree nodes. However, because NVivo nodes contain the links to the coded segments instead of real data, changing the name did not affect these links and accordingly any previous analysis. Nevertheless, checking back is very necessary to make sure of the reliability and consistency of the data analysis (Bazeley & Richards 2000).

5.3.2. Quantitative Analysis Strategy

The main purpose of the quantitative analysis was to augment the results obtained from the qualitative analysis through extracting statistical facts from both of the web-based surveys. From the experts' survey, demographic data were essentially useful in verifying the characteristics of the participants as detailed in Section 6.3. In regards to end-users' survey specific statistics were used to analyse end users benefits, create a profile for mService end users, and verify the validity and reliability of the web-based survey instrument as mentioned in Section 7.4.

Data from both surveys were quantitatively analysed using the powerful Statistical Package for the Social Sciences (SPSS®). SPSS provides frequency distributions, percentages, cross-tabulations and correlations between variables. The frequency distributions and percentages were useful in summarising the data and describing observations. The crosstabulations displayed the number of cases falling into each of two or more categorical variables, while the Pearson

correlation was useful in measuring the directional relationship between two variables of linear association. One-tailed tests were used to measure the directional relationship, at both the 0.01 and 0.05 significance levels (Coakes & Steed 1999).

There was no need for a specific statistical preparation for the experts' survey as it was the case for the end users'. Only frequencies were used for the experts' survey descriptive analysis. On the other hand, a variety of statistical analyses were used for the end users' survey since benefit constructs were used, which necessitated more specific statistical calculations.

Data from the end users' survey were quantitatively analysed through three steps, as explained in the following sections:

- Creating variables
- Data reduction
- Creating relationships

5.3.2.1. Creating Variables

Referring to Section 5.2.2.2 which described end-users' survey structure, each of the four sections generated a set of variables which were extracted from each section's items or questions. These variables could be considered as independent or dependent, depending on the type of analysis required. Variable names are assigned as follows:

First Section: for enquiring about mobile devices and their usage details:

- Type_mDev = type of mobile device (Q1&Q2)

- Dura_mDev = duration of time spent on using the mobile device (Q3).
- Skill_mDev = skill's level of using a mobile device (Q4).

Second Section: for enquiring about the familiarity with existing mServices:

- Know_mServ = knowledge about mService existence (Q5).
- Using_mServ = currently using an mService (Q6).
- Dura_mServ = duration of time spent on using an mService (Q7).
- mServ = mService currently used or is interested in (Q8).
- Q42 = mService future use probability (Q42).
- Pro_mServ = the best 3 (three) things about mServices (Q49).
- Con_mServ = the worst 3 (three) things about mServices (Q50).

Third Section: for enquiring about demographic details:

- Gender.
- Age.
- Education.
- Occupation.
- Income.

Fourth Section: for enquiring about the core of the survey; benefits as generically as they are viewed and assumed by both types of end users. Table 5 shows variable names assigned for sixteen indicators covering statements Q8 - Q42 in the survey for both active and passive users.

GQM Conceptual Level Constructs	GQM Operational Level Indicators		Variables
Value for money (VfM)	1	Pricing	○ VfM_Price
	2	Content	○ VfM_Cont
Quality of service (QoS)	3	Awareness	○ QoS_Aware
	4	Accessibility	○ QoS_Access
	5	Availability	○ QoS_Avail
	6	Reliability	○ QoS_Reliab
	7	Accuracy	○ QoS_Accur
	8	Responsiveness	○ QoS_Resp
	9	Courtesy and Helpfulness	○ QoS_Court
Efficient Transactions (ET)	10	Usability	○ ET_Usable
	11	Timeliness	○ ET_Time
	12	Trust	○ ET_Trust
	13	Privacy	○ ET_Privacy
	14	Security	○ ET_Security
Strategic Data (SD)	15	Accountability	○ SD_Account
	16	Transparency	○ SD_Transp

Table 5-1: Variables of indicator constructs

5.3.2.2. Data Reduction

Sedlacek & Stanley (1992) and Dixon (1990) advised that the shorter the survey and the fewer the number of extraneous items, the more likely it is to be successful. Subsequently, the researcher preferred to limit the number of constructs and their included items (questions) in order to simplify processes of both responding to the survey by the end users (as answering too many questions would have been tedious), and the statistical analysis of collected data. Care was taken when limiting the number of constructs and their questions in order to maintain acceptable validity and reliability, although more complex constructs with numerous items would have produced higher validity and reliability, which might have not significantly enhanced the efficacy of the survey.

5.3.2.3. Creating Relationships

In order to determine the strength of association between variables, relationships were created. Numerous potential relationships were detected, but for the sake of focusing the analysis on the required data, several relationships were disregarded. For example, to produce a portfolio that depicts the end user, a relationship between mService future use probability as an independent variable (Q42) and other dependant variables such as demographic variables, Skill-mDev and Know-mServ.

These relationships necessitated employing different statistical methods such as frequency distribution which was used with the demographic variables, which also produced the required illustrative graphical charts. Correlation methods were used between each construct's items in order to measure the reliability of the construct. Correlation coefficient assisted in deciding the suitability of constructs for factor analysis as a step in the process of measuring the construct validity. This is in addition to the use of crosstabs and basic Chi-Square (x^2), when investigating the independence or relatedness of one variable to another in order to produce the end-users' profile.

5.4. Chapter Review

This chapter discussed in detail the methods that were used for data collection and data analysis. Data collection was accomplished using literature review, web-based surveys and case studies. Literature review has always been a continuous process for collecting, modifying and verifying data. It assisted not only in gathering data about the research topic, but also in preparing the generic

mGovernment theoretical management framework which enabled locating the research problem.

Web-based survey method was detailed to run two essential surveys which collected data from both mGovernment and eGovernment experts, and mobile end users. The choice of this method was accounted for by mentioning a few characteristics or advantages such as promptness, high quality and low cost in comparison to other survey methods. Experts' survey was used to collect 'first hand' data about the barriers that affect the success of government mobile services and the suggestions to overcome those barriers. The survey was based upon theoretical stratified purposive sampling technique, which is proper for qualitative exploratory research such as this, where participants are deliberately chosen because of their knowledge and experiences. Because this survey was not used to generalise to the large population, the experts' sample was not required to be statistically representative, since the stratified purposive sampling aims to create rich, in-depth information and to be used to the point of redundancy. Researchers in mGovernment and eGovernment, government officials and industry experts were invited to participate in that survey, and indeed they enriched the collected data with their genuine knowledge.

In addition, another core survey was launched to investigate the generic needs to mServices as perceived by mobile end users. The design, sampling, participants, measuring scales and pilot test were all discussed in order to detail how this end-user's survey method was structured. For example a pilot test was necessary to test the survey's feasibility regarding the flow of questions, wording, construct validity and the entire instrument reliability.

Case study was also used to collect data about and from local government councils. Besides literature review about three local councils, telephone interviews were utilised to investigate plans, accomplishments and barriers encountered in implementing and providing eGovernment and mGovernment services, direct from the local government officials. Interview questions and data recording and management were handled sufficiently.

Both qualitative and quantitative data analysis strategies were elaborated on. Qualitative strategies were used to analyse data collected from end users' survey through open questions, in addition to data collected from telephone interviews with local government officials. QSR NVivo package was mainly utilised as an aiding tool to organize and manage data more efficiently enabling the researcher to code, locate and derive categories and themes about local councils' current and future mobile activities and accordingly, services.

Quantitative strategies were used to analyse statistical data collected from end users' survey through three processes; creating variables, data reduction and creating relationships between variables. Relationships between variables required using different statistical methods, e.g. frequency distribution, correlation and crosstabs. These relations were used to verify the validity and reliability of the survey instrument, in addition to highlighting end user's characteristics.

The following chapter analyses the data collected from the experts' survey in order to build a theoretical sound ground on which the core end users' survey was based.

CHAPTER 6

6. Expert Survey Analysis

In order to complete the process of paving a sound path to the development of a real-world end-users' survey, which is discussed in Chapter 7, experts in mobile technology had to be firstly consulted. Previously, Chapter 5 handled how data were collected and analysed using the expert web-based survey method, this chapter presents the quantitative and qualitative results of that survey. Experts from nineteen countries around the world identified four types of barriers to the success of government mService projects in their answers to the survey. They however provided suggestions for overcoming only three types of these barriers. These suggestions were compared to the findings from an extensive literature review, resulting in a very close correspondence between them.

6.1. Introduction

There have been numerous attempts to define barriers to success of eGovernment projects and, by implication, to mobile government projects (CIBS & CCICMT 2003; Gasco 2005; OECD 2003; TWGEDW 2002). Researchers such as Heeks (2003) conducted many studies which verified the implementation of eGovernment projects. He suggests that there is always a gap between design and reality, and in order to minimize this gap, he divides factors of success and failure of eGovernment projects into two categories: drivers and enablers. Other researchers viewed barriers to government electronically-rendered services from different aspects. For example, in England, potential voters, who usually use SMS to send messages to friends, were not willing to use it when voting despite the very low cost, only because they could not surmount that psychological barrier of using an unofficial messaging method to fulfil an official task (Arazyan 2002). Others (ETSI 2005) consider negative experiences and failures as a barrier against using a service again. A recent report by the Australian Government (DCITA 2005) reveals that lack of trust in online transactions also represents a barrier to using an online service. Carroll's (2005) research, as set out in Table 6-1 below, revealed the following about mobile acceptance that has informed and assisted in the preparation of this expert survey which is discussed in this chapter:

Factor	Explanations
Availability of mobile technologies	access to mobile technologies does not mean that they are used for a wide range of activities
Amount of Effort	participants were unwilling to invest effort into using mobile devices for complex or lengthy tasks
Convenience	reported as being important for users
Input and Output Features	physical limitations of mobile technologies including clumsy input and output mechanisms and inadequate screen size influenced usage
Privacy and Security Issues	continuing concerns about privacy and security and vividness of 'urban myths' around mobile technologies have led to continuing distrust of electronic transactions.
Lack of public sector services	little access to public sector services; the chief service accessed was transport information.

Table 6-1: Factors Impacting Mobile Acceptance. Source: (Carroll 2005)

However, governments are recognising that mobile devices are vital tools for emergency and law enforcement management as they promise to enhance efficiency, effectiveness, responsiveness and accountability at federal, state and local levels (Moon 2004). The recent major emergencies caused by the Asian Tsunami in December 2004 and Hurricane Katrina in August 2005 provide graphic examples of the failure of government agencies to communicate quickly and effectively with their threatened populations.

6.2. Background

The subsequent step, after extensively examining the literature in Chapter 3 and extracting what other authors thought to be the barriers to mService projects success, was to acquire opinions of mobile technologies experts. The objectives of such expert survey were to precisely develop hypotheses, or extend

interpretation of certain social events and processes (Potabenko 2002). Hence, as explained in Chapter 5, a web-based survey which collected opinions of industry experts, researchers, academics and government officials from nineteen countries, was designed and administered during the months of June- August, 2006.

As every step taken in the process of a constructivist exploratory research, such as this, is interpretive and constructive to the following step, this chapter analyses a large diversity of opinions about barriers depending on the type of barrier and the perspective from which experts view it. These comments *are compared to the results of the literature study* to form and validate the contents of the indicator constructs of the operational level of the Multi-Perspective Effectiveness Evaluation Methodology for mGovernment (MPE^{2}M-mG), which is explained in detail in Section 7.2.3.5, which provides, in turn, the theoretical background for the end-user survey as elaborated in Section 7.3.

6.3. Survey Quantitative Data Analysis

The survey targeted researchers and experts in the field of both eGovernment and mGovernment service delivery over a three month (June - August, 2006) period. The researcher received 36 usable responses from a preliminary email to 116 experts with a response rate of 31% as defined by Tortora (2004) who calculated it to be the product of contact rate (100% - refusal rates) multiplied by both of cooperation and completion rates. Sixteen respondents were willing to be contacted again for follow-up email, telephone, and/or online conference interviews. Because this survey was based upon theoretical stratified purposive

sampling technique, as previously mentioned in Section 5.2.2.1, this response rate was sufficient due to the quality of information obtained per sampling unit, as opposed to their number per se (Patton 1990, p. 169).

6.3.1. Demographic Data

6.3.1.1. Gender

The statistics, shown in Table 6-2 and depicted in Figure 6-1, show 20% female respondents to 80% male respondents. This could reflect the general trend in technology sectors where females are traditionally under-represented especially in mGovernment as a novel area of research.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Male	29	76.3%	80.6	80.6
	Female	7	18.4%	19.4	100.0
	Total	36	94.7%	100.0	
Missing	System	2	5.3%		
Total		38	100.0%		

Table 6-2: Gender representation in the collected expert survey data

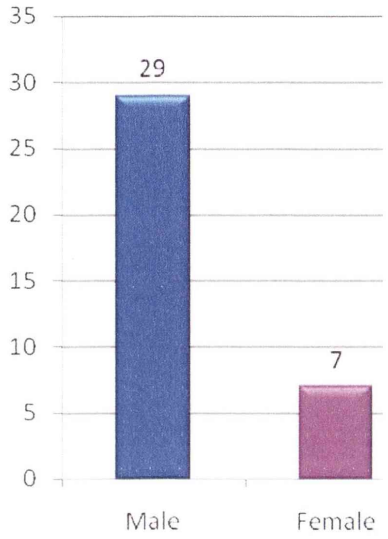


Figure 6-1: Respondents gender ratio

6.3.1.2. Age

The statistics shown in Table 6-3 and depicted in Figure 6-2 reveal that 36% of respondents were in the 20-35, 42% were in the 36-50 and 22% in the 51-65 age ranges. This percentage reflects that new mobile technologies and services are gaining the interest of experts aged 20 - 50 with a cumulative percentage of 78% of respondents.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	20 - 35	13	34.2	36.1	36.1
	36 - 50	15	39.5	41.7	77.8
	51 - 65	8	21.1	22.2	100.0
	Total	36	94.7	100.0	
Missing	System	2	5.3		
Total		38	100.0		

Table 6-3: Age representation in the collected expert survey data

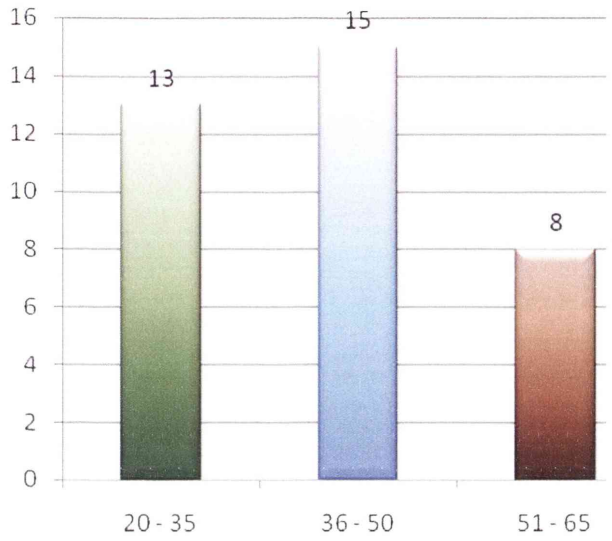


Figure 6-2: Respondents age ranges

6.3.1.3. Country of Residence

As per Table 6-4 and Figure 6-3, the participants included (21) from European countries where most mGovernment service implementations and research are occurring, (4) from Asia, (5) from North America namely USA, (1) from South America, (1) from Africa, and (4) from Australia where this research was firstly initiated and conducted.

The significance of having participants from several countries is reflected on their opinions, which may be influenced by their regional experiences. Various opinions from various parts of the world would have different perspectives regarding the same one topic which would enrich the collected data.

	Frequency	Percent	Valid Percent	Cumulative Percent
Missing	2	5.3	5.3	5.3
Australia	4	10.5	10.5	15.8
Austria	1	2.6	2.6	18.4
Bangladesh	1	2.6	2.6	21.1
Brazil	1	2.6	2.6	23.7
China	1	2.6	2.6	26.3
France	1	2.6	2.6	28.9
Germany	6	15.8	15.8	44.7
Hungary	1	2.6	2.6	47.4
India	2	5.3	5.3	52.6
Ireland	2	5.3	5.3	57.9
Italy	1	2.6	2.6	60.5
Poland	2	5.3	5.3	65.8
Portugal	1	2.6	2.6	68.4
South Africa	1	2.6	2.6	71.1
Spain	1	2.6	2.6	73.7
Switzerland	1	2.6	2.6	76.3
The Netherlands	1	2.6	2.6	78.9
UK	3	7.9	7.9	86.8
USA	5	13.2	13.2	100.0
Total	**38**	**100.0**	**100.0**	

Table 6-4: Country of residence representation in the collected expert survey data

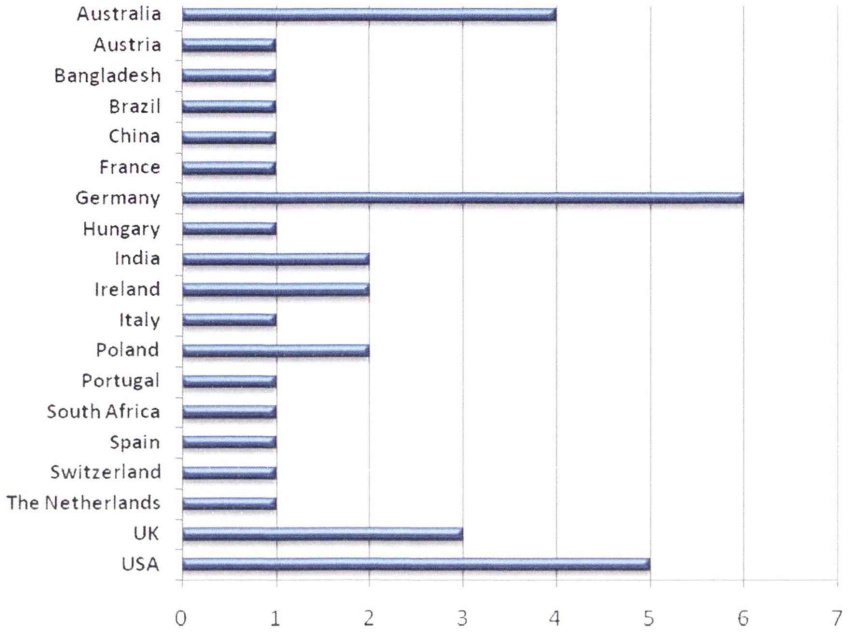


Figure 6-3: Counties of the survey participating experts

6.3.1.4. Involvement in mGovernment service project

It was particularly significant to the researcher that half of the respondents (50%) have been involved in developing a mobile government service enriching the collected data with practical experience besides theoretical knowledge, as per Table 6-5. Such a percentage of returns indicated the high level of commitment to these targeted experts and confirmed the selection criteria as valid.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Yes	18	47.4%	50.0	50.0
	No	18	47.4%	50.0	100.0
	Total	36	94.7%	100.0	
Missing	System	2	5.3%		
Total		38	100.0%		

Table 6-5: Experts involvement in previous mGovernment service projects

Moreover, Table 6-6 shows that 67 cumulative percent represents successful mService projects, which is a very encouraging and significant indicator about the expertise of participants. Details about each type of mService, its country of operation and its success rate, as estimated by these expert participants, are contained in Table 6-7.

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Very Successful	4	10.5%	22.2	22.2
	Successful	8	21.1%	44.4	66.7
	Neutral	5	13.2%	27.8	94.4
	Very Unsuccessful	1	2.6%	5.6	100.0
	Total	18	47.4%	100.0	
Missing	System	20	52.6%		
Total		**38**	**100.0%**		

Table 6-6: Success rates of experts participated-in mService projects

mService	Country	Success Rate
APNEE (www.apnee.org), USE-ME.GOV (www.usemegov.org)	Germany	Very Successful
A touristic and informative guide based on Bluetooth technology	Italy	Successful
USE-ME.GOV (6.FP)	Portugal	Very Successful
eVoting/mVoting in Switzerland	Switzerland	Successful
FairCash payment system	Germany	Neutral
Front office and fieldwork overhaul	USA	Successful
Information broadcasting service	France	Neutral
Local Governmental Information Services - making appointment via mobile	Hungary	Successful
Micro Finance	India	Neutral

Mobile Info-Terminals	Germany	Neutral
Mobile parking service	Austria	Very Successful
Model for disaster management	Bangladesh	Neutral
mVoting	China	Successful
Site field audit information	Brazil	Very Unsuccessful
There were 4 services developed within USE-ME.GOV project. For reference please see: http:// www.usemegov.org	Poland	Successful
Traffic Violations	India	Successful
USE-ME.GOV services	Poland	Successful
Worked on federal agency enterprise architectures modeling all technologies with business processes	USA	Very Successful

Table 6-7: Participated-in mService projects by country and success rate

6.3.1.5. Professional Occupation

Table 6-8 classifies the 36 respondents' professional occupations into 21 types, which vary from university professors and teachers to wireless and mobile researchers. The diversity of professions implies a variety of professional opinions regarding the barriers of mService success and accordingly the suggestions to overcome them, which is needed in order to comprehensively cover the topic from different perspectives.

Professional Occupation	No. of Participants
Administrative	1
Assistant Professor	5
Business Unit Manager	1
Chief scientist	1

E-Government Official	1
IT Solution Architect	1
Managing Director	1
Professor	5
Project Manager	2
Public Auditor	1
Researcher	8
Senior Investigator	1
Senior Lecturer	3
Senior Manager	1
Teacher	1
University assistant teacher	1
Vice President Mobile Computing Products Group	1
Wireless software Analyst	1

Table 6-8: Survey participants' professional occupations

6.4. Survey Qualitative Data Analysis

As this web-based survey was conducted to extract opinions from experts in mobile and electronic technology applied to government fields (El-Kiki, Lawrence & Culjak 2007), 83% of participants answered two core open questions about the main barriers to success in mobile service projects and the suggestions to overcome those barriers.

The researcher's analysis of responses categorised the barriers as identified by the experts across four axes: Organisational, Technical, Governance and Social, however identified only three major areas of suggestions: Organisational, Technical and Social excluding Governance, as illustrated in Figure 6-4. The barriers and suggestions are measured against the findings from the literature review and are discussed below in detail.

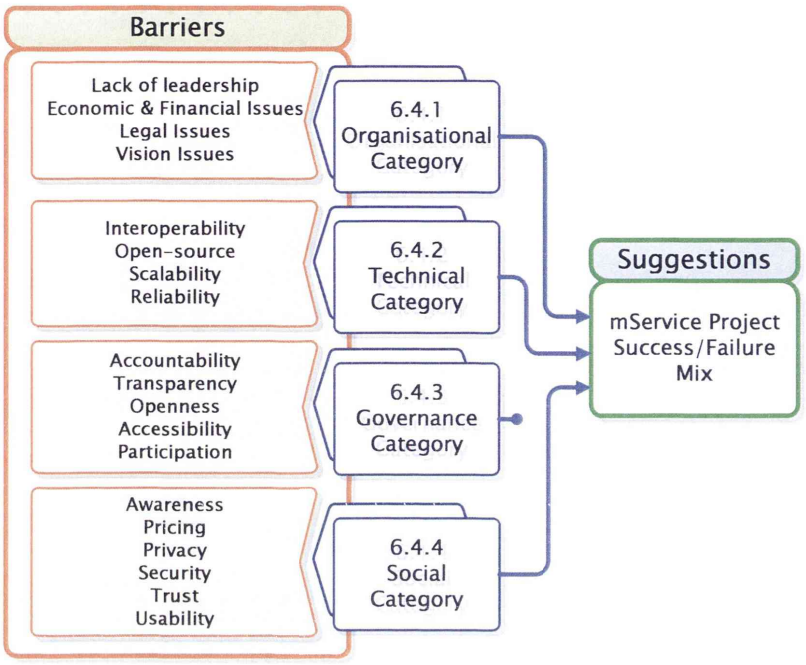


Figure 6-4: mService suggested success mix.

Source: adapted from (El-Kiki & Lawrence 2007a)

6.4.1. Organisational Barriers

Leadership issues were identified as inhibitors in the literature review; Cattaneo (2004) mentions conflicts of leadership between different government levels and Millard & Warren (2005) cite a lack of project management skills as a barrier. The survey respondents reported 'bureaucratic problems', a 'lack of cooperation among public organisations', inadequate 'involvement of local and government authorities' as well as 'interoperability issues between departments' as working against mobile government service implementations. Another respondent indicated a problem with 'taking citizens for granted, thinking that they will accept and use a new service as long as it is provided by the government' whilst another indicated that 'service is structured by the goals of the administration,

not the goals of the citizen user'. Two experts mentioned 'absence of combined e-business/e-governance models' and the lack of 'sustainable business models'. Another expert stated there was a 'reluctance of authorities to alter traditional ways of dealing with their customers (i.e. attachment to offices and office hours)'.

Economic and financial issues also feature as barriers according to some of the survey respondents - 'high development costs', 'lack of infrastructural investments' and 'low budget for mServices' are cited. The legal aspects of mGovernment services were areas of concern in both the literature review and the survey. As mobile government is an extension of eGovernment, it should be able in many cases to use the legal precedents set up for eGovernment. Of course there must also be laws that relate specifically to the unique aspects of mobile government services such as location based services. The literature review revealed mobile government in action in legal areas in many countries. For example, in the West Yorkshire Police Force (BlackBerry 2006), operational officers are able to access critical information from central criminal databases via small Blackberry devices. According to their Head of Information Systems 'The public has responded well to BlackBerry and it is helping us to do our jobs more effectively. Everyone wants to see their police force employing forward thinking techniques for policing'.

The literature review and survey identified potential legal issues as reported in Table 6-9.

Literature review extracts on Legal Issues	Survey Answers on Legal Issues
Developing ontologies, i.e. translating legal clauses into machine-readable policies (IST 2003).	Law related issues - e.g. in Poland most of the documents have to be provided in a way that has a confirmation (stamp, signature).
Multiple digital identities - legal implications of concepts of online identities (IST 2003; Kubicek, Westholm & Winkler 2003).	Adjustments to existing laws.
Legal implications of use of online anonymity and pseudonymity. Privacy friendly concepts of Public Key Infrastructure and privacy friendly Digital Rights Management (DRM) (4th Generation Mobile Communications Committee 2004; IST 2003).	

Table 6-9: Legal issue as barriers to mGovernment

In the United States there is a worrying trend for persons to go online to buy someone else's cell phone records. According to Stone (2006) one potential issue could concern criminals buying the records of an undercover officer and calling his home via his undercover personal mobile phone. The criminals could then connect that phone number back to the agent's real identity. Legislation is now pending to stop the selling of private phone records.

Finally one expert stated that the task of 're-negotiating and reorganizing the work context with the workers' is vital - 'It is definitely NOT the technology, which [is] in the way'.

6.4.2. Organisational Suggestions

Adopting mobile technologies to deliver traditional or electronic services necessitates a change. Hirst & Norton (1998) think that the change, from the

perspective of the government, can be seen as internal, external or relational. Millard et al (2004) view these changes as organisational changes, a shift in mindsets, modernisation of regulation, different consumer behaviour, and political decisions.

The survey respondents provided a diversity of organisational suggestions. The researcher intertwined a coherent set of opinions starting with one expert who suggested that 'the key thing is to create a framework that would allow various organizations/administrations to participate in mobile e-gov services'. Another expert suggested that 'in order to make mobile government services successful, organizational aspects must be carefully considered. Questions like "How do we ensure confidence?", "How do we prevent threat not only from the outside world but especially from within the government?", "What kind of threat is possible - again from outside and internally?", "What organizational changes need be implemented for this mobile government service?" etc. in order to share mechanisms across local, state and federal agencies'. Another respondent urged governments to 'involve workers in planning, decision-making regarding the tradeoffs, and implementation'. Cautiously, Tozsa & Budai (2005) stated that mGovernment necessitates the interaction of the employees of different departments, thus the instinctive concern for organisational integrity may generate resistance to the introduction of mGovernment services.

Taking the respondents' recommendations a further step towards end users, one expert stated that 'governments must start any service not just the mobile, with going down deep to the citizens needs, motives, fears, hopes and abilities to use that service. User-centric policy has to be implemented BEFORE taking any action or project. Policy makers need to look at how their decisions affect the citizen-

user in everyday use, and how interaction with the system fits into the citizen-user's busy and complex lives, their goals and priorities, NOT what is the most convenient solution from the administration's point of view. There is a tendency to "push down" responsibilities and work onto the citizen (e.g. make them fill in forms online), without giving them any help or assistance'.

This reflects the literature findings from a Deloitte Consulting and Deloitte & Touche (2000) report which suggested that customer (citizen) relationship management (CRM) allows governments to effectively share information across organisational boundaries and ensure consistent and reliable customer service, regardless of the channel. The report presents eGovernment (and, by implication, mGovernment) as transforming today's conventional organisational designs into hyper-efficient service models. Berntzen (2007) takes CRM into a deeper level by letting individuals and voluntary organizations provide innovative digital services to the public in collaboration with the government authorities in Norway which possess and provide necessary infrastructure, application software and basic content.

This is confirmed by another respondent who cited that 'adopting a user-centred design process, emphasising the significance of user feedback at each step' is crucial to the success of any mobile service project. Giving more details, one expert advised 'developing compelling services as perpetual beta services and enhance them step by step'. Compelling services are described as 'niche services' which have 'real added value from the user point of view' by other respondents. Regarding introducing a new mobile service, one expert suggested 'not [to] communicate mobile as something special, just talk about new features in this

"version" (i.e. mobile) of a government service' which is indeed significant especially when there is a need for quick test results.

One respondent highlighted the need for 'more money for development'; whilst another viewed that 'some legal regulations also must be changed'. Although mobile government is considered by many experts as an extension of eGovernment, it should be able, in many cases, to use the legal precedents set up for eGovernment in addition to specific laws that relate to the unique aspects of mobile government services, such as location based services.

6.4.3. Technical Barriers

One expert was quite scathing about people's 'lack of familiarity with mobile technologies' whilst another cited the 'lack of technical knowledge among Information Technology personnel' as a barrier. The researcher believes this is understandable given the explosion of mobile technologies in the 21st century. Other respondents felt that 'the lack of interoperability' was a technical obstacle and also mentioned 'competition between access channels' and lack of 'backend process integration' as obstructions. One respondent felt 'the absence of integrated process constructs' was hindering mobile government whilst others indicated that the 'absence of ability to bundle information and materials/service together' were inhibiting factors.

The above aligns with the findings of the literature review which indicated that technical barriers [such as low priority for ICT, interoperability issues and scalability] (Guijarro 2003; Millard 2004; Prisma Project Team 2003a) were major problems. The proliferation of tools and mobile networks is a huge challenge to

governments as they try to evaluate the business case for implementing mobile government services. There are issues with 'bandwidth and the small screen size of mobile devices' and the lack of availability of 'context aware information'.

Many private and government organizations which have adopted new technologies have often regretted the decision (Wyatt 2005). In fact, technology fatigue is often a barrier to the adoption of new technology so governments must check carefully before committing to mobile government projects. One promising technology, Near Field Communication (NFC) is already starting to revolutionise the way people use their mobile phones. NFC uses a short range wireless chip that can be placed into mobile phones to enable them to transfer all sorts of data (including credit card details and bus timetables) once the user touches his phone to a NFC paypoint (Flynn Vencat 2006). This is just one technology that could prove attractive to government officials - for example citizens could pay their parking fees and click through to pay for train tickets, at NFC paypoints, both of which are often controlled by government authorities. The downside, of course, is the infrastructure costs of setting up the NFC paypoints. However, industry pundits are predicting the mobile will replace the wallet by 2010.

6.4.4. Technical Suggestions

"Design for all" is what Clarke (2003) explained as the dissemination of the enormous variety of the human being's characteristics and offered suggestions to standardisation in order that the technical efforts satisfy the greatest number of users possible by becoming aware of and respecting their requirements. Another opinion (DESA 2003; OECD 2003) is that designing the system should be a response to technical problems.

Expert responses contained the least number of technical suggestions, and this may reflect the weight of the technical aspect in a new mobile service project compared to other aspects e.g. the social side. Whilst one respondent vaguely noted that 'the technical measures need to be evaluated and implemented carefully', the researcher noticed that pure technical responses were very few. One respondent suggested 'implement[ing] 'kryptochips' in cell phones', whilst another recommended the 'use of code baked with promotional program to promote the codes, providing contextual information, etc'. Cryptochips/kryptochips are microcircuits that implement hardware cryptography, which means performing encryption and decryption algorithms at the circuit level, providing a speed of 1500 MBits/sec or more. They were firstly used for encrypting commercial TV programs as well as information transmitted from video security cameras and other security devices. They are used now in mobile telephony smart cards, trusted platform modules, digital tachographs and PIN entry devices. Such security measures would go a long way towards satisfying the social suggestions of the need for security and privacy in mobile government services.

Two other experts gave their suggestions which can be classified as socio-technical. One suggested that 'menus must be simple and easy to navigate. Initially there should be a help option so that users can access an actual person for assistance'. The other succinctly stated that a 'single point/ single window data entry' should be implemented.

6.4.5. Governance Barriers

Only one expert noted there was a lack of 'combined e-business/e-governance models' yet governance issues featured highly in the literature review. Many researches (Accenture 2003; CPSI 2003; Government of Italy & United Nations 2003; Martin & Byrne 2003; Millard 2004; Millard et al. 2004; Pascual 2003; Realini 2004) state that accountability, transparency, accessibility and participation can be achieved by eGovernance (or eDemocracy). Gronlund (2003), however, considers accountability as a base for "thin" democracy, which is still vague and impractical to achieve, in contrast to "strong" democracy. Earlier Altman (2002) raised suspicions about the ability of eGovernment to have a positive effect on democratic accountability. On the other hand, Heeks & Lallana (2004) consider accountability, publication, openness, transactions and reporting as examples of the types of transparency that eGovernment offers. The difference among researchers in defining each element of eGovernance makes it difficult to precisely achieve each element in reality, adding more barriers to the success of a project. As well, changing social structures (Prisma Project Team 2003a) hinders the implementation of eGovernance.

6.4.6. Social Barriers

The literature review identified a lack of awareness as a major barrier (Accenture 2003; Clarke 2003; CPSI 2003; Millard et al. 2004; Millard & Warren 2005; Pascual 2003) and this was echoed in the expert survey - there is 'a largely uneducated public in the use of mobile devices for this type of service' and there is a need to let 'people understand why they should use a mobile service'. On usability issues

one expert noted that 'ideally services must be simple, be handled with just a few SMS, location based services or just notification services'. Another stated that it was essential to design 'easy-to-use and societal [socially?] interesting services'. One expert added that a key selling point was 'the level of convenience the mobile services provide in contrast with their tradition counterparts.'

Pricing issues were noted in the survey and the literature review. There are four hierarchical types of pricing: fixed, sale, promotional and dynamic (C. Wyld 2000), where the dynamic itself is classified into four sub-types which mainly depend on the cardinality of transaction: haggle, bidding, auction and exchange. eGovernment and mGovernment pricing policies should adopt those four types of pricing depending on the transaction model (partnership portfolio mentioned in Section 3.3); be it government to citizen (G2C), government to business (G2B), government to government (G2G) or business to government (B2G) in addition to the type of product or service rendered. The experts felt that 'telecommunication costs in many countries [are] too high' and that 'Access charges are too high for everyone'. Privacy fears are a substantial barrier as 'Trust of citizen[s] concerning privacy [is] low'. One expert mentioned that 'the anonymity of voters in mobile voting services' is vital and another stated that 'fears about confidentiality may also be a barrier'. Security is another area of concern: 'If there is no sound solution to security e-government or m-government will be dream'. There is a 'lack of security for transactional services' and 'probable or real security issues in respect of payment and data protection'.

6.4.7. Social Suggestions

Social suggestions are placed into three categories: Mobile Service Price; Privacy and security; and Training and Education as follows:

6.4.7.1. Mobile Service Price

As defined by VentureLine (2005) value for money is in the perception of the buyer or receiver of goods and/or services. Proof of good value for money is in believing or concluding that the goods/services received were worth the price paid. Earlier Zálešák (2002) posited that low price is not the only factor that affects a mobile service usage as psychological factors play a role as well. Supporting his opinion, Zálešák mentioned that, despite the low price of an SMS message, British citizens could not overcome the psychological barrier to use SMS to fulfil an official task such as voting because they used it to send messages to friends. A year later, Zálešák (2003) stated that price is one of three major factors that influence citizens to use mGovernment applications. Rieger et al. (2003) considered mobile service pricing as a sensitive area, as wrong pricing could lead to refusal of the new service. To ensure the acceptance of a higher price for mobile services compared to regular services, the advantages for the user must be clarified and promoted. When entering the market with newly developed services, providers must ensure that the value is obvious to users in order to create acceptance for premium prices. As most mobile services are not free, a certain quality of service (QoS) must be ensured; otherwise the users become frustrated, paying for services that do not meet their expectations. Both Tozsa and Budai (2005) consider that higher accessibility to mGovernment services is linked to the lower cost of the service.

The survey respondents viewed mobile call charges as a necessary ingredient in making a mobile service usable. However, they made the following suggestions for overcoming opposition to charges for mGovernment services. One reported 'all charges need to be uniform', whilst another noted that 'if selecting numerical options additional charges must be avoided'. Another expert stated that government should 'reduce access charges to the rate of fixed line'. One respondent believed that, 'a new service must start with one unified and affordable price which enables all classes of a society to utilize that service'.

6.4.7.2. Mobile Service Privacy and Security

Privacy is defined (Legnini 2006) as "the right to be left alone and to control the conditions under which information pertaining to you is collected, used and disseminated" . If users' privacy is not protected when using a mobile service, they simply will not use it again, making it very difficult to achieve critical mass. Users are becoming more aware of privacy issues and are comparing the privacy policies of government sites with those of the private sector. As outlined by Ng-Kruelle et al. (2002) a serious concern for the concept of "location/context awareness" is the confidentiality of information concerning a person's position. Indeed "misuse could lead to increased intrusion on privacy by exposing an individual's real-time movements with possible negative implications". Citizens would normally react badly to such surveillance of their movements by a government although it is enabled so that emergency services can locate mobile phone users. Nonetheless, security is protection from intended and unintended breaches that would result in the loss or dissemination of data (NECCC 2001a). Goldstuck (2003) confirms that "if a wireless access point is not sufficiently

secure, it can compromise data, which in turn can result in loss, damage and severe public relations fallout". Security is not just about installing the latest security devices and deploying the most modern security technologies. Information security is a combination of business, management and technical measures on an ongoing basis. In a 2005 study by Quocirca, two thirds of IT professionals rated data falling into the wrong hands by theft or loss of a device as the most important mobile security issue (Bamworth 2006). If the material contained mobile voting records, the effect could be catastrophic for governments.

Similarly, in this survey one expert stated that there must be a 'clear privacy policy of governmental organisations', where another highlighted the importance of 'assurance [assuring] that encryption makes transactions secure'. Another expert explained that 'the measures that need to be taken depend on the level of trust needed by the citizen to make him/her feel comfortable in using the service. Payment of parking fees through mobile services does not require the same amount of confidence as a mobile voting solution'. 'Nothing will harm a government service more than bad news about threats regardless of whether the service was implemented by traditional means or with latest technology as for mobile government' reported another respondent.

6.4.7.3. Mobile Service Training and Education

The ultimate goal of training and education is increasing awareness. Awareness is the first step in the users' experience, as they need to know that the service is in existence, what it does and how it is relevant to them. They then need to know in which ways they can contact and access the service. Community awareness and

training programs are often key success factors for successful introduction and acceptance of new services (AOEMA 2004). For an mGovernment service, such as mobile voting, awareness of the service is critical. Training extends to all government officials and employees enabling them to understand more about their roles at the back office to deliver mobile services to end users (Prisma Project Team 2003b).

Training and education for both working staff and citizens were commented on by a few experts, as one highlighted 'education of the service-seeker as to the benefits of mobile services', and this was supported by another expert who viewed 'more information about m-gov solutions (best practices)' as vital. Another respondent cited that 'technical training on mobile technologies can reduce the usage barrier', whilst the fourth suggested 'more IT knowledge among the clerks, officials'. From a different perspective, another expert considered that 'motivational counselling could help change the mind-set to a large extent, provided we are able to show improvements in performance and productivity'.

6.5. Chapter Review

This chapter analysed the data collected by the expert web-based survey quantitatively and qualitatively. The main purpose of the quantitative analysis of data was to verify the credibility and the expertise of the survey participants. On the other hand, referring to Chapter 4 which stated that this research adopts the interpretivist approach in order to discover what people assign to the phenomenon being studied, factors that will affect success of mService project and its effectiveness, with the full intricacy of the situation. This qualitative analysis of data aimed to analyse and define barriers to the success of mGovernment service projects from the perspective of mobile technology experts detailing their suggestions and opinions to overcome those barriers.

The outcome of barriers analysis appeared to confirm the findings from the literature review that potential barriers to mGovernment include the cost of developing mobile applications and the current business strategies of network and mobile device providers such as sport and premium services. High costs are associated with acquisition, maintenance and contracting with third party providers (Moon 2004). A lack of financial resources, staff, expertise, information about mobile applications and support from elected officials has also been identified as inhibitors for mobile government. Issues about privacy, security, upgrading technology and dealing with online transactions also hamper the adoption of mobile government (Moon 2004). The path to acceptance of mobile government will not be smooth. However, given the rapid advances in the usability of mobile devices there may be a leapfrogging acceptance of mobile

government, especially in developing countries which do not have a wired infrastructure.

The outcome of suggestions analysis is a mix of three ingredients: organisational, technical and social. No suggestions that relate to the governance category were provided although these same experts highlighted barriers relating to governance when initiating a mobile service project. This may reflect governance as one of the benefits or outcomes of implementing mobile technologies in government.

The outcome of aligning both literature review findings with the real-world survey data obtained from the experts in mobile technology enabled the researcher to hone in on the items of both conceptual and operational levels in the Goal/Question/Metric or GQM (Solingen & Berghout 1999) measurement tool, which will be used in the following chapter to build the new evaluation methodology Multi-Perspective Effectiveness Evaluation Methodology for mGovernment (MPE^{2}M-mG) which is the theoretical basis of the end user survey.

The end user survey is another real-world survey which was conducted to investigate the benefits of utilising mobile government services from the perspective of the end user; which is handled in detail in the next chapter.

CHAPTER 7

7. mService Effectiveness and End User's Data Analysis

mService effectiveness is the relationship between inputs and outcomes of the service provision process. Inputs are of the back office components, whilst outcomes are the beneficiaries' goals. From the perspective of the mobile end user, outcomes are the benefits that are gained from utilising an mService. mService effectiveness is analysed as viewed by end users through the analysis of their sought benefits.

For these benefits to be analysed as thoroughly as possible, EUSM (End User Satisfaction and Usage Analysis Model of mServices) was derived from the comprehensive MPE²M-mG (Multi-Perspective Effectiveness Evaluation Methodology for mGovernment) that was devised in order to analyse the outcome benefits to their root components. As a result, benefits were grouped into four categories representing four perspectives: Citizens & Businesses, Operational & Internal Businesses, Innovation & Learning, and Financial & Economic.

EUSM represents citizens and businesses perspective and translates their benefits to questions in order to reach an overall mService satisfaction. ESUM was the basis on which the end user's survey was concocted.

In this chapter, mService effectiveness and end user's survey results are discussed in full detail.

7.1. Introduction

Effectiveness may be defined as the extent to which the goals of a certain policy measure have been achieved. A government initiative measure is said to be effective if the goals are reached, i.e. if the outcomes match with the goals. Government is said to be effective when it renders its services to its constituents, and produces a desired result. Effectiveness evaluation is used to describe the relationship between inputs and desired outcomes, that is, between the amount of resources used and the desired effect or result achieved by a project or program (The City of Norfolk VA 2005). According to Paul Epstein (1998) "effectiveness measures service responsiveness to public needs and desires; service quality is an important effectiveness consideration". Accordingly, in order to evaluate effectiveness of mGovernment services, both of the inputs and outcomes have to be defined and then evaluated and measured as accurately as possible.

As per Figure 7-1, inputs are the resources that are provided for the mGovernment services. Implementing these resources creates opportunities but also provides challenges. For example, a monetary amount, human capital or a tax deferral is considered an input once it is provided as a resource by the

government. Although each input would, or could help to, create certain opportunities (such as more employment or the establishment of a small or medium size business (SME)), certain challenges would still be apparent such as the lack of institutional guidance or strategic thinking.

On the other hand, outcomes of a process are 'something that follows as a result or a consequence' (Merriam-Webster) from the outputs. An increase in competitiveness and growth in economy are examples of outcomes. As outcomes bring in benefits which achieve the initial goals, they also invoke some risks, for example, security risks associated with wireless technologies, financial risks linked with the purchase of expensive and easily stolen mobile devices as well as probable interoperability problems.

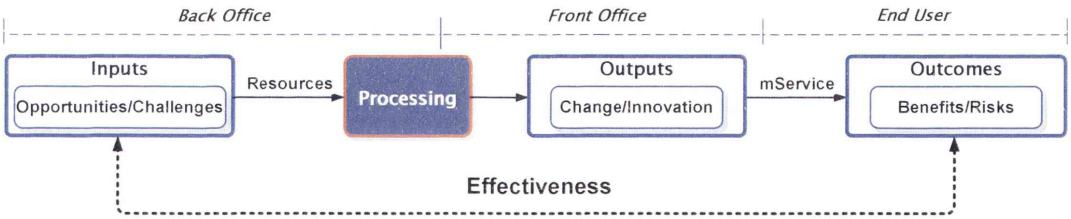


Figure 7-1: Effectiveness as a relation between inputs and outcomes.

Source: Adapted from El-Kiki et al. (2005)

Elaborating on, previously mentioned, Section 3.7.6 regarding the problem allocation, effectiveness evaluation covers all of the activities performed by both back and front offices to produce a service. As a management tool used to assess whether policies, regulations or measures meet their intents based on evidence of their outcomes, evaluation should not only focus on whether the mGovernment goals have been achieved, but it should also bring together all of the stakeholders who affect or participate in making policies producing a service. The

Bournemouth Council in England has implemented use of mobile devices to assist in council decision making. Each weekend Council cabinet members may quickly outline their plans for the town to a public audience at the university. The audience then vote on the proposals using key pads, with other votes coming in by e-mail, text and online. The council believes this is one way to check if they are satisfying the people's need for information and to engage young people with this method, although it is open to all age groups (Textually.org 2005). This example demonstrates an actual application for involving stakeholders in making policies by which they will be affected once these policies are approved.

Wohltorf & Albayrak (2003) adumbrate eight benefits which an end-user seeks in order to accept an mService: mobility, pastime, information quality, efficiency (time & money), spontaneity, convenience, currency (up-to-date) and reachability (own & others). These benefits accompanied by risks, are the two types of outcomes which are inherent in any major mobile and wireless project. Loudon & Loudon (1991) argue that risk is taken to be a negative outcome that has a known or estimated probability of occurrence based on experience or some theory. This negative outcome becomes a 'silent problem' when it is relevant to stakeholder concerns and interests (Willcocks & Margetts 1994).

Comparing outputs with outcomes, outputs are usually much more practical to measure than outcomes, and can be more useful in specifying responsibility. Outputs are also, usually, easier to cost than are outcomes (El-Kiki & Lawrence 2006a), as outcomes are indirect and affected by several variables (UN Expert Group 2003).

Accordingly, in order to evaluate mService effectiveness from the perspective of its end users, outcomes have to be analysed as accurately as they are perceived by end user. The successful mService effectiveness evaluation methodology must then be available to analyse what the end-users' desired benefits are, and what their silent problems could be, and what should be done to deal properly with both. This evaluation methodology must also measure the end-user's satisfaction which is an essential factor in both analysing the current, and predicting the potential, mGovernment audience.

7.2. Multi-Perspective Effectiveness Evaluation Methodology for mGovernment (MPE²M-mG)

7.2.1. First Step

The evaluation methodology was triggered by a few questions, which were deduced from the generic management framework of mGovernment (previously illustrated in Figure 3-5), such as:

1) To what extent will policy, program or initiative goals and objectives be defined and achieved when applied to mGovernment services?

2) Are there other or alternative methods for achieving those goals and objectives?

3) To what extent does the evaluation lead to more Research and Development (R&D) activities at the mGovernment management level?

4) What is the influence of the type of end-user, service, and sector and R&D activities on innovation and change for a certain government agency if it provides mobile services?

5) What is the adequacy of the quality of the mServices provided relative to the citizens' needs, desires and willingness to pay?

6) Are resource values being maintained by offering mGovernment services?

7) Are citizens' trust, privacy and security concerns being addressed adequately?

It is obvious that questions are raised from various perspectives, not just the end user's; and this adds to the complexity of measuring the mService effectiveness.

7.2.2. Background on Effectiveness Measurement Approaches and the Emergence of MPE²M-mG

The second step was to review the literature that handled effectiveness measurement at the public sector. Table 7-1 summarises Evert Vedung's (2000) methods and approaches evaluating governmental policies. These methods expound the basic concepts for designing an evaluation process without handling the technical details pertaining to data collection and analysis.

Effectiveness Evaluating Method	Explanation & Comments
Goal-attainment Model	▪ Basic evaluation approach. ▪ Evaluator judges whether the goals of the program have been reached.

	▪ Effects are a result of the support measures.
Side-effects Model	▪ Takes the goals of the support measure into account. ▪ Examines both positive and negative side effects.
Goal-free Evaluation Model	▪ Assesses the effects of an (economic) intervention. ▪ Ignores the objectives of the measure. ▪ Believes pre-occupation with the objectives of the measure narrows the view of the evaluator.
Comprehensive Evaluation Model	▪ Incorporates the implementation. ▪ Sometimes involves the planning process of the support measure in the evaluation. ▪ May include parts of the intervention other than the outputs and outcomes, such as the processes of implementation and feedback.
Client-oriented Model	▪ May include clients' (or beneficiaries') goals, expectations, concerns or needs as the criterion of merit. ▪ Based on whether a measure satisfies the clients' concerns and expectations - in contrast with the question whether the measures' goals have been met. ▪ Market-drive perspective acknowledges the fact that recipients' objectives and drives do not necessarily coincide with the programme management's goals.
Stakeholder Model	▪ Acknowledges the effects of the intervention in the recipients' clients, competitors, and suppliers. ▪ Organises an evaluation around the organisations (people) that have an interest in or are affected by the intervention.
Policy Commissions	▪ Swedish alternative to the stakeholder approach. ▪ Stakeholders are not consulted but perform the evaluation. ▪ Stakeholders invited by the government to participate in an ad hoc policy commission to advise the government on the effectiveness of the scheme. ▪ Government does specify the issues that should be part of the evaluation, but does not interfere with its completion. ▪ Policy commissions are future-oriented. ▪ Commissions' analyses are focused much more on alternatives for future action than on impacts of past policies.

	▪ In practice, the work of these policy commissions is much more a political enterprise than thorough research work.
Cost-effectiveness	▪ Economic approach. ▪ Measures inputs in purely estimated monetary terms. ▪ Outcomes are measured in terms of actual impact. ▪ Inputs and outcomes are divided in such a way that the cost per unit of outcome is quantified.

Table 7-1: A summary of some effectiveness measurement methods.

Source: Adapted from Vedung (2000)

More investigations resulted in applying the Adaptive Management Approach or AMA (Holling 1978) to a combination of two measurement tools called Goal/Question/Metric or GQM (Solingen & Berghout 1999), and Balanced Scorecard Approach or BSA (Kaplan & Norton 1992). The combination of the three elements yielded the new evaluation methodology, namely Multi-Perspective Effectiveness Evaluation Methodology for mGovernment (MPE²M-mG), as in Figure 7-2.

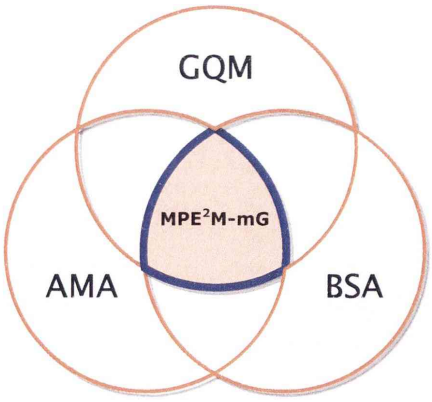


Figure 7-2: Multi-Perspective Effectiveness Evaluation Methodology for mGovernment

Adaptive management is a formal, systematic and rigorous approach to learning from the outcomes of management actions, accommodating change and improving management. It involves synthesizing existing knowledge exploring alternative actions, and making explicit forecasts about their outcomes. The key characteristics of adaptive management (Nyberg 1998) are set out below and explained in the context of providing an mGovernment service such as Table 7-2:

Key	Result and examples	mGovernment in Hungary
Acknowledgement of uncertainty about what policy or practice is "best" for the particular management issue.	Public authorities developed mobile government services through SMS and WAP technologies.	This is undertaken because Mobile phone penetration rate is 81% (in contrast with 30% for computers).
Thoughtful selection of the policies or practices to be applied.	Hungarian Government Introduced mobile phones into public administration procedures.	Mobile phones are a highly inclusive technology in Hungary.
Careful implementation of a plan of action designed to reveal the critical knowledge.	A special vehicle history report available via a premium rate SMS service run by the Hungarian Ministry of Interior.	For the sake of effectively communicating with different constituents.
Monitoring of key response indicators.	A diversity of data may be collected from the above and from other mServices introduced in Hungary e.g. ▪ Payment of parking fees ▪ Notification of school results and processed forms ▪ Application to use public premises	Currently implementing methods for monitoring the effectiveness of these applications.
Analysis of the outcome in consideration of the original objectives.	By implementing quantitative methods e.g. log files and statistics analyses (regression, factor, variance, etc); and qualitative methods e.g.	Has the special vehicle history report available via a premium rate SMS service run by the Ministry of Interior been effective?

	questionnaires, best practices, SWOT and historical analyses.	What is the effectiveness of the other mServices?
Incorporation of the results into future decisions.	Maximizing benefits by adding a new mService, modifying or terminating an existing one.	Could mobile voting be added to the list of mServices offered by the government?

Table 7-2: AMA applied on mGovernment in Hungary.

Source: Derived from Information Policy (2004)

Meanwhile, GQM defines a certain goal, refines this goal into questions, and defines metrics that should provide the information to answer these questions. By answering the questions, the measured data defines the goals operationally, and can be analysed to identify whether or not the goals are attained. This GQM defines metrics from a top-down perspective and analyses and interprets the measurement data bottom-up (Solingen & Berghout 1999, p. 23). The researcher found that this method would be suitable for adaptation for the measurement of effectiveness of mGovernment services such as the Hungarian examples found in Table 7-2. Accordingly, in order to derive proper indicators and metrics, the researcher developed an approach which is defined on the basis of GQM paradigm by Basili & Weiss (1984).

Balanced Scorecard Approach is another framework for measuring and evaluating performance from a management system perspective. It is meant to be a management system, and not only a measurement system, to provide feedback around both the internal business processes and external outcomes in order to continuously improve strategic performance and results. This approach takes four perspectives: customer (citizen & business) perspective, operational / internal business process perspective, innovation / learning perspective, and financial /economic perspective. Thus in the Bournemouth Council and the Hungarian

mGovernment services examples, management would need to measure and evaluate their systems from these four perspectives. Both GQM and BSA are combined to work on the evaluation step of the AMA, as the next section explains.

7.2.3. Describing MPE²M-mG

The researcher adopted and adapted AMA as the backbone framework for effectiveness evaluation process. The provision of mobile payment for a government service such as payment of parking fees to a Council, as a typical mGovernment service, is used as an example to make the underlying idea more understandable. Figure 7-3 illustrates six cyclic steps, which actualize the concept of AMA.

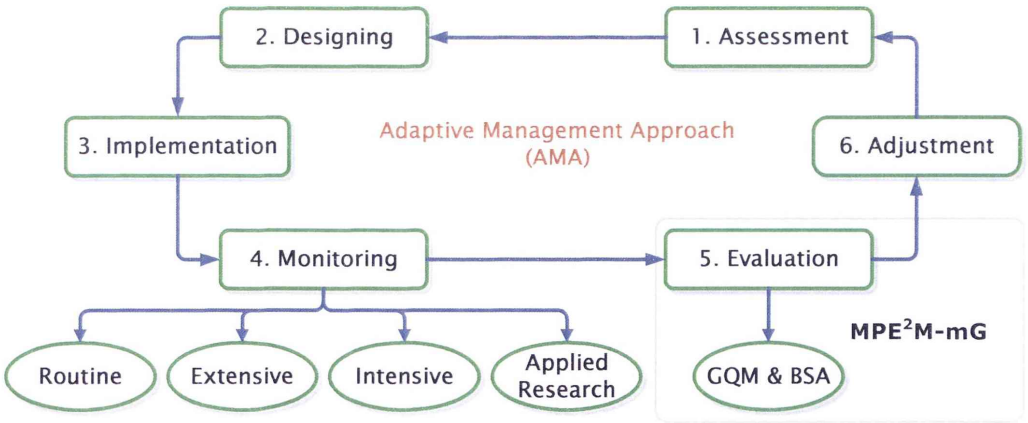


Figure 7-3: Effectiveness evaluation process implementing AMA.

Source: Adapted from J.B. Nyberg (1999)



7.2.3.1. Problem Assessment (Evaluation Question)

The scope and dimensions of the mService effectiveness problem are defined, usually in a form of a question. The basic evaluation question for our 'mobile payment for a government service' example would be: does it work? Accordingly, additional questions should be derived covering the scope and dimensions of this mService. Those questions will lead to, or be translated into, goals, and, in turn, goals will lead to deriving metrics which are used in the evaluation step number 5. In fact, this is how the GQM approach is initiated. Examples for additional questions for the Hungarian applications such as the parking payment could be:

- To what extent are the goals and objectives of this service defined and achieved?
- To what extent are allocated resources used for this service?
- To what extent are the end-users satisfied using this service?



7.2.3.2. Designing a Management Plan

A management plan and monitoring system are designed for capturing reliable data about the effectiveness of the mPayment service provided by mGovernment. Issues and assumptions are made explicit at this step, in order that the policy makers and evaluators make suitable decisions regarding the data to be collected, which mainly depend on aspects that need to be analysed, and the methods with which that data are analysed. For example, how many citizens are paying via their mobile device in the Hungarian example? Is it cost effective? Is it only reaching the young people? This means that this step results in a model

which is used to describe the support, measure and provide evidence of the measure's effect (European Commission 1997, p. 42). This can be done using both quantitative (objectives) and qualitative (subjective) methods. Log files and statistics are examples of the quantitative methods, whilst questionnaires, best practices and historical analyses are examples of the qualitative methods, which also tend to be cognitive. However, the collected data could be:

- qualitative and/or quantitative data by interviewing users of the mobile service application and/or collecting user statistics for the mobile service;
- primary or secondary data for example by examining other mGovernment initiatives in other countries.

7.2.3.3. Implementation

Both management plan and monitoring system are then put into action. In this case it might be useful to follow the advice of Rheingold (2005) who suggests that employers should be questioning their 21 year old newly hired employees to learn about mobility. Does the mGovernment service plan and monitoring system take into account the people who are using the service?

7.2.3.4. Monitoring

Monitoring determines how effective actions have been in meeting the objectives of the effectiveness evaluation. Varying arrays of questions impose different monitoring intensities as follows:

- Routine: such as using yes/no questions.

- Extensive: such as using categories like good, fair and poor.
- Intensive: more detailed quantitative data collection.
- Applied research: such as a controlled approach for example using an ethnographic researcher to follow and observe the users in action.

7.2.3.5. Evaluation

Collected data do not provide the solution to the research questions created at the first step (problem assessment). Analysing and evaluating these data should reveal the answers which would be interpreted into decisions and actions by the decision makers and evaluators. At this step the researcher suggests the following tool that facilitates a thorough analysis and evaluation of mService effectiveness. This tool is the combination of both GQM and BSA approaches as mentioned previously. If it is applied to mobile payment for a government service, as an example, it must detail goals from four different perspectives (citizens/businesses, operational/internal business, innovation/learning and financial/economic). These goals are considered the answers to questions set at the first step, which represent the conceptual level of the GQM approach. The operational level of GQM assigns indicators to each goal. In turn, every indicator is interpreted into metrics at the interpretive level which can be qualitative and/or quantitative. Table 1 in Appendix B illustrates this MPE²M-mG methodology. It is worth mentioning that only examples of goals, indicators and metrics are included, which means more detail must be handled in a real, comprehensive case study. The sum of all metrics values is represented by 'V', which means a

numeric figure measuring the effectiveness of this mService from four different perspectives.

The evaluation step concludes with a comparison between the resulting value V and a threshold value established as a measuring criterion by decision makers and evaluators, as follows:

- Less Effectiveness: $V_{new} < V_{threshold}$
- Same Effectiveness: $V_{new} = V_{threshold}$
- More Effectiveness: $V_{new} > V_{threshold}$

Based on this comparison, decisions are made to continue, adapt or terminate this mService.

7.2.3.6. Adjustment

In reality, additional, and unplanned-for, results and ideas may be generated during the evaluation process, for example, the idea of how this mService could be improved, or why it should continue if it does not prove effective or fulfil its goals. These results and ideas should be included in the final evaluation report as they may provide significant perception about the general performance of the mService. Hence, adjustment to the management plans, monitoring systems, objectives and models created at the second step (designing) is crucial to reflect different understanding and forecasting for more realistic measuring criteria.

7.3. End User Satisfaction and Usage Analysis Model of mServices (EUSM)

In order to investigate end users' satisfaction of mService, the citizens/businesses perspective from MPE²M-mG is focused and elaborated on. MPE²M-mG enabled deriving a new conceptual model which provides a technique to define and analyse mobile-user satisfaction, in order to measure the service effectiveness from the perspective of its end user's perspective. This model is End User Satisfaction Analysis Model of mServices (EUSM), which is detailed in the following sections:

7.3.1. Background on End-User Satisfaction Analysis

Users' satisfaction has been handled by many researchers in the IT, IS and Networking fields and may be defined as the extent to which users believe that the available service meets their needs. Davis (1989) defines perceived usefulness of a service as "the degree to which a person believes that using a particular system would enhance his or her job performance". One year later research by Conrath & Mignen (1990) suggests that the impact of user expectations should be considered when assessing user satisfaction. Further attempts were made to capture the overall post hoc evaluation that mobile users had regarding the use of an IS system coupled with antecedent factors that form this satisfaction (Doll et al. 1995; Henry & Stone 1994; Torkzadeh & Doll 1991).

More recent research (Schay et al. 2002) defined nine generic customer service dimensions in a model to be used to assess all types of internal and external

customer services and their satisfaction. These dimensions are Access, Choice, Courtesy, Knowledge, Quality, Recovery, Reliability, Tangibles and Timeliness. From this model, the researcher deduced and developed the 'Mobile-User Satisfaction Analysis Model of mGovernment Services'. In mobile government research, Carroll (2005) reports that, at present, it appears that users are constructing 'portfolios' of electronic and non-electronic resources to meet their real-time, situated needs as they move from place to place. Carroll (2005) also states that mobile users "select from the vast array of devices, media, applications and non-electronic resources according to their personal preferences, those of their peer group, their perceived needs and purposes for diverse activities in likely situations of use. This portfolio can then provide tailored technological support to the user, be adapted as needs change and aspects of the portfolio can be updated as enhanced technologies become available".

On the other hand, Følstad et al. (2004) defined four user categories according to their interaction frequency with a system and the researcher adapted these to suit this study context:

- Core users: who must use the mobile government service as an important part of their work context, e.g. care workers who look after elderly, chronically ill or infirm citizens in their homes, hospitals or nursing homes (Archer 2005).

- Regular users: who interact with the mobile service in their everyday work, but not as their primary tasks, e.g. managers and secretaries.

- Sporadic users: who have limited interaction with the mobile service in their work or everyday life. These could include citizens paying parking fines via their mobiles or London motorists who must pay an entry fee when visiting inner London for a day for example (Inglesant & Sasse 2005). Most external user groups may be categorized as sporadic users.

- Technical users (secondary users): who are responsible for the day to day maintenance and updating of the mobile service.

In this research, mobile users are citizens and businesses using the mService and include core, regular or sporadic users only thereby concentrating on the users of the mobile service rather than its maintainers or administrators at the back office.

7.3.2. Mobile-User's Goals/Benefits: Definition and Analysis

Some of mobile-user's benefits mentioned here are also handled by some eGovernment researchers as 'opportunities'. For example, Ndou (2004) considers reducing the bureaucracy, offering round the clock accessibility and fast and convenient transactions as opportunities for eGovernment to enhance the quality of services in terms of time, content and accessibility. On the other hand, user's goals or benefits are in fact seamlessly interrelated and cannot be significantly separated from each other. Value for money is gained when there is quality of service and efficient transactions rendered. In order to define and analyse these goals or benefits that lead to mService satisfaction, they are classified into four groups representing sixteen indicators, illustrated in Figure 7-4, and elaborated on in the following sections.

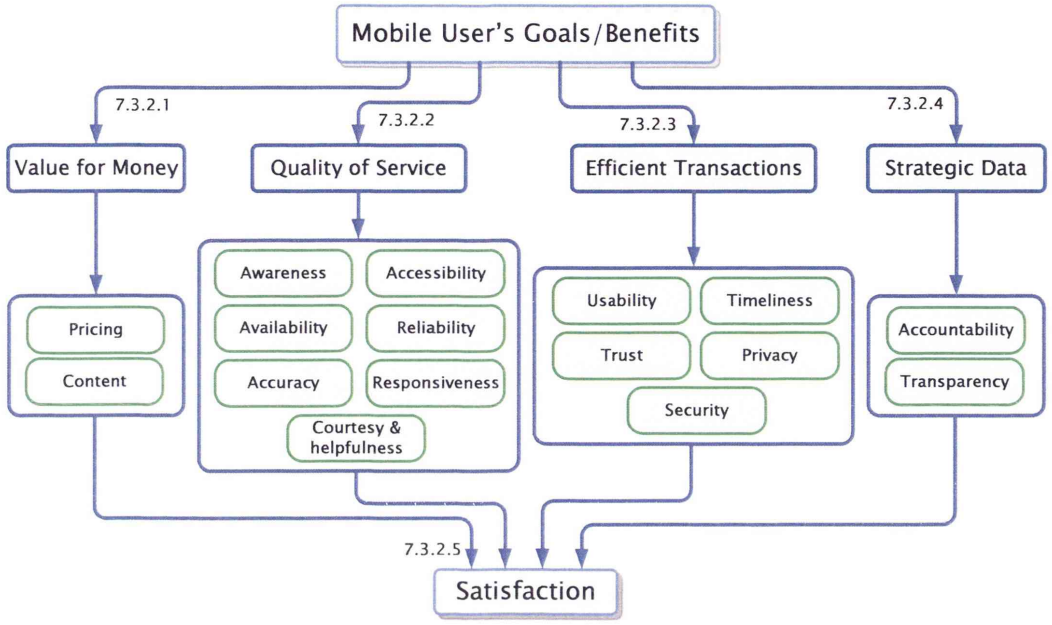


Figure 7-4: Mobile-user's four main benefits from mGovernment services, and their Indicators

7.3.2.1. Value for Money

As defined by VentureLine (2005) value for money is in the perception of the buyer or receiver of goods and/or services. Proof of good value for money is in believing or concluding that the received goods/services were worth the price paid. Hence, pricing and content are two factors to be considered in this goal:

1) **Pricing**: Rieger et al. (2003) consider mobile service pricing as a sensitive field, as wrong pricing could lead to refusal of the new service. To ensure the acceptance of a higher price for mobile services compared to regular services, the advantages for the user must be clarified and promoted. Especially when entering the market with newly developed services, their value has to be mediated in order to create acceptance for certain prices

among the users. For citizens, mobile government services are sometimes of a punitive nature such as paying for speeding fines so it is vital that the citizen is not further irritated by poor quality of service. In fact, as many of the services will not be available for free, a certain quality of service (QoS) must be ensured; otherwise the users would get frustrated, paying for services that do not meet their expectations. The Helsinki Train and Tramline Mobile ticketing SMS system has been successful because of its pricing structure. In Helsinki, for any mode of transport, a normal single ticket costs €2.00, whereas the mobile ticket costs €1.90 (prices in February 2005), even cheaper single tickets are available for the tram. Payment is easy as no cash is needed (Suomi 2006).

2) **Content**: Value for money in mService is not restricted to its price alone, it is also the 'content' rendered by the service. The content of each service varies with the type of the service. The content, though, needs to be relevant to the region, culture and language in order to initiate and create belongingness to the mobile user. For example a local council could relay details of its council rates to citizens who could then select the relevant amount and pay via the mobile device. Other mobile content rich services could include tourism information, disaster alerts and traffic congestion reports.



7.3.2.2. Quality of Service

Every service has a basic set of requirements in order for it to be of a good quality. Quality of service is then perceived as the definition of the service rendered to a stakeholder or user. In fact ambiguous and conflicting objectives may arise when there are many users' requirements to satisfy concurrently, in

addition to having those requirements irreconcilable or imprecise. Hence, quality of service definition varies depending on the perspective from which it is seen. From the mobile end-user's perspective, quality of service refers to the degree of 'goodness' of the mService in respect of its perceived usefulness. Davis (1989) defines perceived usefulness as "the degree to which a person believes that using a particular system would enhance his or her job performance", which in mService scenario would translate to 'task performance' of end users. Hatry (1999) states that timeliness, accessibility, accuracy, and fairness are essential elements of quality of service when delivering it to the mobile user. The Johannesburg Metro Police Department (JMPD) uses an Integrated Information Management System to improve its effectiveness by creating a highly accessible and flexible information repository that is maintained on a real-time basis. At a potential crime/incident scene, the responding officer obtains up-to-the-minute information, including identification verification and outstanding arrest warrants, by mobile phone, allowing the officer to react quickly. The mobiles act as both data capture devices as well as data receiving feedback tools, providing police officers with essential information and empowering them with relevant additional facts (Patel & White 2005). The quality of mobile government services is analysed into seven components, each of which is then defined as follows:

1) **Awareness**: Awareness is the first step in the users' experience, as users need to know that the service is in existence, what it does and how it is relevant to them. They then need to know in which ways they can contact and access the service. Community awareness and training programs are often key success factors for successful introduction and acceptance of new services (AOEMA 2004). For an mGovernment service such as mobile voting awareness of the

service is critical. In Finland, for example, all citizens can obtain motor vehicle brand name, type, vehicle owner name and municipality of residence or business, first day of usage of the vehicle, last inspection date and possible unpaid duties on the vehicle, simply by sending an SMS message to one of two Finnish Vehicle Administration telephone numbers for between €1.30 and €1.70 (Suomi 2006). Awareness of this service is such that it was used 1.37 million times in 2004 and it is interesting to note that this information is not considered private or sensitive in Finland (Suomi 2006).

2) **Accessibility**: Accessibility refers to the process of securing or making the service open to a wider user population (Usable Net 2004), including, where relevant, the assessment of eligibility criteria and the agreement to the specific design (nature and standards) of the appropriate service. All users should have access to their government services regardless of any disability, and this may require some "add-ons" as per the global accessibility guidelines defined by WAI (W3C 2006). Globally there are 1.7 billion of mobile phone users who are potential users of mobile services. In underdeveloped countries a mobile device, such as PDA, will be the nearest device to a computer that most of the population will ever have. A country like Bangladesh suffers annual natural disasters such as cyclones and floods which claims the lives of thousands and causes billions of dollars worth of damage (Hossan, Chowdhury & Kushchu 2005). The lack of electronic services in Bangladesh is pronounced, as only 30% of Bangladeshis have access to electricity and a lesser percentage has access to TV or radio, while mobile phones are widely spread and always on so citizens can receive information 24/7/365.

3) **Availability**: Service availability is the concept that users can obtain the service on demand and without interruption, in spite of using failure-prone hardware and software elements to build the underlying infrastructure (CERN 2006). It is usually measured against time and expressed as a percentage. If service availability is measured from users' perspective, probably as a percentage of successful access, it is more likely to reflect whether, and to what extent, a service really works. Obviously this is a major concern with wireless and mobile devices which may drop out as the mobile user changes location. Despite this, Kushchu & Kuscu (2003b) argue that mGovernment could be the solution for reaching citizens and exchanging information especially in remote areas. Hossan, Chowdhury & Kushchu (2005) define four major life saving uses of mGovernment applications in Bangladesh through disseminating pre-disaster and post-disaster warning SMS, and through exchanging SMS with citizens to enable them request relief assistance, and government-to-citizens interaction to exchange information about health hazards.

4) **Reliability**: Schay et al. (2002) define service reliability as the "ability to perform the promised service dependably, accurately, and consistently". Reliability is then a measure of an mGovernment service's potential for failure since mobile users expect it to be reliable and sustainable - 24/7/365. As an example, take the case of a person paying a parking fee to the local government authority via a mobile device - a reasonably common request by a constituent. After paying via SMS, the constituent receives a receipt number on the mobile device as an output. This is not only feasible

but is operational in Singapore and provides the citizen with a unique receipt number.

5) **Accuracy**: Service accuracy is defined as the agreement between the offered and the promised services. It does not mean error free, rather a minimal error possible, service. For the Finnish tram and metro ticket payment by mobile phone (as mentioned earlier), to eliminate abuse, the system has a certain time lag so that the ticket purchase cannot be initiated when a ticket inspector is arriving (Suomi 2006).

6) **Responsiveness**: Responsiveness indicates the speed with which mService requests are manipulated, pages are browsed, commands are achieved and acknowledgments are displayed. Mobile government services may be hindered by latency when network traffic is high.

7) **Courtesy and Helpfulness**: Respectful, considerate, friendly, helpful, polite and efficient are all examples of courtesy and helpfulness attitudes that relate to the behaviour of mGovernment service provider to mobile users, which may contribute to their satisfaction or dissatisfaction. Carroll (2005) found in her study that unless the services and applications of mGovernment meet citizens' needs, they will not achieve long-term, persistent use.

7.3.2.3. Efficient Transactions

Any online government service and/or transaction must be secure and private. When deciding whether a mobile payment service is efficient; users will consider the following: Is this mobile transaction system easier, faster and better than conventional payment methods? As for mServices in particular the following

elements seem to play even more significant roles in making a transaction efficient:

1) **Usability**: The simplicity or complexity of the system rendering the service is a significant determinant of either an efficient or inefficient transaction (Wefering et al. 2002). Accordingly, in order to accurately define the simplicity or complexity of an mService, mobile users needs have to be investigated. This is particularly important when related to mobile devices which have small screen real estate and awkward input procedures.

2) **Timeliness**: Service timeliness is when the service is delivered on the expected or promised time and does play an important role in the mGovernment to citizen (mG2C) relationship. For example, court appearance notices via SMS, police prompt notifications about missing people to drivers, and police notification of possible terrorist attacks to general public.

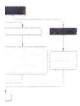
3) **Trust**: Trust has been known as a critical success factor of eCommerce and mCommerce, and has received significant attention in private sector eCommerce research. Lack of trust in online entities can prevent mobile users from providing personal information (Hoffman, Novak & Peralta 1999b) and hinder adoption of eCommerce (Bhattacherjee 2002a). Mayer et al. (1995) define trust as "the willingness of a party to be vulnerable to the actions of another party based on the expectation that the other will perform a particular action important to the trustor, irrespective of the ability to monitor or control the other party". Citizens must have trust in their governments and, indeed, in the Philippines, soldiers are able to use SMS messages to communicate with their leaders if they suspect corruption in the

ranks (El-Kiki, Lawrence & Steele 2005). Dietz (2005) reported that a group of Mobile Network Operators have joined the Liberty Alliance, "which standardizes identity management functionalities bridging mobile and Internet, turning the mobile devices into trusted, mobile passport-like devices".

4) **Privacy**: Privacy is defined (Legnini 2006) as "the right to be left alone and to control the conditions under which information pertaining to you is collected, used and disseminated" . If users' privacy is not protected when using a mobile service, they simply will not use it again, making it very difficult to achieve critical mass. Users are becoming more aware of privacy issues and comparing the privacy policies of government sites with those of the private sector. As outlined by Ng-Kruelle et al. (2002) a serious concern for the concept of "location/context awareness" is the confidentiality of information concerning a person's position. Indeed, "misuse could lead to increased intrusion on privacy by exposing an individual's real-time movements with possible negative implications". Citizens would normally react badly to such surveillance of their movements by a government although it is enabled so that emergency services can locate mobile phone users.

5) **Security**: Security is protection from intended and unintended breaches that would result in the loss or dissemination of data (NECCC 2001a). Security is not just about installing the latest security devices and deploying the most modern security technologies. Information security is a combination of business, management and technical measures on an ongoing basis. In a 2005 study by Quocirca, two thirds of IT professionals rated data falling into the wrong hands by theft or loss of a device as the most important

mobile security issue (Bamworth 2006). If the material contained mobile voting records, the effect could be catastrophic for governments.



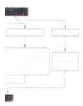
7.3.2.4. Strategic Data

End users view strategic data as data which have been collected and held by the government and which they (end users) need to obtain. As a party in a partnership relationship, end users should have the right to obtain access to these data through an open and available communication channel with government officials (DESA 2003). The right application of the accountability principle guarantees not only access to strategic data, but also access to decision makers themselves. Mobile technologies in this context are a vital means of making this communication happen between end users and government officials who are (or should be) ready to communicate with end users and justify their decisions. The mere action of enabling end users to actively give their opinions or protest unfair or ill-advised decisions to the government is the other side of the coin; namely transparency (Clift 2004). Both of accountability and transparency elements are elaborated on in the following points:

1) **Accountability**: Accountability is an immediate issue as mGovernment services must be accountable to their mobile users, i.e. assure that mobile users can tell who did what and when, and are convinced that the system keeps its security promises. As per Christensen and Laegreid (2002) "The success of market-oriented accountability is dependent on citizens having sufficient resources to make their preferences felt in the market and upon the perfect realization of the notoriously unrealistic conditions that characterize the economist's 'ideal market'". "A preoccupation with efficiency

tends to overvalue the need for managerial accountability rather than promoting political responsibility. Efficiency is no guarantor of good political and social judgment, which are essential in securing genuine political responsibility and legitimacy in a democracy" (ibid, 2002). In addition, the use of private sector partnerships must not reduce accountability.

2) **Transparency**: Transparency means openness of decisions and actions taken by civil servants to the public who would seek to hold them accountable (Heeks 2004b). Citizens too rarely understand how government decisions are made. This lack of transparency prevents the public from actively participating in government and from raising questions or protesting unfair or ill-advised decisions. A lack of transparency can conceal official graft or favouritism (Reffat 2003). mGovernment as a subset of Government (El-Kiki 2006) is no different; mServices should provide security and transparency to their mobile users.



7.3.3. Satisfaction

mGovernment increases the acceptance, adoption and the usage of online governmental services by reaching the citizens through a more personal, familiar and friendly device (Kushchu & Borucki 2004). Earlier, Accenture (2003) found that the potential benefits of eGovernment— improved service, greater efficiency and potential cost savings—will not be realized if usage of the services is low, and accordingly the satisfaction. This is true as by early 2005, fifty (50%) of all users of the Helsinki train and tram mobile ticketing systems bought at least one mobile ticket per week and one third (33%) buy a mobile ticket monthly (Suomi 2006).

In Section 7.1, Paul Epstein (1998) stated that "effectiveness measures service responsiveness to public needs and desires; service quality is an important effectiveness consideration". This led to the hypothesis that the degree of end user's satisfaction reflects the mobile service's effectiveness, as per Figure 7-5.



Figure 7-5: mService effectiveness as result of collective benefits satisfaction

This, in turn, led to EUSUM operationalisation in order to make it the item generator or the pool from which the survey questions were derived. Table 7-3 reflects the constructs core questions that investigate citizens' and businesses' needs as users or consumers of mobile government services. These questions, in addition to other demographic and mobile device usage questions, assisted in forming the end-user survey. Details of this data collection method were handled in Section 5.2.2.2.

GQM / BSA	Conceptual Level	Operational Level	Interpretive Level
Perspec-tives	**Benefit Constructs**	**Indicators**	**Questions (Items)**
(1) Citizens / Businesses	Value for money	Pricing	1. How do you rank this mobile service fee compared to the normal service? 2. Are there any savings using this mobile service? 3. How much do you think you saved last year using this mobile service?
		Content	4. Does the mobile service provide the precise information you need? 5. Does the mobile service report seem to be about exactly what you need? 6. Does the mobile service provide sufficient information?
	Quality of Mobile service	Awareness	7. Were you previously informed about this mobile service? 8. Have you been trained to use this mobile service? 9. How did you learn about this mobile service? (Recommended to you, media...)
		Accessibility	10. Does the mobile service provide access for persons with disabilities?
		Availability	11. Is the mobile service available at anytime? 12. Is the mobile service available anywhere?
		Reliability	13. Does the mobile service provide reliable information? 14. Do you think this mobile service is fault-tolerant? 15. Is your connection session recoverable if there is any interruption?
		Accuracy	16. Is the mobile service error-free? 17. Does the mobile service provide correct information? 18. Does the mobile service provide accurate information?
		Responsiveness	19. Are you satisfied with the speed by which the pages appear on the screen?
		Courtesy and Helpfulness	20. Is it easy finding somebody to answer your question? 21. Do you receive the expected assistance when you need it? 22. Do you receive any courtesy calls after your request is fulfilled?

	Efficient Transactions	Usability	23. Do you understand how this mobile service works? 24. How do you rank the easiness of this mobile service? 25. How difficult was it learning how to use this mobile service? 26. How do you find the language of this mobile service? (Hard...)
		Timeliness	27. Do you get the information you need in time? 28. Does the mobile service provide up-to-date information?
		Trust	29. Do you trust this mobile service? 30. Why do you trust this mobile service?
		Privacy	31. Do feel confident about your privacy protection when using this mobile service? 32. How do you feel when divulging your personal details when using this mobile service?
		Security	33. Do feel your transaction is secure when using this mobile service?
	Strategic Data	Accountability	34. Are you able to communicate with government officials through this mobile service?
		Transparency	35. Does this mobile service enable you to actively give your opinion to the government? 36. Does this mobile service enable you to protest unfair or ill-advised decisions?
	Overall Satisfaction		37. How would you rate your satisfaction with the use of this mobile service?

Table 7-3: Mobile End-User Satisfaction Questions

Source: Derived from (El-Kiki & Lawrence 2006b)

7.4. Quantitative Data Analysis

Three main analyses are covered in this section: Characteristics of the Participants, End-User's Benefits Constructs, and the Validity and Reliability of the Constructs.

7.4.1. Characteristics of the Participants

This section analyses and discusses the characteristic of the survey participants. These data are used to produce a profile of end users who are most likely to use mGovernment mobile services as mentioned in Section 7.4.1.6.

7.4.1.1. General Outlook

Table 7-4 shows the demographic data distributed according to the type of the end user's as active and passive. In addition, the gender item is correlated with other demographic items for prompt detection of the required data.

		ACTIVE USERS			PASSIVE USERS			%
		Male	Female	TOTAL	Male	Female	TOTAL	
Age	<18	0	0	0	21	16	37	20.9%
	18-24	1	1	2	53	16	69	40.1%
	25-34	5	1	6	27	16	43	27.7%
	35-49	1	1	2	11	4	15	9.6%
	50-65	2	0	2	1	0	1	1.7%
Education	High School	0	0	0	14	3	17	9.6%
	Vocational/Trade School	0	0	0	3	2	5	2.8%
	Bachelor's Degree	2	2	4	34	23	57	34.3%
	Master's Degree (MSc, MA, MBA)	3	1	4	46	17	63	37.6%
	Doctorate Degree (Ph.D)	4	0	4	17	7	24	15.7%
Occupation	Student	1	0	1	30	13	43	24.9%

	Civil Servant	2	1	3	6	6	12	8.5%
	Company Owner	2	0	2	5	0	5	4.0%
	Company Employee	3	1	4	46	15	61	36.7%
	Self Employed	0	1	1	8	7	15	9.0%
	Retired	0	0	0	2	1	3	1.7%
	Unemployed	0	0	0	2	1	3	1.7%
	Other	1	0	1	15	8	23	13.6%
Income (p/a)	$10,000 - $30,000	2	0	2	30	23	53	33.7%
	$30,000 - $50,000	1	2	3	29	14	43	28.2%
	$50,000 - $70,000	3	0	3	21	3	24	16.6%
	$70,000 - $90,000	0	1	1	6	3	9	6.1%
	$90,000 - $110,000	1	0	1	9	0	9	6.1%
	Over $110,000	2	0	2	9	4	13	9.2%

Table 7-4: Participants demographic data distributed by active and passive users' genders

One hundred and eighty three responses were received. These responses represented mobile end users from different age ranges. Education, occupation and income categories were also included in order to set up relationships between these demographic items and other benefit constructs as will be handled later at this chapter. Missing data were deleted by the calculating method used for each required analysis.

All responses to the survey were voluntary. All participants were encouraged to complete all the questions in the survey. Of these participants, nearly 93% were passive users, 69% males, 68% aged 18-34, 72% were highly educated (Bachelor and Master's degrees), 25% and 37% were students and company employees respectively, and the majority's (62%) yearly income was $10,000 - $50,000 as shown in Table 7-4.

These data indicate that the majority of participants were ordinary young males who did not know much about mService although they were highly educated.

7.4.1.2. mService Awareness

Data analysis revealed that 80 participants reported they had knowledge of mService (30 for more than 2 years, 16 for more than 1 year, 15 for less than a year, and 19 for less than 6 months) as per Table 7-5 which also shows that nearly 55% of respondents have never heard of mServices. This is illustrated in Figure 7-6 which clearly demonstrates the distribution of mService awareness amongst participants' different ranges of age.

	<18	18-24	25-34	35-49	50-65	TOTAL	%
Less than 6 months ago	5	8	5	1	0	19	10.7%
6 to 12 months ago	2	4	8	1	0	15	8.5%
More than 1 year ago	0	3	10	2	1	16	9.0%
More than 2 years ago	2	13	9	5	1	30	16.9%
Never heard of mServices	28	41	19	8	1	97	54.8%
Total	37	69	51	17	3	177	100.0%

Table 7-5: mService awareness percentages distributed by participants' age ranges

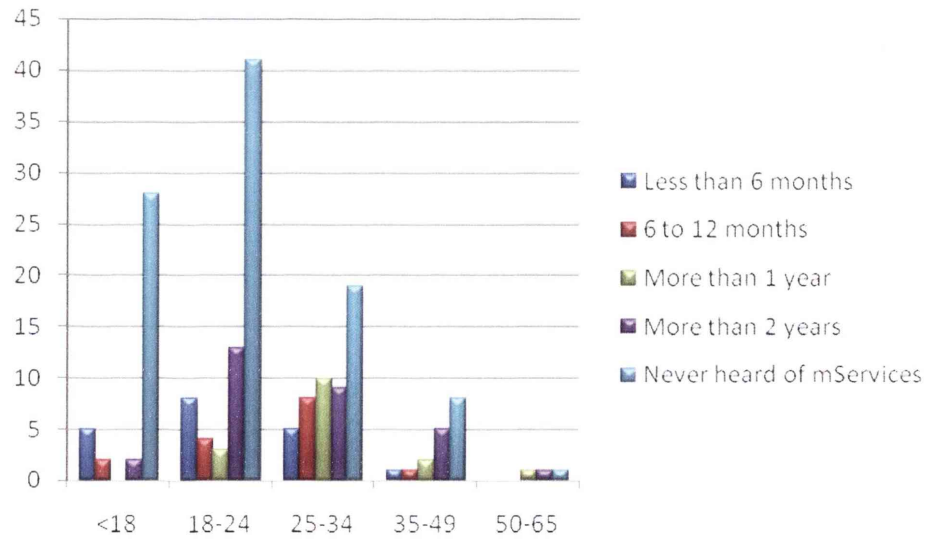


Figure 7-6: mService awareness by participants' ages

7.4.1.3. mService Interest

Exploring the respondents' interest in using mServices, Table 7-6 demonstrates that 164 respondents were not using mServices, 63 of them were even not interested in mServices at all. This gives the indication about the novelty of government mobile services and the level of awareness of end users (citizen and business). In turn, this also indicates the amount of work needed to inform and teach end users about mServices. Only 4 businesses were reported among those 12 end users who had already used mServices which shows the very small penetration rate of mServices to businesses; this rate can be calculated more precisely once a larger sample of end users is identified and surveyed.

		A	B	C	D	E	%
Gender	Male	4	5	11	55	46	68.8%
	Female	0	3	4	31	17	31.2%
	TOTAL	4	8	15	86	63	100.0%

A = Yes, I am a business
B = Yes, I am a citizen
C = No, but I occasionally participate in activities such as forums, conferences, etc.
D = No, but I am interested in using one in the near future
E = No, I'm not interested

Table 7-6: Participants' interest in mServices by gender

7.4.1.4. Mobile Devices

Investigating the types of mobile devices which end users usually use, Table 7-7 shows that mobile phones, and laptops and notebooks are used by nearly 50% and 34% respectively of end users, where males are the majority as illustrated in Figure 7-7.

	Male Users	Female Users	TOTAL	%
Mobile Phone	104	54	158	49.7%
Palm PDAs are based on Palm OS	8	5	13	4.1%
PocketPCs are based on Windows OS	19	4	23	7.2%
Tablet PC	6	3	9	2.8%
Laptops/Notebooks	77	31	108	34.0%
Other devices	6	1	7	2.2%

Table 7-7: Participants' usage of mobile devices by gender

Above 2% of participants used 'other devices'. These devices included: Blackberry, IP phone, Navigation system, Nettelephone German Telecom, Nokia N80, T-Com MDA Pro, PDA phone with windows mobile version, Sanyo 4700 in the USA and Smartphone with windows mobile.

The different types and capabilities of these devices are considered essential points to be considered when designing or re-engineering an mService, to try to guarantee full interactivity between the end user and the mobile service centre.

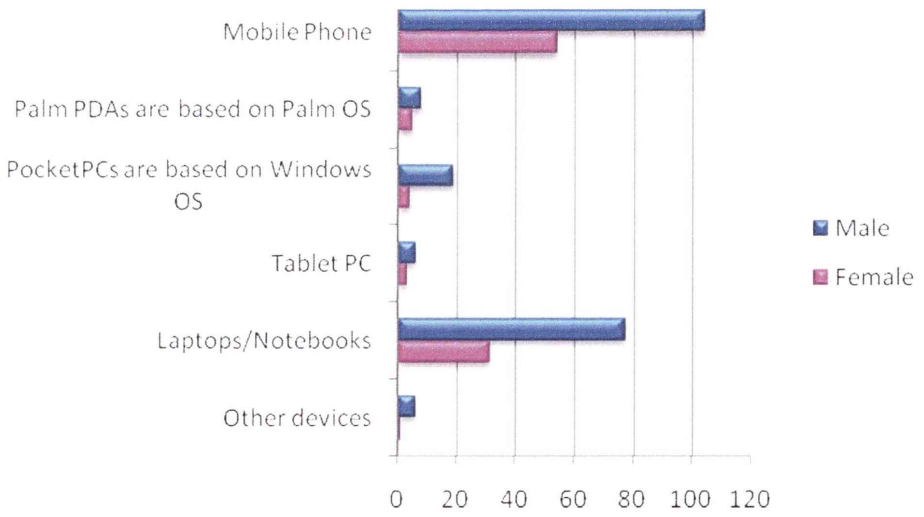


Figure 7-7: Mobile device types as used by gender

7.4.1.5. Mobile Devices Usage Skills

In order to build an idea about age and mobile device usage skills, a frequency relationship between these two variables was established and shown in Table 7-8.

	<18	18-24	25-34	35-49	50-65	TOTAL
Basic	0	0	3	3	0	6
Average	9	11	10	6	0	36
Above average	18	23	22	4	1	68
Advanced	10	36	15	4	2	67
Total	37	70	50	17	3	177

Table 7-8: Age and mobile device usage skills

It is obvious that skills are mostly above average and advanced for all age ranges, which gives the idea that the mobile users who participated in this survey were apt users of their devices. These skills are demonstrated in Figure 7-8 collated by age range.

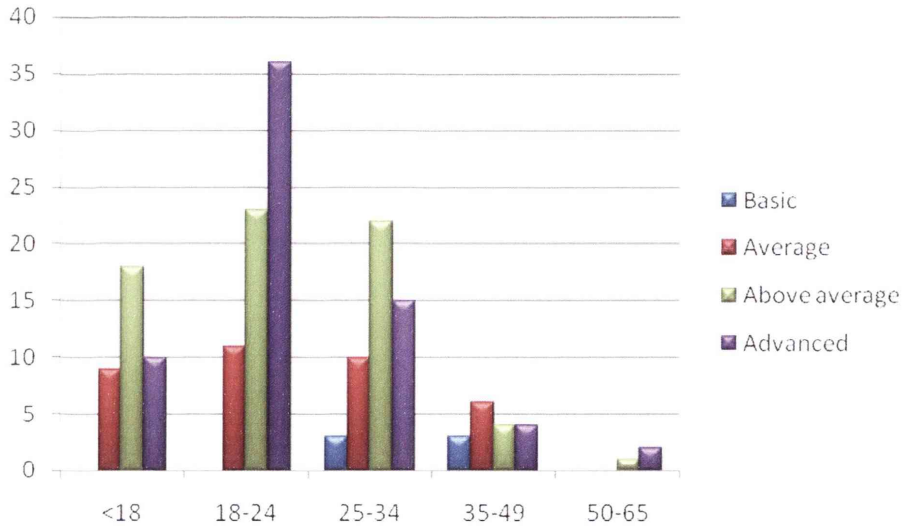


Figure 7-8: Distribution of mobile device usage skills by age range

End users' skills should be considered when designing training or educational programmes in order to attract and encourage those skilled users as well as beginners.

7.4.1.6. Mobile Devices Usage Duration

As shown in Table 7-9, the vast majority (164 respondents) used their mobile for over three years; most of them are in the age category of 18 - 34. This reflects the extent of experience of those participants in using their mobile devices, which indicates their preparedness to receive training in regards to mService utilisation. This variable shows the penetration rate of mobile devices within the survey sample by time, which means that the older the respondents are the less they tend to use mobile devices. Figure 7-9 clusters the duration of mobile devices usage by age.

	<18	18-24	25-34	35-49	50-65	TOTAL
Less than a year	1	0	1	0	0	2
One year	1	0	1	0	0	2
Two years	2	0	1	0	0	3
Three years	2	2	2	0	0	6
Over three years	31	68	45	17	3	164
Total	37	70	50	17	3	177

Table 7-9: Age and duration of using the mobile devices

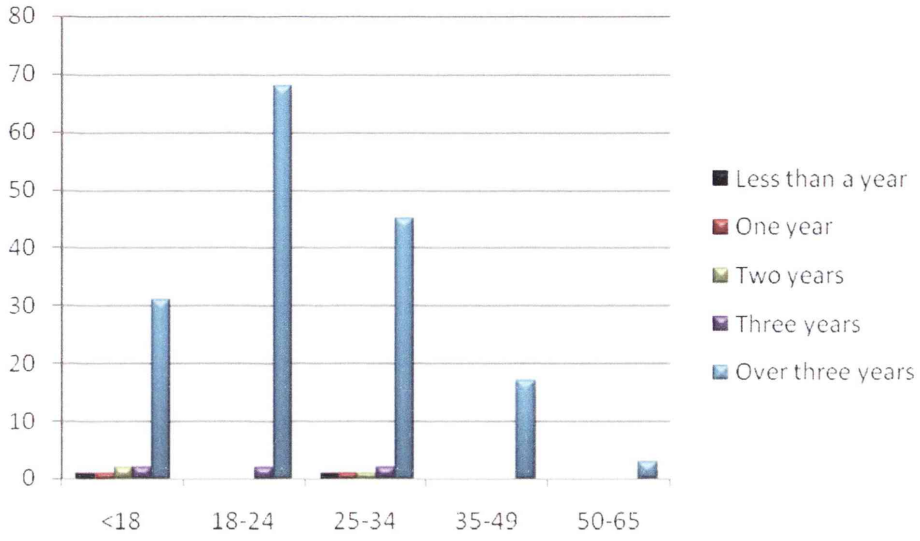


Figure 7-9: Respondents' experience in using their mobile devices

7.4.1.7. End User's Profile

In order to produce a profile for those end users who are most likely to use mServices, crosstab and Chi-Square tests were utilised between end users' opinions about using mService in the future as an independent variable, and another nine variables as dependant ones. The following table summarises the results of this analysis which can be found in Appendix B:

		X^2 Value	Degrees of Freedom (df)	Asymptotic Significance (2-sided)	Relatedness
1	Gender	0.356	2	0.837	Not related
2	Age	14.032	8	0.081	Not related
3	Education	4.910	8	0.767	Not related
4	Profession	25.278	14	0.032	Related
5	Income	25.491	10	0.004	Related
6	mService Awareness	38.832	8	0.000	Related
7	mService Interest	26.942	8	0.001	Related
8	Mobile Devices Usage Skills	2.304	6	0.890	Not Related
9	Mobile Devices Usage Duration	14.155	8	0.078	Not Related

Table 7-10: Chi-Square relatedness analysis between one independent variable and nine dependants

From Table 7-10 it can be derived that the expected use of mService:

1. **Gender**: Does not relate to the end user's gender. The analysis reveals that with 2 degrees of freedom and critical value of 0.05, up to 5.99 may be expected to occur by chance. Thus, $X^2 = 0.356$, $df = 2$, $p > 0.05$ indicates that there is no connection between the two variables.

2. **Age**: Does not relate to the end user's age. The analysis reveals that with 8 degrees of freedom and critical value of 0.05, up to 15.51 may be expected to occur by chance. Thus, $X^2 = 14.032$, $df = 8$, $p > 0.05$ indicates that there is no connection between the two variables.

3. **Education**: Does not relate to the end user's education. The analysis reveals that with 8 degrees of freedom and critical value of 0.05, up to

15.51 may be expected to occur by chance. Thus, $X^2 = 4.910$, df = 8, $p > 0.05$ indicates that there is no connection between the two variables.

4. **Profession**: Relates to the end user's profession. The analysis reveals that with 14 degrees of freedom and critical value of 0.05, up to 23.68 may be expected to occur by chance. Thus, $X^2 = 25.278$, df = 14, $p < 0.05$ indicates that there is a connection between the two variables.

5. **Income**: Relates to the end user's income. The analysis reveals that with 10 degrees of freedom and critical value of 0.05, up to 18.31 may be expected to occur by chance. Thus, $X^2 = 25.491$, df = 10, $p < 0.05$ indicates that there is a connection between the two variables.

6. **mService Awareness**: Relates to the end user's awareness of mService. The analysis reveals that with 8 degrees of freedom and critical value of 0.05, up to 15.51 may be expected to occur by chance. Thus, $X^2 = 38.832$, df = 8, $p < 0.05$ indicates that there is a connection between the two variables.

7. **mService Interest**: Relates to the end user's interest in mService. The analysis reveals that with 8 degrees of freedom and critical value of 0.05, up to 15.51 may be expected to occur by chance. Thus, $X^2 = 26.942$, df = 8, $p < 0.05$ indicates that there is a connection between the two variables.

8. **Mobile Device Usage Skills**: Does not relate to the end user's mobile device usage skills. The analysis reveals that with 6 degrees of freedom and critical value of 0.05, up to 12.59 may be expected to occur by chance. Thus, $X^2 = 2.304$, df = 6, $p > 0.05$ indicates that there is no connection between the two variables.

9. **Mobile Device Usage Duration**: Does not relate to the end user's mobile device usage duration. The analysis reveals that with 8 degrees of freedom and critical value of 0.05, up to 15.51 may be expected to occur by chance. Thus, $X^2 = 14.155$, $df = 8$, $p > 0.05$ indicates that there is no connection between the two variables.

These results mean that end user's profession type, income level, knowledge about mService, and interest in mService are all factors that would influence the end user to utilise the mService. In contrast, factors such as end user's gender, age range, level of education, mobile device usage skills, or mobile device usage duration will have a lesser effect on the utilisation of mServices. This analysis is used to augment the results and outcomes of this research found in Section 9.3.4.4.

7.4.2. Benefits Data Analysis

In order to assess the end-user's satisfaction, the GQM conceptual level constructs are analysed in the following sections where figures and charts are provided. Theoretical background about each construct has been previously handled in Section 7.3.2.

7.4.2.1. Value for Money (VfM) Construct

Data for the following indicators (El-Kiki & Lawrence 2007e) are contained in Appendix B:

a) **The Pricing** indicator examines gained or expected benefits through four statements directed to both active and passive users. As illustrated in Figure

7-10, sixty-five percent (65.2%) of active users think that using government mobile services

- costs less than using a traditional one
- saves money and
- is economical.

Sixty-six percent (66.2%) of passive users would expect or assume the same. The overall percentage of participants who agree with the pricing indicator statements is over sixty-six percent (66.1%).

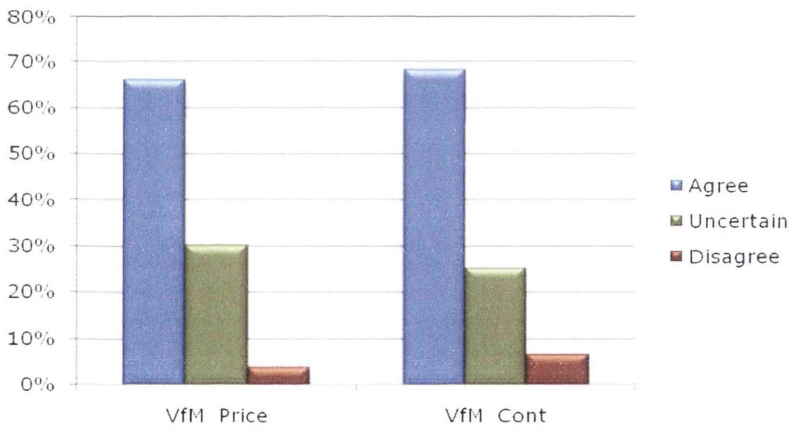


Figure 7-10: Value for Money construct collective answers

b) **The Content** indicator examines gained or expected benefits via six statements directed to both active and passive users. As illustrated in Figure 7-10, fifty-six percent (60%) of active users believe that:

- government mobile services provides sufficient information,
- the rendered content of the service is relevant to their culture,
- the language of the service is easy to understand, and

- the rendered content of the service is dependable.

Seventy percent (70%) of passive users would expect or assume the same. The overall percentage of agreeing with content indicator statements is over sixty-eight percent (68.2%).

Consequently, Value for Money construct gained a collective agreement, at both of its pricing and content items, of sixty-seven percent (67.4%).

7.4.2.2. Quality of Service (QoS) Construct

Data for the following indicators (El-Kiki & Lawrence 2007c) are contained in Appendix B:

a) **The Awareness** indicator examines both active and passive users' views concerning mService information and training through four statements. Fifty percent (50%) of active users agree that being previously informed about and trained before using an mServices is essential for the success of the service, whilst over fifty-eight percent (58.4%) of passive users would expect or assume the same. The overall percentage for agreeing at this indicator items is nearly fifty-eight percent (58.7%).

b) **The Accessibility** indicator examines both active and passive users' opinions about providing people with disabilities access to mService through two statements. Fifty-eight percent (58.3%) of active users agreed that mServices should be accessible by people with disabilities; meanwhile eighty percent (80.3%) of passive users would expect and assume the same. Having a total

agreement of nearly seventy-nine percent (78.5%) confirms the significance of the second component of quality-of-service benefit.

c) **The Availability** indicator examines both active and passive users' stances regarding rendering mServices everywhere, anytime and to everybody through six statements. Slightly over fifty-eight percent (58.3%) of active users agree, and about seventy nine percent (78.6%) of passive users would expect or assume the same. Total agreement at the 'Availability indicator' was seventy-seven percent (76.9%), confirming the significance of this component of quality-of-service benefit.

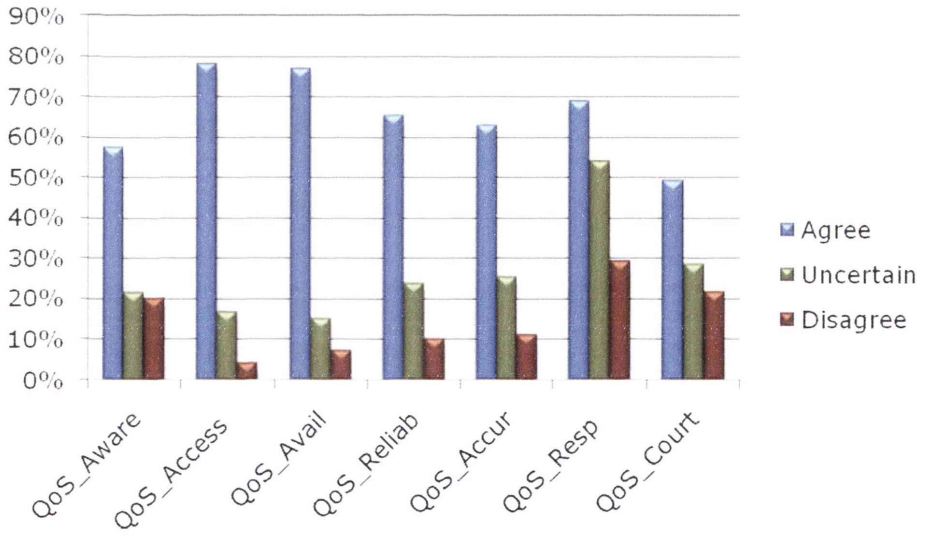


Figure 7-11: Quality for Service construct collective answers

d) **The Reliability** indicator verifies both active and passive users' views regarding providing reliable information, being fault-tolerant and always recoverable from any interruption as features for mService through six statements. Only about forty-two percent (41.6%) of active users agreed

which raises some suspicions about the reliability of existing mServices. Nearly sixty-eight percent (68.9%) of passive users expect or assume these benefits. The total agreement at the 'Reliability' indicator items is close to sixty-six percent (65.7%).

e) **The Accuracy** indicator examines both active and passive users' views regarding the significance of being rendered an error-free mService, with correct and accurate information through six statements. Only thirty-two percent (32.4%) of active users agreed, which indicates some dissatisfaction with the accuracy of current mServices. About sixty-six percent (65.8%) of passive users expect or assume accuracy in their foreseen mServices. The total agreement at this indicator was sixty-three percent (63.2%).

f) **The Responsiveness** indicator examines both active and passive users' opinions regarding the speed with which mService requests are manipulated, pages are browsed, commands are achieved and acknowledgements are displayed through two statements. Fifty percent (50%) of active users and seventy-one percent (70.8%) of passive users agreed at the statements, making the total agreement at this indicator up to seventy-nine percent (79%).

g) **The Courtesy and Helpfulness** indicator examines both active and passive users' opinions regarding finding somebody to answer a question and provide the needed assistance, in addition to receiving a courtesy call after a fulfilled request through six statements. Nearly thirty-nine percent (38.9%) of active users and fifty percent (50.5%) of passive users agreed at the

statements, making the total agreement at this indicator around fifty percent (50%).

Summarising the Quality of Service benefit, the collective agreement at the seven indicators is sixty-four percent (63.2%). Figure 7-11 illustrates each indicator's summary.

7.4.2.3. Efficient Transactions (ET) Construct

Data for the following indicators (El-Kiki & Lawrence 2008) are contained in Appendix B:

a) **The Usability** indicator examines gained or expected benefits through eight statements directed to both active and passive users. Sixty-five percent (65.2%) of active users agreed that ease of language, use, learning, and understanding are essential for the success of the mService. Seventy-six percent (75.9%) of passive users also agreed at the same. The total agreements of seventy-five percent (75%) confirm that usability of the mService is a significant element in making the transactions efficient.

b) **The Timeliness** indicator investigates the importance of mService promptness and the originality of information provided as viewed by both active and passive users through four statements. Around sixty-seven percent (66.6%) of active users agreed that mServices should be rendered and accessible whenever they are needed. Respondents also required the most up-to-date information through such service. Seventy-four percent (74.4%) of passive users expected the same. The seventy-four percent (73.7%) of total

agreement to the Timeliness indicator makes it a significant element in making an mService transaction efficient.

c) **The trust** indicator tests how much trust an end user has in government mobile services through two statements. Forty-two percent (41.6%) of active users showed no trust in current mServices. The majority of passive users (43.4%) were uncertain about putting their trust in mServices. Uncertainty about trust represents the major inclination of respondents in mServices with total of forty-two percent (42%), and this, accordingly, negatively affects the transactional efficiency of such types of government services.

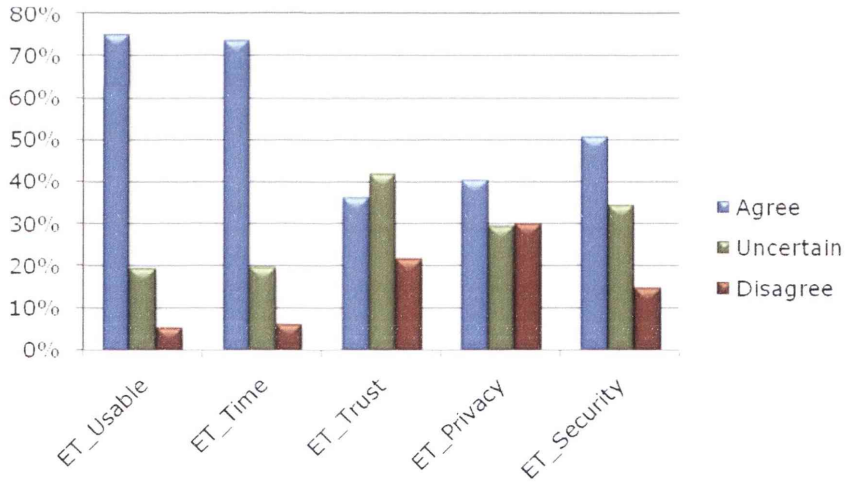


Figure 7-12: Efficient Transactions construct collective answers

d) **The Privacy** indicator tests the degree of confidence in privacy protection when utilising mServices through the use of two statements. Forty-two percent (41.6%) of active users agreed that their privacy is protected when using mService, whilst forty percent (40.5%) of passive users expected the

same. The total agreement at this indicator is slightly above fifty percent (50.6%).

e) **The Security** indicator tests, through two statements, how end users feel towards the security of the mServices once they are used and depended on. Fifty-eight percent of active users agreed that their mobile transactions are secure. Another fifty percent of passive users expect or assume the same. A total of fifty-one percent (50.7%) agreement confirms that security is an essential element in making mServices transactions efficient.

Summarising the Efficient Transactions benefit, the collective agreement at the five indicators is sixty-four percent (63.8%), as Figure 7-12 illustrates each indicator's summary.

7.4.2.4. Strategic Data (SD) Construct

Data for the following indicators (El-Kiki & Lawrence 2007d) are contained in Appendix B:

a) **The Accountability** indicator examines gained or expected benefits through two statements directed to both active and passive users. Fifty percent (50%) of active users think that using government mobile services enables them to communicate with government officials, whilst sightly over forty-one percent (41.5%) of passive users would expect or assume the same. Although those who agree with the accountability statements are slightly over forty-one percent (41.2%), it is still an encouraging percentage for the mobile technologies to break that barrier between end users and government officials, especially as over one-third (33.1%) of participants were uncertain.

This may indicate suspicion or lack of knowledge or experience regarding the use of mobile technologies in this regard by end users.

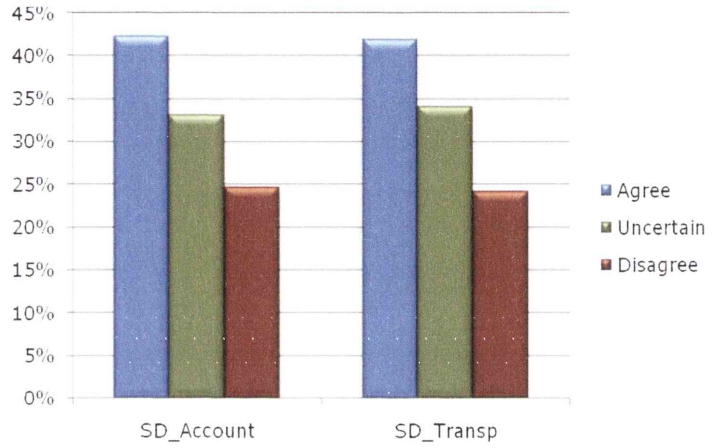


Figure 7-13: Strategic Data construct collective answers

b) **The Transparency** indicator examines gained or expected benefits via four statements directed to both active and passive users. Nearly thirty-two percent (31.8%) of active users believe that:

- they are able through mobile services to actively give their opinion to the government.
- they are able through mobile services to protest unfair or ill-advised decisions.

About forty-three percent (42.7%) of passive users would expect or assume the same as illustrated in Figure 7-13. The overall percentage of agreeing with transparency indicator statements is nearly forty-two percent (41.8%).

7.4.2.5. Satisfaction (Construct of Constructs)

By measuring end user's existing or expected satisfaction from utilising a government mobile service, the researcher found that nearly sixty percent (59.7%) of respondents agreed with the four types of benefits as per Table 7-11 represented in Figure 7-14. All indicators gained the agreement from the participants except for one; Trust. The majority (42%) were uncertain whether to put their trust in mGovernment services. Although it is just one indicator, it is one of the most significant elements contributing to the success or failure of a mobile service project.

Construct	Indicator	Agree	Uncertain	Disagree
Value for Money	VfM_Price	➡66.1%	30.0%	3.9%
	VfM_Cont	➡68.2%	25.2%	6.5%
Quality of Service	QoS_Aware	➡57.7%	22.0%	20.3%
	QoS_Access	➡78.4%	17.3%	4.3%
	QoS_Avail	➡76.9%	15.6%	7.5%
	QoS_Reliab	➡65.7%	23.9%	10.3%
	QoS_Accur	➡63.1%	25.6%	11.3%
	QoS_Resp	➡69.0%	54.2%	29.6%
	QoS_Court	➡49.5%	28.7%	21.7%
Efficient Transactions	ET_Usable	➡75.0%	19.5%	5.5%
	ET_Time	➡73.8%	19.9%	6.4%
	ET_Trust	36.4%	➡42.0%	21.7%
	ET_Privacy	➡40.6%	29.4%	30.1%
	ET_Security	➡50.7%	34.5%	14.8%
Strategic Data	SD_Account	➡42.3%	33.1%	24.6%
	SD_Transp	➡41.8%	34.0%	24.1%
Mean		➡59.7%	28.4%	15.2%

Table 7-11: Mean = Overall Satisfaction

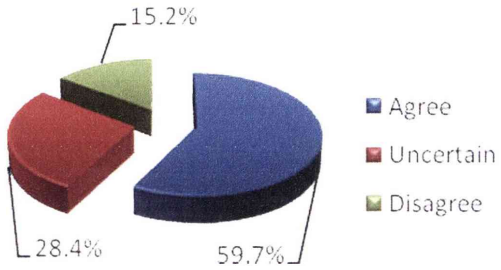


Figure 7-14: Overall Satisfaction

7.4.3. Constructs Validity and Reliability

Validity is defined as "the extent to which measurements indicate what they are intended to measure" (Schutt 1999, p. 83), whilst reliability is the extent to which "a particular technique, applied repeatedly to the same object, would yield the same result each time" (Babbie 1992, p. 129). In this section, validity is verified for both the content and construct; meanwhile reliability is assessed to indicate the construct homogeneity.

7.4.3.1. Content Validity

Content Validity refers to the extent to which variables or items encompass the whole content, or all the main magnitudes of the concept being studied, as Boudreau et al. (2001, p. 8) stated that "content validity is the degree to which items in an instrument reflect the content universe to which the instrument will be generalised". For an instrument to be valid in content it must draw representative questions from a universal pool (Cronbach 1971; Kerlinger 1978).

One of the reasons of conducting the expert survey was to develop and verify the contents of this instrument following Straub's (1989) opinion. In addition,

previous instruments developed by other researchers in eGovernment, eCommerce and mCommerce were critically consulted. Moreover, the researcher acted on feedback received from the respondents of the pilot test, about the representativeness and relatedness of questions to the items of each construct before officially releasing the survey (Boudreau, Gefen & Straub 2001),. Therefore, the researcher contends that content validity is actualized.

7.4.3.2. Construct Validity

The purpose of construct validity is to determine if the selected survey items can be considered as an intellectual whole (Straub 1989). In order to test GQM operational level indicator constructs' validity, an exploratory factor analysis on each construct items (factors) was performed. According to Nunnally (1978, p. 389), this factor analysis is performed to determine the relatedness of the items to their collective construct.

First, factor analysis is preferable when the number of respondents is larger than the number of variables; which is the case in this survey. How 'large' the number of respondents should be in proportion to the variables was contentious. For example, whilst Guilford (1954) suggested 1:2 and Nunnally (1978) suggested 1:10, Gorsuch (1983, p. 332) argued that "nobody has yet worked out what a safe ratio of the number of subjects to variables is". Whichever that ratio is, or should be, the ratio of this end-user survey is over 1:11 as a result of 16 variables manipulated by 183 respondents, which is considered a safe construct validity ratio.

Second, for even more precise assessment, Kaiser-Meyer-Olkin (KMO) Measure of Sampling Adequacy and Barlett's Test of Sphericity was performed in order to examine whether the data set was appropriate for factor analysis. Although De Vaus (1991) and Field (2000) suggested that KMO measure should be generally greater than 0.5 to be acceptable, Garson (2006a) stated 0.6 as a rigorous cut-off-point. The KMO statistics fluctuated between 0.690 and 0.910 at a significant level of 0.001, as shown in Table B-2. In comparison with these cut-off points, the KMO results are satisfactory.

Finally, factor loadings were assessed by applying Principal Components Factor Analysis with a Varimax rotation. Generally, factor loadings below 0.4 are considered low, and accordingly low-loading items should be suppressed (Comrey 1973; De Vaus 1991; Field 2000; Hair et al. 1995; Stevens 1992). The results in Table B-2 show that factor loadings are between 0.592 and 0.916, which exceeds the cut-off level. Hence, for an exploratory study such as this, construct validity is substantiated.

7.4.3.3. Construct Reliability

The reliability of constructs was assessed by the most widely used internal consistency relationship coefficient, Cronbach's (1951) alpha, to measure the homogeneity of the constructs. As a rule of thumb, a cut-off point of 0.60 is common in exploratory research (Garson 2006b; Nunnally 1978). Table 7-12 shows that all alpha values for the four main constructs passed this threshold, which means that construct reliability was successfully established.

Construct	α
Value for Money	0.687
Quality of Service	0.923
Efficient Transactions	0.842
Strategic Data	0.852

Table 7-12: Construct reliability results as tested by Cronbach's alpha

7.5. Qualitative Data Analysis

Two open questions were included at the end of the survey in order to extract the advantages and disadvantages of mobile services as they were perceived by the end user. These questions were intended to delve into end users' wishes, experiences, and ideas in quest for the truth (Strauss & Corbin 1998); the truth about mService in their minds. The responses of these two questions provided a large diversity of opinions. Although such analysis may be classified as small-scale where a word processor, with its features of easy coding, retrieval, searching and data graphic display, was considered as sufficient (Fielding 1993; Miles & Huberman 1994), the use of QSR NVivo software was necessary for a thorough coding and categorisation of the answers.

7.5.1. mService Advantages as Viewed by End Users

Although this is a qualitative analysis, the researcher preferred including the summary of an NVivo generated report about 27 mService advantages in Table 7-13. From the references, five advantages were thought to be the most important as by the number of times they were talked about or repeated. These advantages

are convenience, less cost, no place or time restrictions, and promptness which are all collated in these integrated verbatim comments as examples:

mService is "convenient in performing transactions" as "it fits into my busy schedule" and is "likely to be affordable". It is "location independent" which means it is "available everywhere, anywhere", and it "saves time and avoid[s] queues" as it is "available 24 hours a day", so "tasks are finished on the go" with "spontaneous reactivity".

It was noticed that most of the comments described generic characteristics of using any mobile device. In other words, end users viewed the advantages of the mService through the characteristics of the medium device, which in fact reflects a lack of knowledge or awareness about mServices. This in turn, returns to the novelty of mService and the narrow scope of its application.

Scrutinising the rest of advantages, which are also illustrated in Figure 7-15, it can be seen that there are subtle differences in meanings of the used words; e.g. effort saving and convenient which could mean the same thing, also accessible could be understood as to be from "anywhere" at "anytime". This means that these coded nodes could be further clustered together which will not be in the end much different from the original EUSM four main categories of benefits.

Nodes Coding	References
Accessible	11
Citizen-government cooperation	1
Convenient	22
Customisable	3
Easy to understand	2
Efficient	5
Effort saving	1
Government re-organisation	5
Higher mobile penetration	1
Info availability	9
Info correctness	3
Less cost	13
No place restrictions	24
No time restrictions	22
Paperless	2
Personal control	1
Portable	2
Private	3
Prompt	12
Ready to use	2
Reduce Bureaucracy	1
Reliable	5
Suitable content	2
Time saving	7
Transparency	2
Ubiquitous	6
Up-to-datedness	1
Total References	168

Table 7-13: Coding Summary Report for mService Advantages as viewed by end users

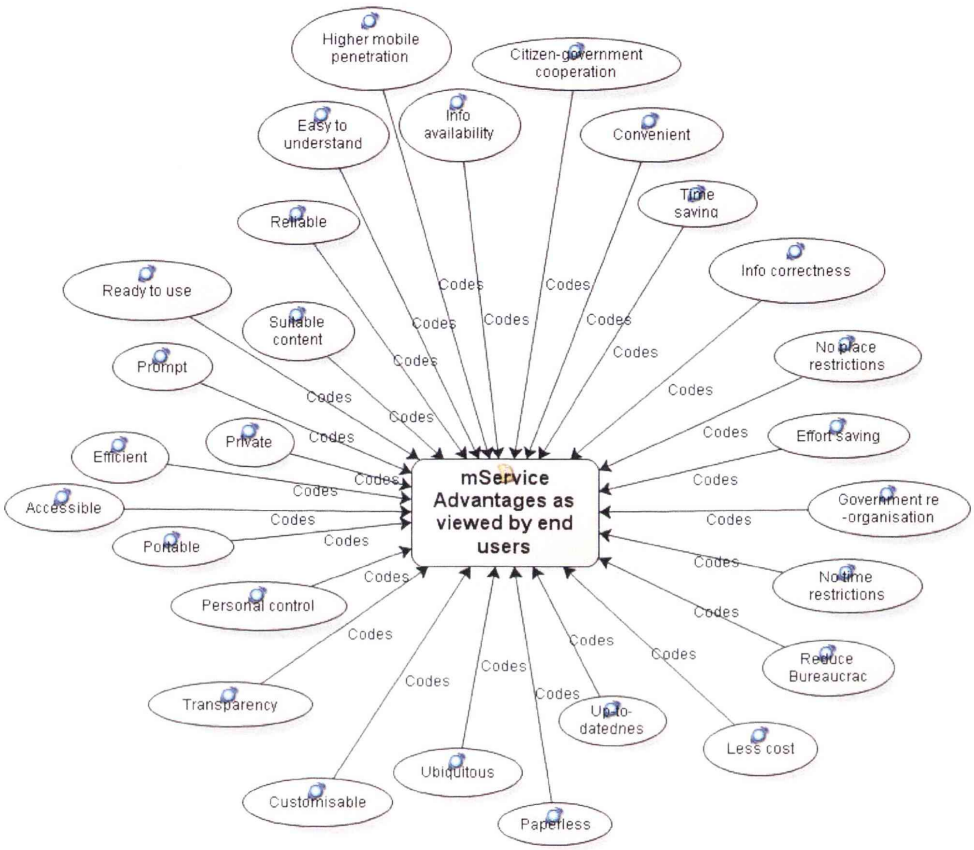


Figure 7-15: NVivo generated model of mService advantages

7.5.2. mService Disadvantages as Viewed by End Users

As with mService advantages, Table 7-14 summarises 21 (illustrated in Figure 7-16) mService disadvantages. From the references, four disadvantages are thought to be the most significant; complicated technology, high prices, lack of privacy and lack of security. The following examples of integrated verbatim comments highlight this point:

mService uses a technology that is "complicated" and "hard to understand" and this will "not [be] viable for older people". This is in addition to the "high costs of

using mobile communication to access services" which returns to the "ridiculously high pricing of mobile calls". On the other hand, "data privacy and security [are] not guaranteed" because of the government's "big brother attitude of monitoring citizens". The "loss of security and freedom" means mServices "may be subject to infiltration by unauthorised people".

A thorough look into these comments would reveal that these thoughts on mService disadvantages have been previously highlighted directly or indirectly as barriers to the application of government mobile services as mentioned in Sections 3.4 and 6.4.

It is worth mentioning that "less cost" was mentioned as an advantage, whilst "high prices" were mentioned as a disadvantage; in the meantime both mean the same thing. By "less cost" end users meant mService cost less when compared to the cost of other means of service such as doing it "in person". On the other hand, by "high prices" they referred to the high prices charged by their mobile telecommunication provider for using their devices. Such facts will not be revealed by any objective quantitative method.

Nodes Coding	References
Complicated technology	13
Devices unsuitability	6
Difficult language	4
Fragile technology	10
High prices	15
Lack of availability	5
Lack of human interaction	1
Lack of privacy	19
Lack of publicity	2
Lack of reliability	7
Lack of robust business model	2
Lack of security	16

Lack of trust	2
Misuse	1
Need to learn how to use	8
Never used mService	2
No assistance	6
Standardisation issues	2
Traceability	2
Unaware of mService	8
Unsuitable content	1
Total References	132

Table 7-14: Coding Summary Report for mService Disadvantages as viewed by end users

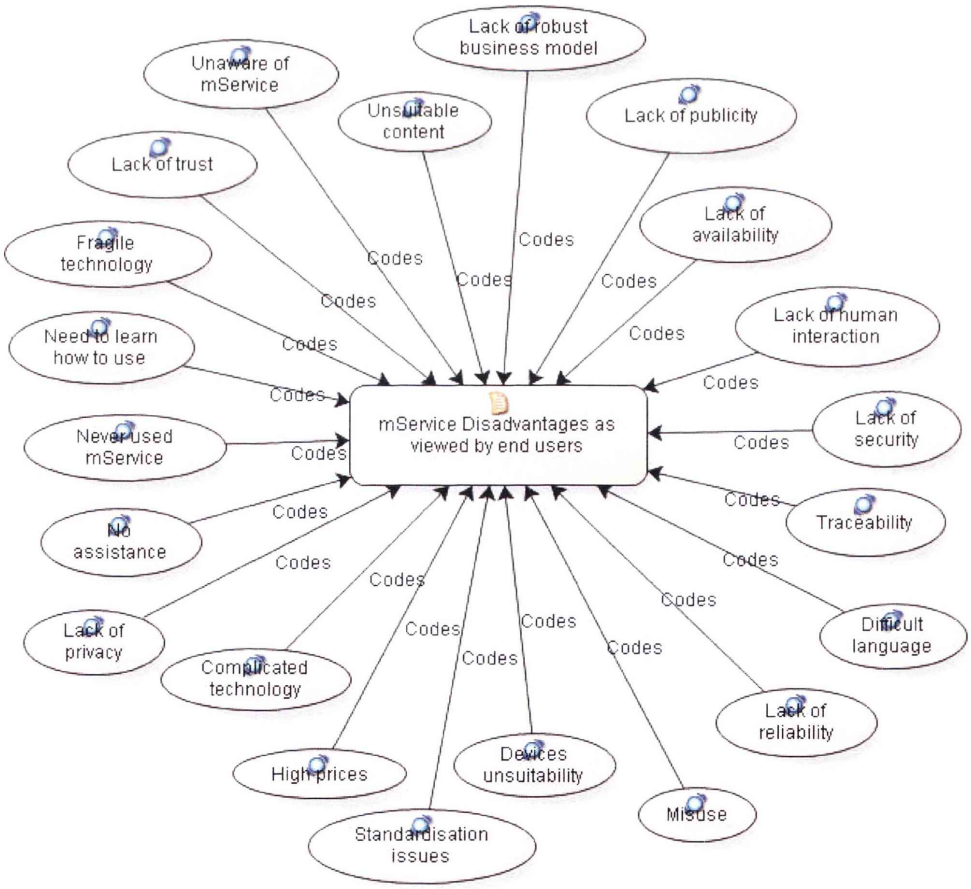


Figure 7-16: NVivo generated model of mService disadvantages

7.6. Chapter Review

This chapter discussed the roots of mService effectiveness evaluation from the perspective of end users. It described the rationale behind devising MPE²M-mG through which the focus was on citizens and businesses as end users. Accordingly ESUM was derived and mobile end user's benefits were established as four categories: Value for Money, Quality of Service, Efficient Transactions, and Strategic Data.

These categories represented the four main constructs of GQM conceptual level. Each construct was bifurcated into indicators which represented the GQM operational level. These indicators were further translated into questions which represented the interpretive level of GQM. This was the theoretical ground on which the end-user survey was built.

Data from the survey were quantitatively analysed using SPSS® package, and a diversity of data were encountered and derived. These data pertained to the characteristics of the participants from which end-user's profile could be depicted. End users' opinions in regards to the gained, or expected to be gained, benefits from utilising mServices were also analysed in order to evaluate the overall satisfaction. The survey instrument validity and reliability were measured through the content and construct validity, and construct reliability calculations.

Qualitative analysis handled the survey open questions which were analysed using QSR NVivo that assisted in sorting out the advantages and disadvantages as viewed by end users into interrelated points. The aggregation of these points

resulted in the same four categories of end user's benefits which were stated by ESUM.

The following chapter analyses the results of three local Councils case studies describing the effectiveness of implementing mICT in local government and from where such implementations should start.

CHAPTER 8

8. Local Government Case Studies

Implementing mobile technology in government means utilising it in all types of government; Local, state or Federal. In order to investigate how mobile services are applied in Local Government, three local councils, A, B and C, were selected from Sydney's suburban councils, where each council's case was closely studied. As these three are mService providers, the perspective of these local councils is considered crucial in augmenting the results of this research.

8.1. Introduction

The modernisation agenda has forced most of the governments around the world to embrace and develop strategies to implement ICT in all of their internal processes and external services. The future of local government is tied to its

capacity as a community leader to work alongside other agencies and its citizens in order to achieve social and economic benefits (Birch 2002). The result was the local **eGovernment** initiatives to disseminate information and render services electronically through web-based Internet applications. A new trend to deliver services through the use of mobile and wireless technologies has, in turn, led to local **mGovernment.** From the end-user's perspective, local mGovernment is viewed as a new front-end access to the local government services; in other words, taking the Council's services to the citizens in contrast to expecting citizens to come to acquire the services.

The operationalisation of mGovernment means the use of mobile devices (mobile phones, handhelds, PDAs, wearable PCs, Black Berry pagers, etc.), wireless networks and 3G services. Short Messaging Service (SMS) is the most successful application used on mobile devices to date (Inglesant & Sasse 2005) although with the advent of smart phones more web based services are growing in popularity. The Blackberry phone has proven very popular as a tool for providing email access anywhere, anytime for example. Consequently, potential benefits like increasing the productivity and effectiveness of the public service personnel, improving the delivery of government information and services, increasing channels for public interactions, lower costs leading to higher participation (Mohanty 2005) are all expected.

Because they are one of the government mService providers, local councils were investigated to realize the factors that influence the success of these services from a more practical perspective. The methods used to collect and analyse data were explained earlier in Sections 5.2.3 and 5.3.1 respectively. Consequently, interviews were conducted with three local councils in Sydney: Council A, Council

B and Council C. Each council nominated a municipal official to be interviewed. The officials were in charge of eGovernment, IT Management, and Wireless and Mobile Implementation. The interviewer was well received and, in general, found the officials to be knowledgeable and concerned about the affairs of their respective municipalities.

As previously mentioned in Section 5.3.1.1, the qualitative analysis of local government data underwent three conceptual stages: Accuracy Check & Data Reduction, Open Coding, and Selective Coding. These stages enabled extracting some organised meaning from the many pages of each interview transcript starting with identifying the descriptive themes (cases) and concluding with interpretive themes.

8.2. Stage 1: Accuracy Check & Data Reduction

At this stage, the transcribed interviews were sent back to the interviewees to review and comment in order to achieve the highest possible degree of accuracy of collected data before running any analysis. This is another form of member checking mentioned in Section 4.4.1 as one of the methods that enables the control over the credibility of the data and their interpretation. In addition, the researcher used his own notes taken during the interviews in order to check and correct any garbled data resulting from the digital recording artefact.

Data reduction refers to the process of selecting, simplifying and transforming data that appears in the original documents (Miles & Huberman 1994, p. 10). The main aims of data reduction are to enable a concise description for each

council's case, and to enable the detection of free nodes, which is the process that does take place during the open coding.

Subsequently, this stage describes in detail the three local councils' case studies. It narrates what the interviewees have declared with minor editing to interjections and incomplete sentences and phrases. The transcripts of these interviews are found in Appendix E

8.2.1. Case Study 1: Council A

8.2.1.1. The Council's current electronic services

All electronic services at Council A were selected as per Appendix D; not all are directly provided by the Council, though. The reason behind this is that the Council does have and does provide a community service directory; since one of the drivers of electronic services is providing information. Service categories mentioned are categories within the community services directory, which is a static directory that can be accessed on the Web. It provides pointers to organisations where community members can access those services locally. For example, Council A does not provide accommodation; yet it has available on the website through the community directory details of organisations that do deliver such a service.

Due to the age of the technology on which the Council's systems, such as the financial system, land information system and geographic information system, run, the existing technology will be replaced and, accordingly, the entire systems will be changed over in the next five years. A new .Net environment will be employed to deploy new integrated systems. The interviewee stated that

management at Council A is currently planning to achieve this upgrade in the very near future in order to deliver more and new electronic services to the businesses and citizens.

However, according to the next five-year plan, no specific new electronic services are expected to be added online. In order to fill in this gap customer service managers should speak to the ultimate users to figure out what they really need from the Council. The IT management suggests investigating the use of voice over internet protocol (VOIP) in order to deliver more services online through the telephony system. VOIP would give people more options to face to face services so that they can actually access services out of hours.

8.2.1.2. The Council's current mobile services

Management of Council A has a positive outlook in terms of the use of mobile technologies, and recognises that they will potentially enable new avenues of communicating with customers. Through his experience, the interviewee stated that there is a high percentage of people who live locally who are ready to interact with the Council through their mobile telecommunication devices. Currently, there are six areas where mobile technologies are utilised; they are Strata Titles, Environmental Action, Information Hotlines, Entertainment, Holidays and People with Disability.

In terms of near future plans to expand the usage of mobile technologies in the Council, there is not any defined or specifically targeted area where the mobile services will be rendered. In order to actually deliver mobile services beyond what is currently offered, the Council needs to be capable to face some new

challenges such as new infrastructure and more flexible budgets. The Council does not have these capabilities for the time being, but realises that mServices are inevitable in the short term. There is a vision that by replacing the current systems as mentioned above, the Council as an organisation will move in the direction which will satisfy the customers.

8.2.1.3. Impact of mobile technology on the Council's internal and external operations

Once mobile technologies are utilised on a larger scale, more resistance to this change will be expected internally from the working staff, especially those who are computer illiterate, and externally from the Council's customers, especially the elderly who have limited patience to learn how to effectively use the mobile devices. This resistance is one type of the "prices" that have to be paid especially in the beginning of a major project that will be introducing or producing mServices.

Accordingly, the interviewee felt it was difficult to predict whether mobile technologies will participate in reducing office running costs, which would depend on both the nature of the technology and the uptake by the Council's customers. In this regard, cost benefit analysis may prove useful. On the other hand, the cost for providing information to the public is expected to decrease once the required information is obtained at the first time of contact, and this requires meticulous organisation of information which may consume some resources.

In addition, in terms of internal processes it is expected that there will be a decrease in the cost of completing transactions to the public if they are able to access the required information through mGovernment services without having to interface with the Council staff. Subsequently work is done in a more flexible way as a result of freeing up front line staff. In turn, the requirement for office space will decrease since the staff members will be able to complete their daily tasks remotely through their mobile devices; even customers will not need to attend to the office in person resulting in a more organised and quieter working environment for the rest of the staff whose work necessitates their being at the office. Time spent by both staff members and customers in fulfilling or acquiring a service will definitely decrease due to the fact of having that service accessible through the mobile technologies 24 hours a day, 7 days a week.

The eventual expected objective is high quality for a permanent, available and accessible mService which if not error-free, should have the least errors possible and this necessitates setting up the serving system right from the very beginning.

8.2.1.4. Problems in using the mobile technologies

As previously stated, internal and external resistance to Council's implementation of the mobile technologies is a real challenge rather than a problem. Adapting work processes, training staff, educating customers to move away from traditional ways of engaging the Council and advertising about the available mServices - all represent challenges that should be considered and confronted. The literature review previously revealed these challenges and classified them under the term 'awareness', which is the ultimate goal of training

and education through various methods such as community awareness and training programs. Confirming this point, a few experts highlighted the importance of training and education for both working staff and citizens in the expert survey.

In addition, ensuring that the mService system and process do not breach any privacy regulation, yet are secure enough to gain trustworthiness, is also another challenge that should be carefully addressed. This was also confirmed by the outcomes of the end-users' survey analysis as 41% and 51% of end users agreed at the magnitude of privacy and security respectively, whilst 42% were uncertain whether to put their trust in mGovernment services.

8.2.1.5. The Council's opinion about mService success factors

The interviewee believes that ensuring that the population needs are fulfilled is the core success factor for mobile services, and this will not take place until the Council is aware of these needs. So, rather than just saying that mService is available, actually having a plan for discovering people's needs and then making them realise that those needs can be totally fulfilled through mServices, will maximise the chances of success.

8.2.1.6. Plans for further mobile technology use

As mentioned above, there are six current areas where mobile technologies are used. Council A is looking into more areas where an actual interaction between the customer and the Council is taking place. Accordingly, these areas will be nominated for mobile technologies implementation in order to free up some

resources which could be utilised in other areas. There is no actual timed plan to achieve this task, since it is done on an ad-hoc basis.

8.2.2. Case Study 2: Council B

8.2.2.1. The Council's current electronic services

From the perspective of Council B, electronic service, which was initiated nearly four years ago, is an extension to the current services that the Council offers to the community. For example, citizens can check the progress of their applications on the Web, whereas the traditional process of the service requires them to come in person to customer service, or to call by telephone in order to check the progress of their applications.

In terms of electronic service delivery, the main confronting issue is the community that Council B serves, i.e. the consumer of the service. For example, when developing electronic applications the multi-cultural and ethnic community imposes its requirements, such as languages other than English, on those private businesses contracted by the Council to develop those applications. Accordingly, ultimate care is required when targeting the end users be they citizens or businesses; an operation which is very similar to market assessment for any product or service.

On the other hand, the back office is made ready to respond to the end user's queries 24/7 either by humans or via automated messages. The philosophy of the Council is that end users are given the first priority once it comes to personal contact between them and the Council, which also represents the biggest challenge in service delivery. It would be very frustrating for the end user to be

provided with a form to fill in instead of an immediate answer for a query. As a result, very few electronic services, providing traceable information at anytime, are rendered with satisfactory levels of response to the end user. The small number (n=17) of electronic services also reflects the Council's technological readiness to accommodate such services. So far, this number of rendered services is manageable administratively and technologically.

8.2.2.2. The Council's current mobile services

Council B believes that mobile services are important especially in the areas of improving information access, accessibility, service delivery and also generating income. Since they started two years ago, mobile services in Council B (n=8) have grown significantly and quickly. For example, since 2003 road maintenance and road investigations services have been conducted electronically, so all queries and information requests are handled online. Due to the lack of computer literacy the Council decided to introduce the mobile solution to the employees, where little training is offered and better performance is achievable. Accordingly, by applying the mobile technology the required data are dispatched immediately on site at any time. Another similar example is the use of PDAs by the road and parking inspectors, who can issue infringement notices on the spot at any time. Hence, the Council has been able to transform an electronic service with its entire processes into a mobile service as a mobile solution.

8.2.2.3. Impact of mobile technology on the Council's internal and external operations

Applying mobile technology has improved the Council's internal and external operations. For example, a new environmental health mobile service was initiated in order to investigate regulations compliance. Inspectors, using their mobile devices with broadband access, can easily access the required information from the server from anywhere as if they were at office; they do not even need to go to their offices to start their jobs.

This definitely has improved the quality of internal operations and even saved time since staff members who use mobile devices do not have to come to the Council in the morning and then leave it again for some tasks in the field; they instead go directly to the work spot where they start their working day. This, in turn, has reduced office running costs, increased the ability of staff to work more flexibly and improved quality of service; reinforcing the literature review findings in regards to reducing costs, for both citizens and government, and increasing the revenue (Chang & Kannan 2002; Hartel, Bulander & Decker 2006).

8.2.2.4. Problems in using the mobile technologies

Problems in using mobile technologies in Council B revolve around the staff computer literacy. Over 50% of the staff members do not have adequate education or that little training in using mobile devices at work. This is in addition to inadequate IT infrastructure which could accommodate more intricate mobile technology to render more services.

8.2.2.5. The Council's opinion about mService success factors

According to the interviewee, mobile service delivery must be thoroughly analysed in order to render a beneficial and desirable service. Desirable means that the objectives and benefits that the Council is trying to achieve satisfy the needs of the consumer of the service. Consumers need the service to be rendered on time.

Mobile services and electronic services complement and integrate with each other. Accordingly, highlighting the relationships and interdependencies between both types of service is an essential step towards real success. Once this is done, management committees should be formed to lay down the financial and administrative plans with required manpower to implement the mobile initiative. The interviewee confirmed that this is exactly how Council B achieved success for the rangers and road patrol personnel whose jobs are now done smoothly by using the mobile devices.

8.2.2.6. Plans for further mobile technology use

The initial success achieved in the current Council's mobile services is encouraging the officials to implement more. In the following eighteen months to two years, there will be heavy concentration on developing services that will enable consumers to lodge their applications through mobile devices and to enquire about their progress. This is in addition to the regular types of licenses and certificates which are issued by the Council; these will also be applied for using the mobile technology.

This confirms that mobile technologies have their impact on the government by exhorting eGovernment implementation to another stage, the ubiquity stage, where mobile services are rendered and utilised by end users, as previously discussed in Chapter 1.

8.2.3. Case Study 3: Council C

8.2.3.1. The Council's current electronic services

Although there are many electronic services (n=55) rendered by the Council, the real understanding of the business process has not been given much attention; and accordingly internal processes have remained obscure and misunderstood, according to the interviewee. This mainly returns to the desire of applying the technology (because it is there) without understanding what the consumers practically need. Since they were initiated three years ago, the major eServices actually used revolve around debtor payments, and lodgement and tracking of certificates online.

In the next five years, the Council will be providing a closed circuit television as a service that is electronically sourced, in the centre of 'C' City. There will also be another eService that relates to the Council's assets management. The Council's assets are valued to be around $3 billion with an annual budget of $150 million. In order to cover the maintenance costs and even draw a greater return on investment of those assets, an eService, as a part of the major strategic asset management process, utilising bar-coding/RFID and geospatial capture of assets, will be provided.

8.2.3.2. The Council's current mobile services

Council C commenced using mobile technology in its internal processes nearly five years ago, but last year the Council achieved a great success in a trial to use PDAs as remote working devices for mapping street trees using geospatial special coordinates. The result was mapping over 8,000 trees on public streets. It was essential in terms of planning an asset renewal program for those trees so that there is a green canopy in the city. Forty years ago, the greenery could be seen only in people's properties, but now 'C' City probably has 300% to 400% more street trees than it had 40 years ago. Accordingly mobile technology was a real success in assisting to protect the micro-environment.

Thus, it can be confirmed that mobile government is really having an impact through the geospatial understanding of streets and the Council's local communities. As another example if there is problem such as burst water main pipe, the local community will expect a prompt action by the Council even if the required truck crew are on another job, or moving to do another job. To solve the problem quickly in such a situation, the council must detect a close-by truck which may then be directed to the location of the emergency.

Currently, there are 18 different mServices rendered by the Council; Meals on Wheels is considered the most commonly used, whereas the rest are occasionally used. Accordingly, mobile services, within the Council's communities, are critical to what the Council currently offers from the static facilities.

8.2.3.3. Impact of mobile technology on the Council's internal and external operations

The application of mobile technologies in the Council has various effects on the internal processes. For example, office running costs will increase in the short term because of the lack of expertise in properly maintaining and running an effective mobile office. Therefore, the costs of providing information to the public will increase; information availability though will compensate for the rise, side by side with the reduced times and costs of processing and completing transactions.

On the other hand, the opportunities for staff to work more flexibly will increase. In turn, the requirements for office space will decrease.

In regards to the service quality, Council C cautiously presumes that it will increase when using mobile technology taking into consideration other quality factors such as well-trained staff who understand the business processes. Mobile technology will definitely enable public take-up and access of information and services, and hence more people will be served in less time.

8.2.3.4. Problems in using the mobile technologies

As mentioned before, understanding the business processes is crucial before applying mobile technology. The currently rendered mServices are not all used as expected, merely because the business processes were not fully understood. In addition, mobile services are complementary to electronic services, thus when a service that used to be rendered over the counter is now provided by mobile technology, the potential for certain categories of consumers, such as elderly

people, to lose information is great. Young people in this case will be able to effectively use the new mService, while the elderly, especially if they are from non-English speaking background, are more unlikely to effectively use it.

Subsequently, knowing how those people will use the mobile service is the first step to understand the business processes. In other words, the use of mobile service is linked to the need to such service; once this need becomes known the business process at the back office will then start in the right direction.

8.2.3.5. The Council's opinion about mService success factors

The interviewee stated that understanding the business processes is an essential success factor for mServices; this is in addition to understanding how people perceive them. So, before investing in mobile technology for citizens, it is very constructive to know how mServices will be used by them.

Although the interviewee mentioned only two success factors, they are still considered core factors since they cover activities of both back and front offices, and their practical interpretation would necessitate detailed analysis of these activities.

8.2.3.6. Plans for further mobile technology use

Paperless record management has been the aim of Council C for the last three years. Currently all transactions records are digital. There are other records in hard copies stacked in two floors in one of the Council's buildings, and the aim is to digitalise them in the following years. Certain data from mobile services are digital, so storing them will not be difficult but it will be time consuming. Hence,

further use of mobile technology will be hindered by an administrative task such as storing the data.

On the other hand, the Council, according to the interviewee, will draw the line where the use of mobile technologies should stop. Staff members are humans and they should not be accessible after hours as they should enjoy their privacy and family life, and this may constrain the essence of mobile use which enables accessibility and flexibility to the services all the time. The Council will try to automate the mobile services in order to minimise the need for the human interaction especially after hours.

At the end of Stage 1, the interview data within each transcript were grouped by their questions before importation into NVivo. When imported into NVivo, these questions formed section headings within NVivo allowing data from the three interviews pertaining to each question to be collated together. The purpose of this process was to link the answers to any given question in the interview allowing the researcher to effortlessly scan through the interview data in relation to any question and highlight the differences.

8.3. Stage 2: Open Coding

At this stage, and following coding answers to questions, data were analysed line-by-line in order to extract every possible piece of information; this is open coding. Subsequently, as shown in Table 1 and Figure 1, fifty-three free nodes were extracted from the three data sets. Because not all questions were directly answered by the interviewees, there was an ample amount of data with a variety of free nodes.

For example, in discussing the mService success factors, one interviewee considered having an internal strategy that deals with cultural change and heightens peoples' awareness as vital, whilst another interviewee viewed, and stressed, the internal business processes that discern end user's needs as crucial for mServices. During the interviews, the researcher realised that both interviewees meant the same thing but expressed it differently, and this cannot be obtained through quantitative methods. The result was not only the question's answer, but an abundance of extra information such as the flexibility that staff members gain from working outside their offices when using mobile technology. These pieces of information were very beneficial in sorting out the free nodes into tree nodes.

Both Stage 1 and 2 represent the computerisation of the qualitative analysis.

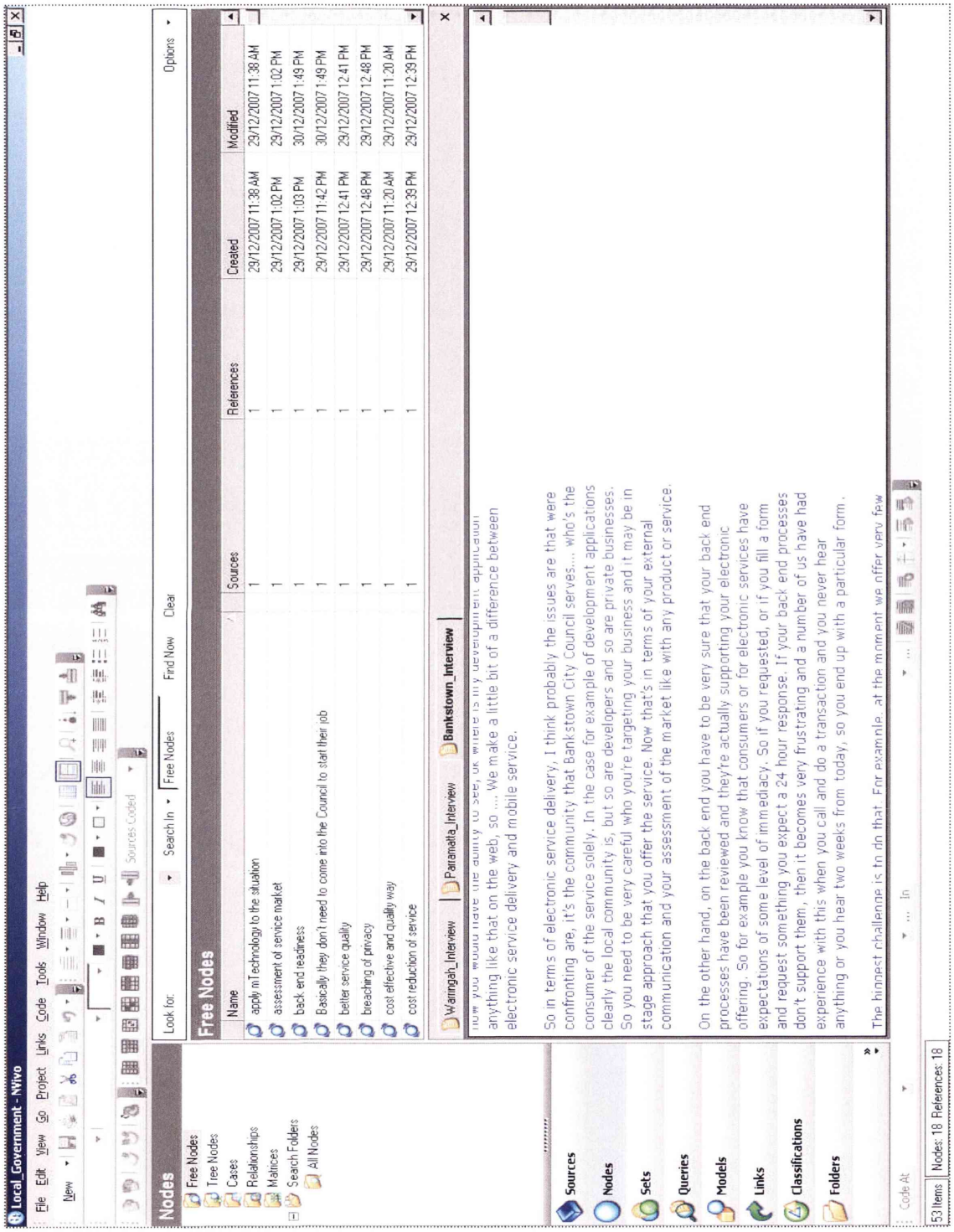


Figure 8–1: Open coding interpreted in free nodes

8.4. Stage 3: Selective Coding

The advantage of selective coding is that the researcher may focus on the analysis of one core variable with all the conditions and consequences that relate to it, but still within the total context developed during open coding (Glaser 1978). The selective coding begins when the researcher moves from running the data open to delimiting the coding process around a core category (Glaser 1978).

The result of the selective coding was five core categories representing the interpretive themes that dominated the thoughts of the interviewed local councils' officials. These five themes as per Table 8-1 categorized all the free nodes that resulted from the open coding in the previous stage. As mentioned in Section 4.4.3 in regards to the study's reliability, the researcher included the interviewees' direct or verbatim quotes in the free nodes; they are edited, though, using the researcher's personal memos taken during the interviews. Included in square brackets are the researcher's words in order to clarify the meaning of each phrase.

Tree Nodes	Free Nodes
1. Cautions & Recommendations	apply mTechnology to the [particular] situation
	breaching of privacy [should be avoided]
	cost effective and quality way [are highly recommended]
	cultural change [must be considered]
	lack of infrastructure [as a hindrance to mService project]
	not all data are easily accessible electronically
	only young people who are able to effectively use mTechnology [compared to old people's potential]
	people [staff] tend to be on duty longer [as a result of using mICT]
	size of the documents [should be considered when enabling filling in forms or downloading using mobile devices]

	technology uptake by customers [since they have to be informed and trained before using any mService]
	The people that actually do the work are not very computer literate [staff should be trained in this regard]
	Then their [end users'] needs [have] to be [of] very effective timing
	there's no real point in trying to do everything at once [proficient and thorough planning]
	there's the potential to get better access than maybe older people who are from a non English speaking background
	to move across to a .NET environment [for more and new application facilities]
	we don't have the technology to properly maintain an effective mobile office
	you get to take your work home [and this has to be controlled]
2. Conditions of success	assessment of service market
	back end readiness
	defining the service consumer
	getting supporting technology
	good understanding of business processes
	it's necessary to work out what the end user needs and then work out how
	need to invest in time management and training
	need to really have a process documented from beginning to end
	well trained staff
	What are the objectives and benefits we're trying to achieve for the consumer of the services that we offer
	working out what business processes
3. End-user's benefits	better service quality
	cost reductions
	improving information access
	Improving response times and productivity
	the quality of the services would increase
	they can actually access services out of hours
4. Staff-member benefits	Basically they don't need to come into the Council to start their job
	decrease service rendering time
	free up desk space
	free up office space
	Improving response times and productivity

	improving service delivery and also in income areas
	it allows you to serve more people
	less errors
	to serve more customers more quickly
5. Successful mService Characteristics	accessibility
	accountability
	public awareness
	to boost transparency
	To enable residents to actually access more of the information services

Table 8-1: Free nodes assigned to tree nodes

Referring to Section 6.4 in which the experts suggested an mService success mix that contained three categories: Organisational, Technical and Social, Table 8-1's five categories (tree nodes) give more real-life cast to those suggestions. For example, one of the expert organisational suggestions was that "user-centric policy has to be implemented BEFORE taking any action or project", whereas the local councils consider "it's necessary to work out what the end user needs and then work out how" after "defining the service consumer", which necessitates "working out what business processes" are.

Similarly, the details (free nodes) of each of these five categories can be synthesised to interpret what the experts have suggested as mServices success factors. Additionally, these details confirm some of the end user's benefits deduced from the literature review and approved through the end user's survey, such as cost reduction for available and accessible mServices, indicating the integration between the results obtained from the three data collecting methods. Further discussion in Chapter 9 will use these five categories in conjunction with end user's survey results to draw the final outcomes of this study.

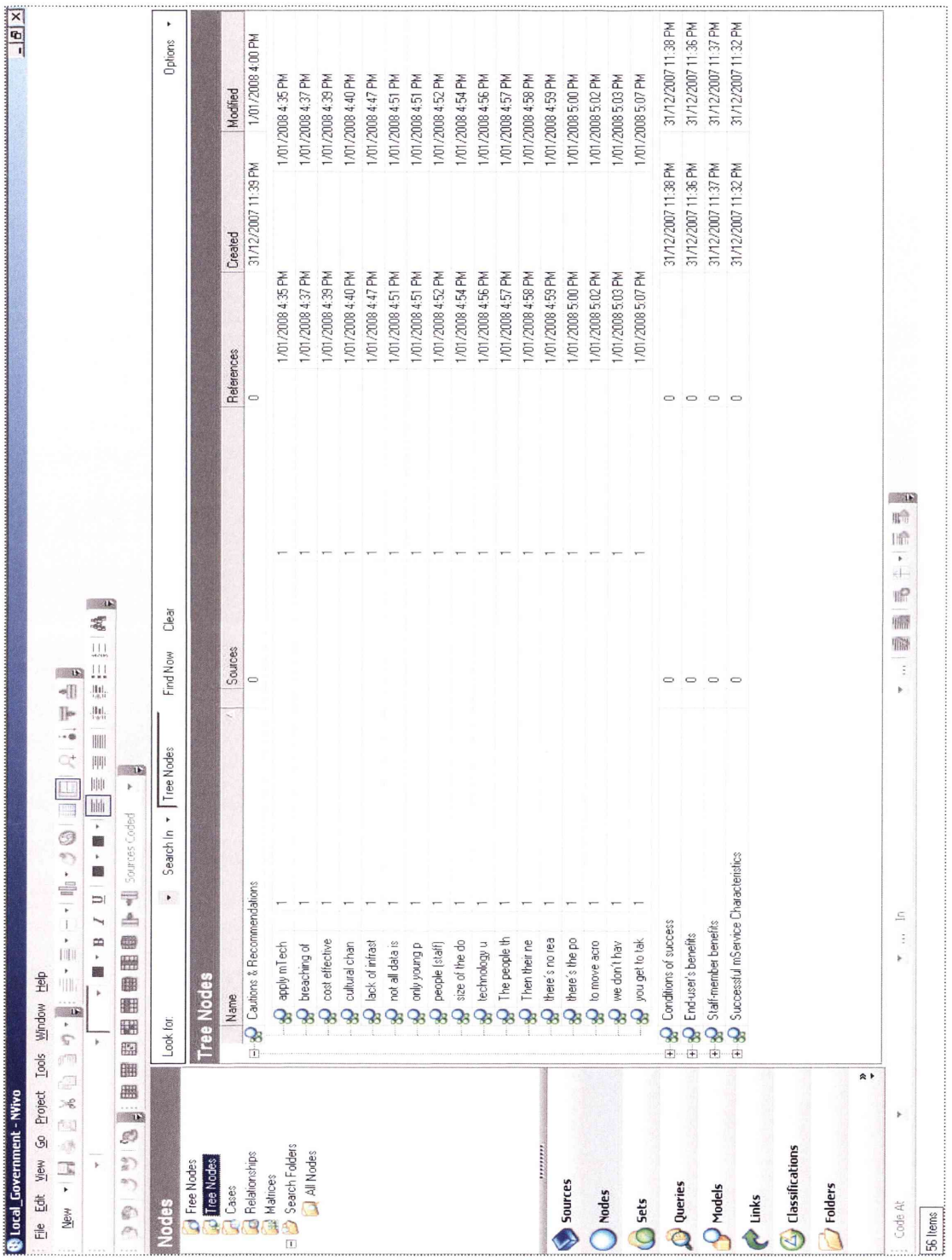


Figure 8-2: Selective coding interpreted in tree nodes

8.5. Chapter Review

This chapter discussed and analysed the results of three local government case studies. Council A, Council B and Council C were selected to undergo this study as they attempted implementing mobile technologies, although it was on a small scale with limited number of services.

Each council representative expressed the Council's views towards current electronic and mobile services in regards to the number, quality and future development of those services, in addition to the impact, whether positive or negative, of mobile technologies on the council's internal and external operations. Furthermore, problems in using mobile technologies and ways and suggestions to overcome them were also explicated by the interviewed councils' officials. Interviews also handled the councils' opinions about mService success factors in detail.

All questions in the interview were amply answered, adding more detail not only around the topic of the question but also about some other internal processes or services rendered by the council. This abundance of data enriched the derived information about each council's case study.

The general qualitative analysis about the three councils concluded this chapter by deriving five core categories representing the interpretive themes that dominated the thoughts of the interviewed local councils' officials. These categories are tree nodes that contain independent nodes construed from the interviews data.

The following chapter is the final one, in which the analysed data, qualitative and quantitative, from this chapter and previous chapters are collated and combined to present the final findings of this study, where conclusions, limitations of the study and further research are all discussed.

CHAPTER 9

9. Outcomes & Conclusions

This chapter concludes this thesis by addressing the main contributions of this research and relating them to the research questions which were stated in Chapter 3. It then outlines the research outcomes and delves into their theoretical and practical implications. Finally, it highlights the strengths of this research, and then discusses the research limitations and further future work. Unlike previous chapters, this chapter does not have its own chapter review section since it summarises, reviews, and concludes this thesis.

9.1. Overview of the Study

Mobile technologies, by their pervasive and powerful existence, are inevitably changing people's lifestyles as people become contactable at all times. Mobile

devices are becoming indispensable tools of verbal and data communication at present, and will be even more essential to the following generations.

Governments are able to exploit the ubiquitous nature of mobile technologies in order to maintain their contact with their constituents. Mobile technologies enable the citizens, businesses and government officials to effectively and efficiently access, manipulate and accomplish their needs through the rendered mobile services from anywhere, at any time.

The success of mobile technologies in achieving communication among people is not necessarily a condition for success of government services offered via the mobile technologies, simply because these mobile services are not provided only for communication. Thus, in order for governments to offer acceptable and attainable mobile services, these services have to be successful. The preliminary question that provoked this study was what is a successful government mobile service, or how can it be successful? As government mobile services are a new field of work and research, there is a minimal amount of research and literature that could assist in discerning the success factors of such services. As a result, constructivist interpretive exploratory type of research that involved a literature review of previous work on electronic government services, surveys and case studies, was considered essential.

As mentioned in Chapter 3, the literature review revealed a diversity of factors, which contributed to the success of electronic services and their newly born mobile services. Several perspectives could be detected by classifying or categorising these factors; for example, financial, administrative, social and technological. It seemed that the end-user's perspective was the least considered

by researchers and practitioners when contemplating factors of mobile service success.

The absence of a profound end-user's perspective represented a gap that started emerging and becoming more pronounced especially after conducting the experts' survey, which highlighted many factors that pertained to the mobile end user. Both literature review and experts' survey enabled devising MPE²M-mG from which EUSM was derived, which represented the theoretical ground for the end user's survey, as illustrated in Figure 9-1.

Subsequently, the researcher's stance was to adopt end-user's perspective towards mServices and thoroughly analyse it to its most minute possible detail through the end-user's survey.

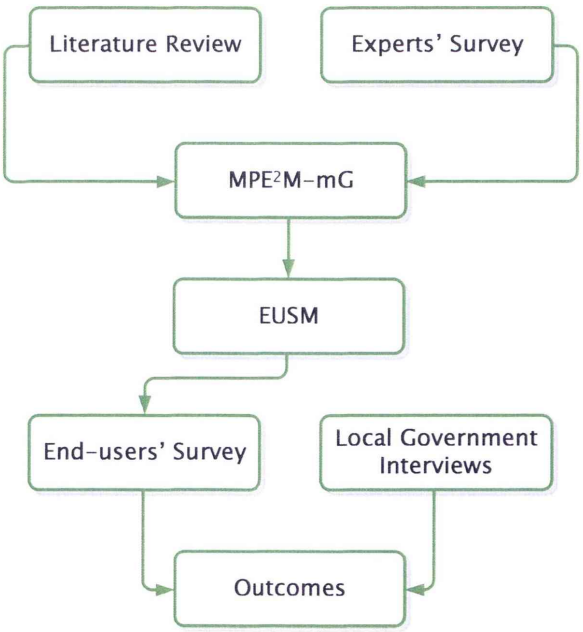


Figure 9-1: Research workflow outlook

On the other hand, in order to build a realistic picture about the practical rendering of mobile services in local governments, if there were any, and how effective these services are, or should be, three local councils were selected for case study.

Being a constructivist research, outcomes were accumulated to form this chapter.

9.2. Research Question

This study aimed to find out what factors or reasons make, or will make, end users use their mobile devices to interact with a government department or a public agency to acquire a service. In order to achieve this aim, these factors were interpreted from two perspectives; the mGovernment service management, and the end user. From the perspective of mService management these factors are factors for effective mService and, accordingly, models for analysing mService effectiveness were devised. From the end user's perspective, those factors are the benefits which if, or when, satisfied as indicated or desired by the end user, mService would be considered effective.

Merging the two perspectives this study managed to answer the research main question, and fulfil its objective. The main research question outlined in Chapter 3 was: **What does 'successful government mobile service' mean to the end user?**

From the previous chapters, the answer to this question can be confidently stated as:

An effective mobile service will satisfy the end user's needs to the bounds of satisfaction. Once satisfaction is reached, the mService will become indispensable, or irreplaceable to the end user. This is the point where the objective of the study is achieved; the ubiquitous provision of government's services through mobile technologies.

This answer was reached from the compound results of the experts' survey, end-users' survey and case studies through the research process which is summarised in the following three sections:

9.2.1. Narrowing the research focus

As a research field, mobile government service is both enormous, and fertile due to its novelty. Subsequently, thousands of topics can be researched and studied about mService; one of them is mService effectiveness.

In order to pinpoint the research problem, the mGovernment theoretical management framework was formed as a result of an extensive and pensive literature study, which was mentioned in Section 3.7. Through this framework, which, as thoroughly as possible, places and depicts the main components of mGovernment management, effectiveness was defined as the relationship between inputs and outcomes of the management process of mService provision project. This is the management perspective.

Outcomes are the benefits that beneficiaries or end users seek or aim to achieve as goals from using or utilising mService. This is the end user's perspective.

In order to create an effective mService that satisfies the end user's needs, both of mService effectiveness and end user's needs or benefits had to be thoroughly analysed.

9.2.2. mService effectiveness analysis

mService effectiveness is also a large topic that could easily involve multiple perspectives in regards to its definition and the way it is evaluated or measured, as mentioned in Section 7.2.1. In order to narrow the focus of the study more to the end user's perspective, different effectiveness measurement approaches were studied. The outcomes were two tools: Multi-Perspective Effectiveness Evaluation Methodology for mGovernment (MPE^{2}M-mG), from which End User Satisfaction Analysis Model of mServices (EUSM) was derived.

As mentioned in Section 7.2.2, MPE^{2}M-mG was the result of combining the Adaptive Management Approach (AMA), the Goal/Question/Metric (GQM), and the Balanced Scorecard Approach (BSA). BSA yielded four perspectives to consider in order to obtain an overall effectiveness evaluation: customer (citizen & business) perspective, operational / internal business process perspective, innovation / learning perspective, and financial / economic perspective.

The customer (citizen & business) perspective was further extracted to form EUSM, as mentioned in Section 7.3, where mobile end user's benefits were classified into four categories: Value for Money, Quality of Service, Efficient Transactions and Strategic Data. These four categories represented the main constructs contained sixteen indicators on which end-user's data collection and analysis were based. A web-based survey was the method used to collect the

data, which were quantitatively and qualitatively analysed, using SPSS and nVivo respectively.

9.2.3. Defining end user's needs

Defining end user's needs and classifying them into four categories passed through two stages. A literature review was the initial step which provided a solid understanding of what mobile users from different fields, e.g. mCommerce, mEducation and mTourism, really wanted from using those relevant mobile services. This was in addition to reviewing what other researchers have said in regards to end users' needs in other fields such as IT, IS and Networking.

By aligning both literature review findings with data extracted from the experts' survey as the second step, the author was able to decide on the items of both the conceptual and operational levels in the GQM measurement tool. As mentioned earlier in Section 7.3.2 end users' benefits are in fact seamlessly interrelated and cannot be significantly separated from each other. Value for money is gained when there is quality of service and efficient transactions rendered. In order to define and analyse these goals or benefits, they were thus classified into four categories with sixteen indicators in order to evaluate and finalise what constitutes an end user's satisfaction level.

9.3. Research Contributions

This research provided a number of original and significant contributions in this novel field of mobile government services. Some of these contributions have never existed or been proposed before, such as mGovernment theoretical

management framework, and the devised effectiveness evaluation tools. Other contributions were the results of collecting fragmented pieces of information that were provided by other researchers, to provide a comprehensive mGovernment evolution history. Although all the following contributions were previously mentioned in their relevant chapters, the next sections synthesise and highlight them.

9.3.1. Comprehensive mGovernment evolution review

The literature review chronologically presented the evolution of mGovernment starting with the emergence of eGovernment. The five transforming eGovernment stages and their types from which mGovernment, as a subset, have transpired were thoroughly discussed. The researcher contributed by identifying a new sixth stage, ubiquity (El-Kiki & Lawrence 2007b), to the mGovernment evolution process in order to take into account the massive expansion and effects of wireless and mobile technologies in the past 3 years as detailed in Chapter 2.

In order for mGovernment services to perform the roles which spring from its mission and vision, the relationship, or partnership, with all the constituents was determined, leading to the definition of mGovernment dimensions which was initiated by other researchers (Lallana 2004a; Zálešák 2003). Subsequently, this was followed by detailed discussion about the pressures leading to the adoption of mGovernment services.

This contribution collated most of what was written about mGovernment emergence in an orderly and sequential manner, besides emphasising the concept of ubiquity (El-Kiki 2006) to its evolution process.

9.3.2. mGovernment theoretical management framework

The outcome of the previous point was another graphically depicted contribution; the mGovernment theoretical management framework, which paved the way for the location of the research problem.

This framework comprises most of the functions that are needed to detail the processes of mService project initiatives. It also shows the type of relationship between mGovernment dimensions and its constituents who utilise the produced mServices.

Such a framework has not existed before, and it should enable further research into this new field of knowledge.

9.3.3. Multi-Perspective Effectiveness Evaluation Methodology for mGovernment (MPE²M-mG)

Due to the multitude of perspectives from which mService effectiveness can be viewed and evaluated, it was natural for the researcher to seek a method that assists in evaluating mService effectiveness without being subjectively involved.

MPE²M-mG is the outcome of combining the three approaches AMA, GQM, and BSA, as mentioned above in Section 9.2.2, where each approach has its specific functions. AMA is a formal, systematic and rigorous approach to learning from the outcomes of management actions, accommodating change and improving management. It involves synthesizing existing knowledge, exploring alternative actions, and making explicit forecasts about their outcomes. GQM defines a certain goal, refines this goal into questions, and defines metrics that should

provide the information to answer these questions. By answering the questions, the measured data defines the goals operationally, and can be analysed to identify whether or not the goals are attained. BSA is another framework for measuring and evaluating performance from a management system perspective. It is meant to be a management system, (and not only a measurement system), to provide feedback around both the internal business processes and external outcomes in order to continuously improve strategic performance and results.

The usefulness of MPE²M-mG lies in its flexibility, as one or more perspectives can be focused on for a specific study utilising the three approaches simultaneously.

9.3.4. mService success factors

mService success factors are those factors which facilitate for the adoption and diffusion of government mobile services as discussed in earlier chapters. In the following sections these factors are categorised and summarised:

9.3.5. Organisational success factors

The following mService organisational success factors are derived from Section 6.4.2:

1. Creating a framework that will:

    a. Allow various organisations, administrations or agencies to participate in the process of mService production.

b. Ensure confidence and prevent threats internally within the government.

c. Enable highlighting the organisational changes necessary for the new mGovernment as an mService provider.

d. Facilitate sharing mechanisms across local, state and federal agencies.

e. Arrange reliable financial resources for any suggested mService project.

2. Involving employees, from different departments, in the process of planning, decision making and implementation of mService initiatives. This will ensure the organisational integrity and reduce any resistance to the introduction of mGovernment services.

3. Involving end users in the mService initiative by genuinely realizing their needs, motives, fears, hopes and their abilities to use the mServices through active customer (citizen) relationship management (CRM) before taking any action in the implementation process. This reflects and emphasises the significance of the inevitable adoption of a user-centric policy that gives end users the first priority when making decisions in their regard, ensuring effective sharing of information across organisational boundaries with consistent and reliable customer service.

4. Avoiding communicating 'mobile' as something special, rather it should be presented as a new feature for an existing government service, which is indeed significant especially when there is a need for quick results.

9.3.5.1. Technical success factors

Extracted mService technical success factors in this study are considered the least in number compared to organisational and social suggestions, which might reflect the low weight of the technical aspect in a new mobile service project.

Since a few technical suggestions were mentioned in Section 6.4.4, what is preferred to be highlighted at this point is what Clarke (2003) explained as to design for all. This is applied by extracting and learning the enormous variety of the end user's characteristics and requirements in order that the technical efforts satisfy the greatest number of mobile users possible; not to design a system as a response to technical problems.

9.3.5.2. Social success factors

Social success factors revolve around satisfying the end user's needs which involves sixteen items, as mentioned in Section 7.3.2. These items are summarised in the following points with words underlined connoting each factor:

1. **Pricing**: mService as a newly developed type of service must be sensitively priced in that way which enables covering its delivery costs, and is affordable for any class of a society to utilise it and to maintain a standardised level of its quality.

2. **Content**: mService content must be relevant to the region, culture and language of its end users, in order to initiate, create and maintain relatedness to that mobile service.

3. **Awareness**: mService awareness involves end-users' knowledge and information about the existence of the service, what it does, how it is relevant to them, and how it can be accessed and utilised; community awareness and training programs are two methods to achieve all these.

4. **Accessibility**: mService has to be appropriately designed to be accessible and exploitable by any user including the disabled 24/7/365.

5. **Availability**: mService must be available on demand and without interruption especially when the mobile user changes location.

6. **Reliability**: when mService is able to perform the promised service dependably, accurately, and consistently with the least possible probability of failure, then it is considered reliable and sustainable.

7. **Accuracy**: when mService is able to offer the promised service with a minimal error possible, then it is considered accurate.

8. **Responsiveness**: the speed of manipulating mService requests, browsing pages, achieving commands and displaying acknowledgements - makes mService responsive.

9. **Courtesy & Helpfulness**: they are the behavioural attitudes of mService providers towards mobile users.

10. **Usability**: mService simplicity of use decides its usability particularly when having to use mobile devices with small screen real estate and awkward input procedures.

11. **Timeliness**: mService timeliness is when the service is delivered on the expected or promised time, which, in fact, is crucial in the mGovernment to citizen relationship (mG2C) especially when it comes to the national security, for example when a police notification of possible terrorist attack is sent to the general public via SMS.

12. **Trust**: Trust in mService is the willingness of end users to be susceptible to the actions of the government's unmonitored or controlled service provider based on the expectation that the latter will perform a particular action to the former.

13. **Privacy**: mServices must be able to protect its user's personal information. Confidentiality is crucial although this information has to be known to the government for emergency and security services.

14. **Security**: mService security is a combination of business, management and technical measures on an ongoing basis in order to protect the strategic data, such as mobile voting records, from intrusion, collection or dissemination.

15. **Accountability**: mService, in a democratic state, has to provide a means through which its government providers become reachable and accountable to the mService end users.

16. **Transparency**: mService has to enable openness of decisions and actions taken by civil servants to its end users to understand how government decisions are made.

9.3.5.3. End user's profile as a success factor

One of the factors that will affect the adoption on the individual level of use (or micro-level) of mService is realising the characteristics of the end users'; i.e. those characteristics of mobile end users which should be taken in consideration when initiating an activity that relates to the mService such as education and training, and advertising campaign. From Section 7.4.1.7, it can be stated that end user's profession type, income level, knowledge about mService, and interest in mService are all characteristics that would influence the end user to utilise the mService. Other characteristics such as gender, age range, level of education, mobile device usage skills, or mobile device usage duration will have a lesser effect on the adoption of mServices. Diffusion (macro-level) of mService occurs when it becomes publicly utilized as a second and natural step after the adoption.

9.3.6. Local government perspectives about mServices

From Section 8.5.3, the following outcomes are summarised reflecting the perspectives of local government regarding the implementation of mService:

9.3.6.1. Cautions and recommendations

Mobile technology should be applied according to the desire or urge for each service. For example, services that necessitate promptness, such as emergencies or safety and security imperatives, are given priority over other services. This will accordingly rationalise the use of the available resources. On the other hand, when putting mService into practice it should be realised that young people who are able to effectively use mTechnology are expected to be the majority of users.

Older people, especially those who are from a non-English speaking background, could be expected to join as mobile end users after providing them with sufficient information and training on mService; which is considered as a culture change for them. Cost-benefit analysis is essential in such case.

9.3.6.2. Conditions of success

For an mService project to be successful a detailed and documented business process has to be well prepared. The service consumer's objectives, needs and benefits should be well defined which assist in outlining the mService market. Back end (office) should be able to accommodate for the amount of work acquired by mService especially when it is first introduced, hence supporting technology is essential. Investments in time management and staff training are essential.

9.3.6.3. End-users' benefits

Mobile end users seek better service quality, cost reduction, improved information access at anytime, improved response times and more service productivity. The main reason of mentioning these few benefits at this point compared to what was mentioned in Section 9.3.4.3, is to show how little the local government officials thought about the end user's benefits and how much consideration end users usually get accordingly.

9.3.6.4. Staff-member benefits

Implementing mService will enable employees to work more freely, since they don't need to come to their offices before setting off to their field work. Accordingly, this will provide more desk and office space. As a result, more customers will be served, more quickly and more efficiently with fewer errors.

9.3.6.5. Successful mService Characteristics

For mService to be successful information should be accessible by the public who should be aware of its existence. mService should boost accountability and transparency. Once again, these few characteristics of successful mService, compared to all success factors mentioned above in Section 9.3.4, reflect the amount of knowledge the interviewed local government officials have about mService success factors and highlights the significance of this study as explained in Section 9.5.1.

9.4. Research Implications

Mobile services have an enormous potential to be one of the government's most effective tools to rule, control, and to provide peace and justice. This study endeavoured to analyse how effective these services can be from the stance of the end user. It extracted various factors for mService success which can be adopted by any government service provider when designing or re-designing a new mobile service.

9.4.1. Theoretical Implications

This research has made a theoretical contribution to the existing understanding of mobile service success factors. It focused on end users' needs as the basis of the model on which mService is built and customised. The developed theoretical model of mGovernment service process management created a research environment within which more research can be triggered and launched.

9.4.2. Practical Implications

The research provides mService providers with a practical and communicable checklist of contextual and conditional factors, which are seamlessly integrated, that cover the end user's perspectives which should be considered as the cornerstone for any mService project.

It also specifically itemises the barriers or inhibitors to the success of mService project by offering the "success mix", as mentioned in Section 6.4, which consists of three main contextual categories; organisational, technical and social. This mix can be adopted, outlined and detailed as a guide for any mService project.

The end-users' survey showed that "trust", besides other factors, is one of the most significant elements contributing in the success or failure of a mobile service project as mentioned in Section 7.4.2.5. mService project managers should think about any proposed service as a channel for building and putting trust in the mService providers (government or public sector).

9.5. Research Strengths

9.5.1. Significance

There have been a very few academic papers which handled directly or indirectly the end user's interests and goals regarding utilising mobile services. This research contributes with its comprehensive study to enrich the available literature.

On one hand, although the researcher could not specify the transferability of the results, this study can still provide adequate information to help other researchers determine whether the findings are applicable to a new situation. On the other hand, it should be confirmed that the research results are not confined to the Australian society or public, they rather apply to any human community since it studied the end users' generic needs for mobile service, regardless of the language or culture. This is supported through the use of triangulation, which combines both qualitative and quantitative methods together to conciliate the generalisability limitations that naturally result from the qualitative methods; which is the case in this research.

Moreover, this study represents a detailed guideline for mService providers, as mentioned earlier, which they can follow and apply according to the real scenarios of their services.

9.5.2. Sound and relevant theoretical philosophy

The philosophy of this research is based on constructionism as its epistemology which includes methods based on interpretivism as its main theoretical paradigm as revealed in Chapter 4. This philosophy aims to transform believed things into known things, or doxa to episteme i.e. to arrive at 'true' cognition which is constructed by human beings through their engagement with the real world (Burrell & Morgan 1979; Niehaves 2005).

Accordingly, in order to study success factors (which are the meaning or truth) of mServices (which is the object), they had to be associated to mGovernment constituents (who are the subjects; the human beings), or, in particular, end users who were defined in Section 7.3.1. mService as an object implies every particle that participates in producing it such as procedures, applications and used mobile devices which are (to be) experienced by the subjects, we; the human beings in our real world.

Because the nature of this research tended to be more towards subjectivist orientation; interpretivist approach meant that the researcher was after explanation and meanings within the realm of individual consciousness and subjectivity in the context of the use of mobile services.

Descriptive exploratory was adopted as the research methodology, which allows for a theoretical perspective to be expounded in the conceptual framework guiding the research process. The purpose of this methodology is to intensively investigate the phenomenon, success or failure of mService projects, in order to find patterns and themes since the researcher has raised specific questions about

the factors that control or affect the success or failure of these projects from the perspective of their end users.

9.5.3. Rigour and quality of the research

In order to corroborate the quality of this research outcomes and conclusions, a number of factors were taken into consideration at the early stages of research design. These factors return to the nature of the qualitative methods and epistemological assumptions of this interpretivist study. Accordingly a quality verification method was synthesised from a diversity of quality terms and dimensions, which were set by other scholars and researchers, into guidelines to verify the rigour and quality of this research as revealed in Section 4.4.

Through those guidelines, there was an ample number of measures which checked eight main dimensions of trustworthiness and rigour representing the quality evaluation for this research. For example, member checking when the researcher provided segments from the raw data to his doctoral cohort members for analysing, and also provided segments from the findings to the participants (researchers, government officials and some end users) in order to confirm the findings and make sure that this was what they really meant from their responses and interviews.

On the other hand, data collected from the end-user's survey were quantitatively analysed using SPSS® package, where a diversity of data were encountered and derived. The survey instrument validity and reliability were measured through the content and construct validity, and construct reliability calculations as mentioned in Section 7.4.3.

Lastly, the rigour and quality of this research are demonstrated in the way collected and analysed data, whether quantitative or qualitative, are communicated. This research is enriched with tables, illustrations, figures and screenshots, in addition to numerous examples for a better understanding (communicability) of the codification processes.

9.5.4. Impact value of this study

The impact of this study springs out of its uniqueness. Throughout the research process the researcher globally published several peer-reviewed papers about government mobile services, which directly contributed to this thesis. These publications attracted many researchers to request the researcher's cooperation in the same field to either participate with a chapter in an edited book, or co-write conference or journal papers. The impact of this study was also felt when other researchers started referring to the researcher's published work. The journal paper (Rossel, Finger & Misuraca 2006) is one example.

The impact of this study was also represented in the interest of the local governments in the results of this study which was very strong, especially when the researcher was requested to provide copies of this thesis when completed.

In addition, the results of this study are presented in such a way that can be understood by non-academics and, hence, be directly applied in practice.

9.6. Research Limitations

The limitations of this research can be summarised in the following points:

1. Due to focusing in this study on mService effectiveness evaluation from the perspective of the end user's, benefits, as one type of mService provision process outcomes, were researched and analysed. Meanwhile, risks, as a second type of outcomes were sectioned off. mService risks represent a very fertile topic which necessitates a separate comprehensive research.

2. Due to focusing on end users' benefits as outcomes, inputs, which are the myriad resources to the process of the mService provision process that create new opportunities and challenges, were also disregarded because they do not relate directly to the end user's needs and goals. Inputs are practically manipulated at the 'back office'. For mService providers to have a complete effectiveness assessment for their services, inputs must be analysed from three different and integrating perspectives: Operational/Internal Business, Innovation/Learning, and Financial/Economic. In fact, these are the three remaining perspectives in the MPE^{2}M-mG model, which, if completed, will enable a thorough comprehensive evaluation for any mService. Only efficient mService providers will have this effectiveness evaluation accomplished.

3. mService efficiency is a quantitative relationship between outputs and inputs. The researcher studied that relationship and concocted a new mathematical methodology which calculates efficiency of mServices as per Appendix A. Consequently, and because it does not directly relate to the end user's needs and benefits, it was removed from the research path.

4. The term "end user" combined both citizens and businesses together, whilst businesses may be studied separately as they have their own particular

needs from utilizing mServices which may totally differ from those of the citizens'. This was not seen as an issue in this particular research because mService is still in its infancy with very limited adoption and diffusion rates and separating businesses from citizens would not have affected the results of this study in any significant way.

5. Despite all the efforts done by the researcher to invite as many participants as possible in the end user's survey, the results of that survey were collected from a sample size of one hundred and eighty three (183) participants who represented both mService active and passive users.

9.7. Future Directions

This study is only one episode in a chain of research. Only one perspective from MPE²M-mG was used to examine the end user's needs. In order to draw a complete and thorough picture about mService effectiveness, the other three perspectives have to be scientifically investigated. Each perspective represents a complete study that deserves ample time to be properly completed.

On the other hand, mService efficiency has to be theoretically and empirically investigated. mService performance measurement as a further step necessitates both efficiency and effectiveness as core measurement criteria.

The researcher is intending, after having some rest, to continue studying these topics. In order for this to be done, he is intending to compose a research team whose members enjoy perseverance and eagerness for more knowledge about mServices; the services that pave the road to the government ubiquity.

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Appendix A:

Towards a Better Understanding of Efficiency in mGovernment Services

Abstract: - *The benefits, which can also be considered as incentives or drivers, of implementing mGovernment services, include increasing efficiency of government processing (back office) and services (front office). The focus of this study is on efficiency evaluation of mobile services (mServices) rendered by mGovernment, regardless of the type of the end-user, aimed at producing a simplified methodology that will assist in analysing and assessing efficiency. The paper outlines the authors' methodology that aims to evaluate the efficiency of the services rendered by mGovernment entities. It has been developed as follow-on to the generic management framework developed by the researchers to guide government in managing the adoption of wireless and mobile technologies for the implementation of mGovernment services.*

Key-words: mGovernment, efficiency, evaluation, mobile, services, management.

1. Introduction

The generic meaning of efficiency is that degree to which the goals have been reached, in relation to the means that have been applied. A process is considered 'efficient' if it requires relatively few inputs to produce a certain number of outputs. Efficiency in the public sector involves making best use of the resources available for the provision of public services (Gershon 2004, p. 58). The efficient government uses functions in such a way to minimise or avoid financial losses as well as time and resource wastage.

As with eGovernment, mGovernment helps improve efficiency in government. Information and communication technologies (ICTs) are a necessary enabler of reforms to the ways in which public administrations work. Improving internal operating systems - financial systems, purchasing and payment arrangements,

internal communications and sharing of information - and programme processing and delivery arrangements can generate operating efficiencies and improve performance (OECD 2003).

The focus of this study is on efficiency evaluation of mobile services (mServices) rendered by mGovernment, regardless of the type of the end-user, aimed at producing a simplified methodology that will assist in analysing and assessing efficiency. The authors have concentrated on mPayments as an example of an mGovernment service in light of the prediction by Wireless World Forum that by 2006 there will be more than 200 million regular mobile payment users spending a total of 47.2 billion Euros worldwide (Lallana 2004b).

2. Problem Formulation

2.1 Evaluating Efficiency in Mobile Government

In order to evaluate efficiency, both of the inputs and outputs have to be calculated as accurately as possible. Inputs are the resources that are provided by the mGovernment. Implementing these resources creates both opportunities and challenges. For example each instance of a monetary amount, human capital or tax deferral is considered an input once it is provided as a resource by the government. Although each input would, or could help to, create certain opportunities (such as more employment or the establishment of a small or medium size business (SME)) certain challenges would still be confronting such as the lack of institutional guidance or strategic thinking. On the other hand, outputs are the direct effects of mGovernment management processing such as an increased number of activities or services, or a better-educated workforce. Increasing the number of services or introducing a new service is viewed as the

response to the processing which can take the shape of change and/or innovation (El-Kiki, Lawrence & Steele 2005).

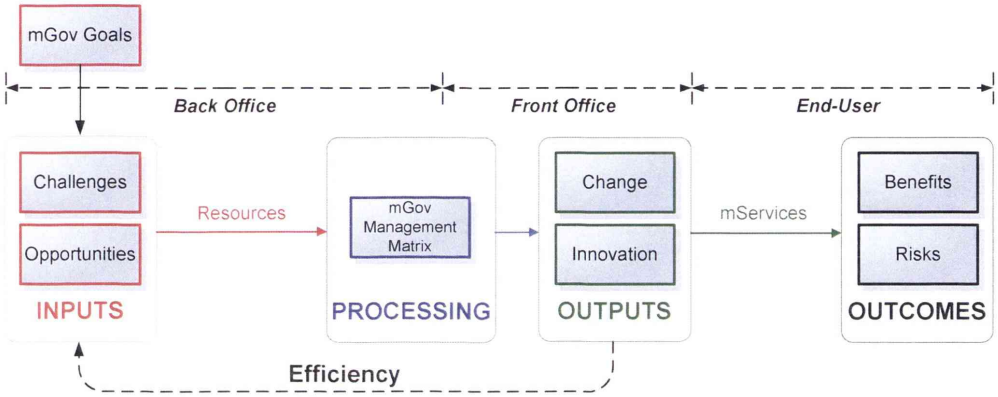

Figure A-1: Efficiency as a relation between inputs and outputs.

Source: Adapted from (El-Kiki, Lawrence & Steele 2005)

Inputs of the mGovernment are practically manipulated at the 'back office', whilst outputs are presented by the 'front office'. The mGovernment back office undertakes all the activities and processes in order to produce a service, such as finance, human resources, Information Technology (IT) support, facilities management, marketing and communications. Front office activities and processes cover the supply of a service to the end-user, who can be any of the mGovernment constituents, i.e. citizens, businesses or other government agencies.

Efficiency evaluation, as one of the elements used to measure-performance, covers all of the activities performed by both back and front offices to produce a service. Efficiency in service processing and service delivery should lead to cost benefits for both the administration and the end-user (IDA 2004). In their

technical report, Centeno et al (2004) state three trends in public needs for government services, namely needs related to:

- Service Provision,
- Service Delivery, and
- Service Access.

Examples of needs types for each trend are shown in the following table:

Back Office		Front Office
Service Provision	Service Delivery	Service Access
Personalized	Reliable	Easier
Pro-active	Simple	Faster
Cross-border	One-stop shop	Better

Table A-1: Three trends in public needs of government services

2.2 The Problem Definition

While both service provision and delivery are managed by the back office activities, service access is one of the tasks of the front office. These service needs yield benefits, such as personalized, reliable and easier service, which the end-user seeks and desires. A real challenge emerges when taking a benefit component such as service access, as an example, to derive outputs indicators and metrics. The difficulty is how to measure a 'better' or a 'faster' service, especially when outputs depend on collaborative input efforts, as discussed below.

In addition, for the sake of simplifying the idea of this study, not all the inputs or outputs, which contribute to the impact on the mService, are considered. Accordingly, the efficiency assessment product aims to provide an initial indication rather than an authoritative evaluation. Part 2 of the paper provides a background overview of measuring efficiency and part 3 outlines the methodology of the paper. Part 4 describes the mGovernment Efficiency Evaluation Methodology while the conclusion and future directions are contained in Part 5.

2.3 Background on Efficiency Measurement techniques

Measuring efficiency is one of the principal tools for improving mGovernment performance. Efficiency measurement has been handled from different perspectives and applied on many areas of the corporate and government activities. Economic, production, systemic, technical and administrative efficiencies are examples of the areas to which such measurements have been applied. Accordingly, different methods for efficiency measurement were created, adopted and adapted. Examples include the parametric method, which relies on econometric techniques, represented in Stochastic Frontier Analysis (SFA), and the non-parametric method, which uses mathematical programming techniques, to estimate distance functions known as Data Envelopment Analysis (DEA).

Many researchers, such as Cornwell, Schmidt and Sickles (1990), and Coelli, Rao & Battese (1998), have enhanced the theoretical and practical application of SFA model which sets up a frontier by taking in all the available data to estimate the cost function of a reasonably efficient firm. The function is then assumed to be

common to all firms to assist in the finding of inefficiency measures. The SFA model can be written as follows in Table A-2 (Sarafidis 2002):

Formula	Explanation		
$c_i = f(y_i;\beta) + w_i$	c_i represents the actual cost which can never be lower than the frontier cost in the absence of data errors.	w_i is the total observed residual,	where $f(y_i;\beta)$ represents the cost frontier
$w_i = v_i + u_i$	v_i is the statistical noise		u_i is the inefficiency term

Table A-2: SFA Formulae and Explanation. Source: (Sarafidis 2002)

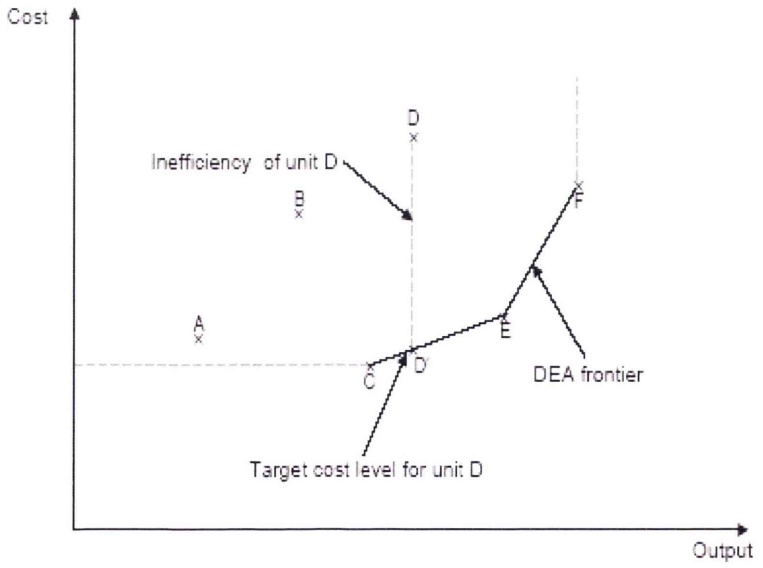

Figure A-2: Data Envelopment Analysis. Source: (Sarafidis 2002)

As this method uses maximum likelihood estimation, there is no guarantee that the final estimators will hold any desirable statistical properties (unbiasedness, efficiency, consistency) in small samples (Sarafidis 2002), which is currently the case of mGovernment services from the perspective of the government management. Practically, a few mobile services are rendered by the government and this may lie under the required sample size where inferences will become problematic as they are directly affected by the quality and nature of data, the number of explanatory variables and the estimation procedure used. Theoretically, SFA uses the half-normal and the exponential distributions which assume a large number of efficient units (mServices) and only a few of them are relatively inefficient, and this adds another objection for implementing this model (Sarafidis 2002).

Studies of service quality that adopted the Data Envelopment Analysis (DEA) method used both single-stage and two stage empirical approaches. The single-stage approach was implemented by Soteriou & Stavrinides (1997) to analyse the service quality of bank branches so theoretically it could be applied to mGovernment services such as mobile payments. Athanassopoulos (1997) used the two-stage approach as an enhancement for the single-stage to provide more explanation about why services are efficient. DEA computes a scalar measure of efficiency and determines efficient levels of inputs and outputs for the organizations under evaluation (Bowlin 1998). One major issue with DEA is that a unit can appear efficient simply because of its pattern of inputs and outputs and not because of any inherent efficiency (DEA Zone 2001).

Both the above measurement tools have drawbacks as described above. In Section three the authors outline the measurement tool called Goal/Question/Metric or

GQM which is used to measure the quality improvement of software development that they believe is particularly suited to the measure of the efficiency of the provision of mServices by mGovernment.

2.4 Study Methodology

This paper represents the next step in our study of the potential of mGovernment to provide efficient services to constituents of a state or country (El-Kiki, Lawrence & Steele 2005). The focus of our initial literature review concentrated on existing response models for mGovernment. Academic databases, mainly Proquest and Computer and Information Systems Abstracts (CSA), were consulted to search for papers that dealt with the impact and response of either ICT or wireless and mobile technologies on government. Kushchu and Borucki (2004) devised the Mobility Response Model; another useful framework for mobile government was developed by Goldstuck (2003) and the authors developed a generic framework in author (2005).

As mGovernment is a new area of research, there are very few completed studies so exploratory research is a legitimate methodology (Hussey & Hussey 1997). Such exploratory research assists in establishing the theoretical foundation for further examination and has been vital in developing a viable, theoretical framework as set out in our previous paper (Sekaran 2003) and which is further expanded in this paper.

It became apparent to the researchers that the measurement of efficiency for mGovernment services such as mobile payment (Mallat, Rossi & Tuunainen 2004), would be of vital importance if the delivery of such services is to be handled by

mobile devices which currently face such technical challenges as handover, roaming, dropout, lack of technical standards and security issues.

Our investigations revealed a third method called Goal/Question/Metric or GQM which is used to measure the quality improvement of software development. GQM defines a certain goal, refines this goal into questions, and defines metrics that should provide the information to answer these questions. By answering the questions, the measured data defines the goals operationally, and can be analysed to identify whether or not the goals are attained. This GQM defines metrics from a top-down perspective and analyses and interprets the measurement data bottom-up (Solingen & Berghout 1999, p. 23). The researchers found that this method would be suitable for adaptation for the measurement of efficiency of mGovernment services. Accordingly, in order to derive proper indicators and metrics we have developed an approach which is defined on the basis of GQM paradigm by Basili & Weiss (1984), as explained in part 4.

3. Problem Solution

3.1 Efficiency Evaluation Methodology applied to the supply of mGovernment Services

The researchers propose the following as suggested steps for a complete efficiency evaluation process for the supply of mGovernment services. Firstly, it is necessary to precisely define the evaluation objectives and the authors use, as an example, the provision of mobile payment for a government service as a typical mGovernment service. Table A-3 sets out specific objective examples for this

mGovernment service which can be strategic, managerial or operational as outlined in author (2005).

Strategic	Managerial	Operational
Determining the most feasible mix of the three ways to developing mobile payment infrastructure: bank-driven methods, mobile operator driven methods, and third-party driven methods (Rannu 2003).	Integrating mobile payment service as an additional facility with other mServices.	Implementing a mechanism that constitutes prima facie evidence of authorization (e.g., a dialled call) and authentication (NECCC 2001c).
Increasing cooperation between the government and the banks to generate more traffic for government mobile networks.	Addressing the regulations for mobile payments.	Improving quality of mobile payment service.
Developing scalable mobile applications that can absorb new standards and support models.	Revising the rules of mobile services charges to reduce costs to administration.	Improving security.

Table A-3: Examples of Efficiency Evaluation Objectives

The next step involves building indicators and metrics and this necessitates realizing and fulfilling the four requirements as set out in Table A-4. If there is an over proliferation of indicators, measurement has passed the point of diminishing return thereby negating its usefulness and becoming counter-productive. Measures should ideally be clear, focused and manageable within the capacities of those administering and using them (UN Expert Group 2003). A structured process for selecting inputs for government mobile payment

service and outputs indicators and metrics is essential, for ensuring that those selected will answer the questions that have been posed to fulfil the desired objectives at the previous step. Table A-4 summarizes some properties mentioned by Hatry (1999).

Indicator's Property	Meaning	Mobile Payment Service Indicator Examples
Representativeness	Indicator should address the scope of the objective question	As an example take the case of a person paying a parking fine to the local government authority (a mobile government service) via a mobile device - a reasonably common request by a constituent. A reliable output: after paying via SMS the constituent receives a receipt number on the mobile device. Feasible - yes. (Operational in Singapore) Uniqueness - unique receipt number.
Reliability	Indicator should not affect the final results for which it was used to deliver or extract	
Feasibility	Indicator should be practical, readily available, and cost effective within a specified time frame	
Uniqueness	Indicator should not be duplicated or overlaps with other indicators	

Table A-4: Indicators & Metrics Properties

Deriving efficiency indicators can be affected by certain constraints that may exist in the mGovernment three-organisational levels; strategic, managerial and operational. Table A-5 highlights some of these factors which have been adapted from CDLR (1997, p. 20):

Constraint	Explanation	mGovernment Service Implementation

Inadequate skills:	Specific skills are required for building efficiency indicators	Five essential skills are required as per LaVigne (2001): 1. analytical skills 2. information management skills 3. technical skills 4. communication and presentation skills 5. project management skills
Unsatisfactory goal-setting:	Strategic goals are not broken down to managerial objectives and operational tactics	Developing scalable mobile applications that can absorb new standards and support models are not satisfactorily detailed into the needed resources and how they will be managed.
Lack of cost information:	Costs (as inputs) in relation to outputs for certain mServices are difficult to establish as a result to miscommunication between different management departments	Maintenance cost per a constituent account in a mobile payment service may not be as accurate as it should be because of the unavailability of correct figures for the staff costs due to the application of a certain policy such as internal privacy.
Lack of interest from political assemblies:	Certain efficiency measurements could cause political problems when indicators show "undesirable" results	If mobile payment efficiency proved "low", this may lead to certain conflicts between the politicians and the managers of this public service.
Existing regulations:	Accounting, statistic regulations and established	Standards Australia has developed the mCommerce Committee: Responsible for Australian

	procedures for reports and control can be constraints to building indicators	representation on international m-Commerce standards setting bodies Contact point for other Standards Association committees on m-Commerce issues Oversees the work of its subcommittees Das (2005) ICMB2005

Table A-5: Factors Affecting building Efficiency Indicators. Source: CDLR (1997, p. 20)

In this step the authors devise Inputs and Outputs Indicators and Metrics Formation: Depending on the evaluation objectives at the previous step, indicators and metrics are decided for both inputs and outputs of an mService.

3.1.1. Inputs

Producing an mService necessitates collaborative efforts, such as labour, information infrastructure and stakeholder inputs to the numerous government planning activities. These inputs are processed by mGovernment management and its contractors producing the mServices, which yield the benefits to their end-users.

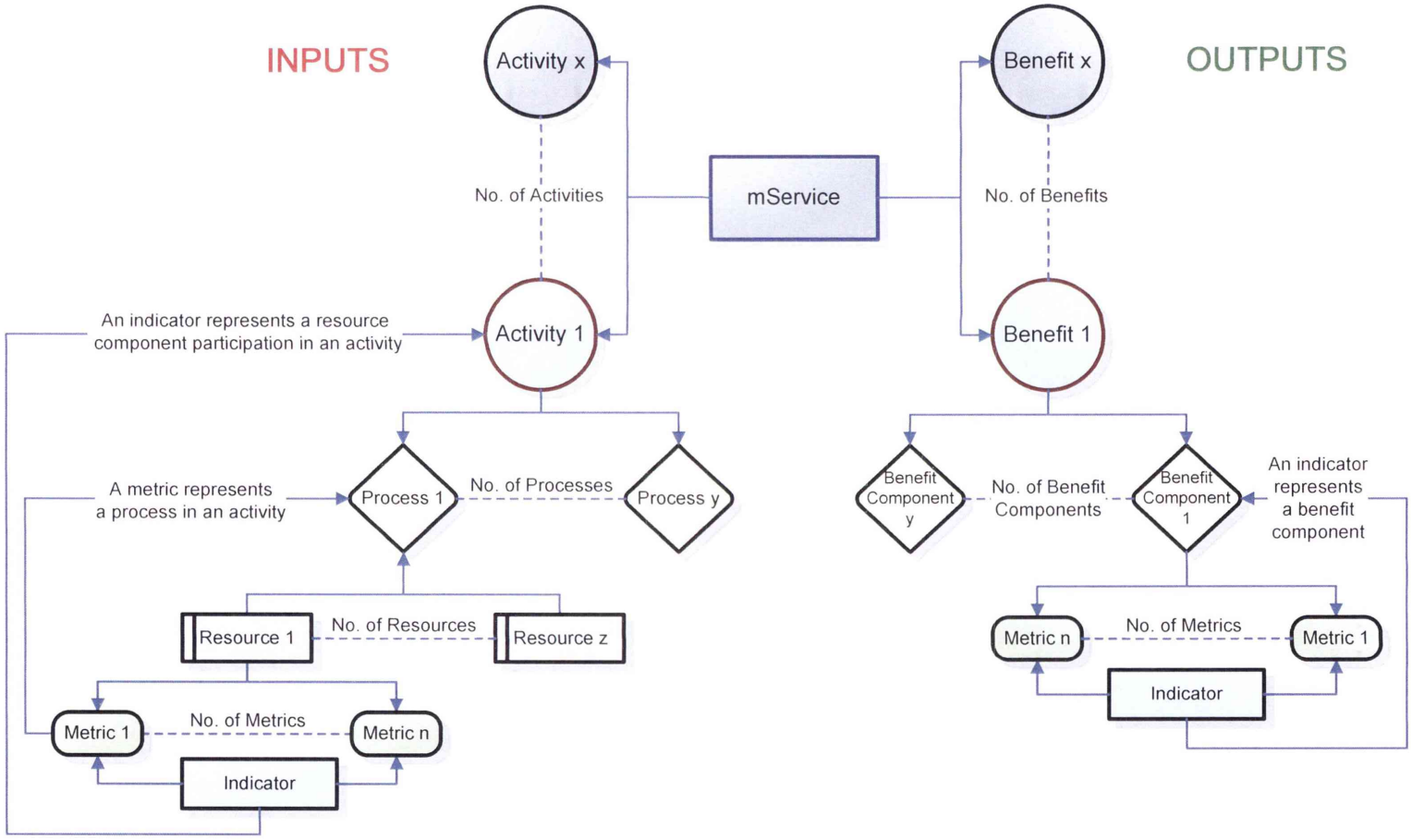

Figure A-3: Indicators and metrics of inputs and outputs of an mService

Hence, each mService is decomposed to a number of activities; each activity is considered a collection of processes which, if completed, accomplish the activity. For a process to be completed, a combination of resources is necessary. As shown in Figure A-3, for one activity each resource is considered an indicator which consists of a number of metrics representing different values of that resource. The result of using indicators and metrics will represent the cost variable of the inputs.

For example, if mobile payment service (mService *s*) consists of a number of activities $(a_1 ..a_{n-1})$, then for one activity such as activity a_1 to be completed, a number of resources is to be utilized and this may implement human, software, hardware and other resources as shown in table A-6 . Each or all of these resources are used to achieve a number of processes $(p_1 ..p_{n-1})$ in activity a_1.

Resource Component	Indicator	Metric	Metric Meaning	Resource Component Cost
Human resources for activity a_1	$c^{H}_{a_1}$	$n^{H}_{p_1 a_1}$	Number of human resources of process p_1 in activity a_1	$c^{H}_{a_1} = \sum_{p_1}^{n^{H}_{a_1}} n^{H}_{p_1 a_1} c^{H}_{p_1 a_1} t^{H}_{p_1 a_1}$
		$c^{H}_{p_1 a_1}$	Cost of human resources of process p_1 working in activity a_1	
		$t^{H}_{p_1 a_1}$	Human resources allocated time for process p_1 in activity a_1	
Software resources for activity a_1	$c^{SW}_{a_1}$	$n^{SW}_{p_1 a_1}$	Number of software resources utilised for process p_1 in activity a_1	$c^{SW}_{a_1} = \sum_{p_1}^{n^{SW}_{a_1}} n^{SW}_{p_1 a_1} c^{SW}_{p_1 a_1} t^{SW}_{p_1 a_1}$
		$c^{SW}_{p_1 a_1}$	Cost of software resources utilised for process p_1 in activity a_1	
		$t^{SW}_{p_1 a_1}$	Software resources allocated time for process p_1 in activity a_1	

Hardware resources for activity a_1	$c^{HW}_{a_1}$	$n^{HW}_{p_1 a_1}$	Number of hardware resources utilised for process p_1 in activity a_1	$c^{HW}_{a_1} = \sum_{p_1}^{n^{HW}_{a_1}} n^{HW}_{p_1 a_1} c^{HW}_{p_1 a_1} t^{HW}_{p_1 a_1}$
		$c^{HW}_{p_1 a_1}$	Cost of hardware resources utilised for process p_1 in activity a_1	
		$t^{HW}_{p_1 a_1}$	Software resources allocated time for process p_1 in activity a_1	
Other resources for activity a_1	$c^{OT}_{a_1}$	$n^{OR}_{p_1 a_1}$	Number of other resources utilised for process p_1 in activity a_1	$c^{OT}_{a_1} = \sum_{p_1}^{n^{OT}_{a_1}} n^{OT}_{p_1 a_1} c^{OT}_{p_1 a_1} t^{OT}_{p_1 a_1}$
		$c^{OR}_{p_1 a_1}$	Cost of other resources utilised for process p_1 in activity a_1	
		$t^{OR}_{p_1 a_1}$	Other resources allocated time for process p_1 in activity a_1	

Table A-6: Derived inputs indicators and metrics for mServices '*s*'

Considering $v^A = a_1 .. a_{n-1}$ then the following equation will represent the total inputs cost of mService '*s*':

$$c_s = \sum_{a=1}^{v^A} \left(c_a^H + c_a^{SW} + c_a^{HW} + c_a^{OT} \right)$$

3.1.2. Outputs

Indicators and metrics are derived from the benefits that the end-user gains from an mService. Gouscos et al (2003) analyse benefits to their building components and consider this the first step in deciding which indicators and metrics are to be used. Benefits components are those values that the constituents expect from using an mService. As illustrated in figure A-3, each benefit component has a number of metrics. Each metric measures a certain value in that component. One indicator represents one benefit component, and also groups a number of metrics under its heading.

Accordingly, in order to find out how "easier", "faster", or "better" the mobile payment service (mService s) is, the benefits of this service are analysed into their components. Effort of Acquisition (EoA), Effort of Familiarization (EoF), and Technical Support Necessity (TCN) are the three components making an "easier" service, and so on as shown at table A-7.

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Benefit	Benefit Component / Indicator	Metric	Metric Meaning	Benefit Component Response Weight	Benefit Impact
Easier Service (ES)	Effort of Acquisition (EoA)	t_s^A	Effort of Location (the number of minutes required for accessing an mService)	$EoA = \Sigma\left(t_s^A + t_s^R + t_s^O\right)$	$ES = \Sigma(EoA + EoF + TCN)$
		t_s^R	Effort of Request (the number of minutes required for making a request for an mService)		
		t_s^O	Effort of Delivery (the number of minutes required for obtaining the results of an mService)		
	Effort of Familiarization (EoF)	t_s^{LN}	Effort to Learn (the amount of training time in minutes needed for new users in order to find features, perform common tasks and	$EoF = \Sigma\left(t_s^{LN} + t_s^{RM}\right)$	

			acquire an mService)		
		t_s^{RM}	Effort to Remember (the number of minutes needed to perform an operation or feature that has not been used for a while)		
	Technical Support Necessity (TCN)	n_s^{TSR}	Number of Technical Support Requests (how many times users ask for help)	$TCN = \Sigma\left(n_s^{TSR} + n_val_s^{TSR} + t_s^{RC}\right)$	
		$n_val_s^{TSR}$	Content of Technical Support Requests (a significant value assigned to the content of users' requests)		
		t_s^{RC}	Time to Recover (the number of minutes needed to retrieve)		
Faster Service (FS)	Time of Acquisition (ToA)	t_s^{DI}	Time of Data Input (the number of minutes required for the user to enter needed information for each mService)	$ToA = \Sigma\left(t_s^{DI} + t_s^{D} + t_s^{LOC}\right)$	$FS = ToA$

		t_s^D	Time of Delivery (the number of minutes required for obtaining the results of an mService request)		
		t_s^{LOC}	Time to Locate (the number of minutes required to locate the required mService)		
Better Service (BS)	Quality of Experience (QoE)	n_s^{ER}	Number of Errors (the number of errors made by the user while performing an operation)	$QoE = \Sigma\left(n_s^{ER} + n_val_s^{TRN}\right)$	$BS = QoE$
		$n_val_s^{TRN}$	Transparency of mService (users' satisfaction as a significant value assigned from assessing the entire mService access cycle)		

Table A-7: Derived outputs indicators and metrics for mService *'s'*

The total benefit impact m_s is then the calculated outputs of mService s, which is represented by: $m_s = \sum(ES + ES + BS)$

3.1.3. Design Data Collection Approach

In order to pinpoint an mService benefit, end-user's needs (customer care) have to be initially investigated. In the mPayment scenario end users must be consulted initially and during the implementation. Customer support, relationships and service enhancements must be investigated using both quantitative (objectives) and qualitative (subjective) methods. Log files and statistics are examples of the quantitative methods, whilst questionnaires, best practices and historical analyses are examples of the qualitative methods, which also tend to be cognitive.

3.1.4. Assessment

Efficiency assessment is the quantitative relation between outputs and inputs of the same mService. In mobile payment service example, efficiency is investigated from three aspects: how easier, faster and better this service is than via conventional payment methods as depicted in Table A-7 above. Accordingly, Table A-8 shows the final value of efficiency criteria which is to be used as indices for future assessments.

Efficiency Criteria / Future Indices	Calculation
eff_{ES}	$\frac{ES}{c_s}$
eff_{FS}	$\frac{FS}{c_s}$
eff_{BS}	$\frac{BS}{c_s}$
eff_{m_s}	$\frac{m_S}{c_s}$

Table A-8: Final Calculations for Efficiency Criteria

3.1.5. Recommendations

Depending on the efficiency assessment of mServices such as a mPayment implementation, recommendations for improvement are made. Recommendations will affect some or all of the goals, strategies, objectives and initiatives of mGovernment management, as shown in Figure A-4. A prioritizing methodology is essential for optimum implementation of recommendations throughout a set period of time. Nonetheless, recommendations need to be delivered to decision makers at the right time, as there will inevitably be a compromise between rigorous recommendations on one hand and practical realities on the other (OECD 2003, p. 136).

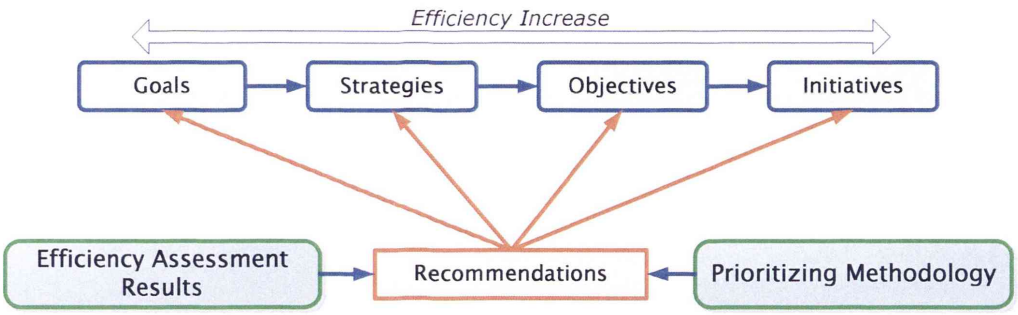

Figure A-4: Efficiency Assessment Recommendations Effect on mGovernment Management

The following Table A-9 expands the goals, strategies, objectives and initiatives of mGovernment management. Many countries such as Norway, Finland, Malta, India and Singapore are leading the charge for implementing mGovernment services, examples of which are seen in the table below.

Goals	Examples
Adopting a new comprehensive or holistic solutions rather than separate departmental services. Satisfying citizen's needs through diversified and multiple channels and platforms. Removing certain organisational or internal barriers between the government and citizens.	In the mPayment example as an mGovernment service consider the following: For parking infringements in Sydney for example citizens could pay via SMS, via Cosmos CardPay (Australia), CardAccess (Australia). www.cardpay.com.au www.cardaccess.com.au for example MobEPay, Teleterminal Singaporeans: receive SMS alerts for a variety of e-services such as: renewal of road tax, medical examinations for domestic workers, passport renewal notifications, season parking reminders, and parliament notices Malta residents can register to receive SMS notifications of court sitting/hearing deferrals, license-renewal, exam results, and direct credit

	payments from the Department of Social Security. Emmanuel C. Lallana, 2004
Strategies (Prisma Project Team 2003a, p. 58)	
Permanent monitoring of users' demands. Effective complaint management. Ubiquitous services with multilingual support.	For the above example, FAQs are normally provided on web pages, free calls to help operators when transactions go wrong.
Objectives (Oakland County 2002)	
mGovernment applications are designed to interface with a wide variety of mobile devices. Citizens are to be educated about how to use and participate in an mGovernment initiative. Enabling citizens to have a common and seamless entry point to mGovernment services.	In Finland, SMS tickets can be used for Helsinki's public transport system. These tickets can be ordered by sending a text message and the user is billed through his or her regular mobile phone bill. The ticket itself is also delivered to the commuter by SMS. (Lallana, 2004).
Initiatives (Pardo 2000, p. 3)	
Facilitating citizen access to government information.	Norway's tax collectors have introduced SMS tax returns. Taxpayers who have no changes to make to the form they receive in the post can now simply send a text message with a

Facilitating compliance with rules. Citizen access to personal benefits. Government to government information and service integration.	code word, their identity number and a pin code instead of returning the form by mail. (Lallana, 2004)

Table A-9: Examples of Recommendations

4. Conclusions

This study proposed a methodology to assist in the evaluation of the efficiency of mGovernment services. By analysing both of the inputs and outputs in relation to their building components, indicators and metrics are derived. Simple and sequential mathematical equations are used to measure the cost of inputs, and the impact of outputs. To illustrate the principles of the method the authors have used an mPayment example of the type of mGovernment service throughout the paper. Quantitative and qualitative methods should be used to gather data for both inputs and outputs. As efficiency measurement means criteria that result from dividing outputs value over inputs value, these criteria will also used as future indices and benchmarks. Further research will focus on conditions of applying the efficiency evaluation methodology discussed in this study, and how the performance of mGovernment, in general, can be affected once this element (efficiency) is adjusted to a certain rate. Our next step will be to apply the methodology to an existing mPayment, mGovernment service to test its viability.

Appendix B:

More Details About Chapter 7's Analysis

GQM / BSA	Conceptual Level	Operational Level	Interpretive Level															
Perspec-tives	Goal/Benefit Constructs	Indicators	Metrics															
			MT1	MT2	MT3	MT4	MT5	MT6	MT7	MT8	MT9	MT10	MT11	MT12	MT13	MT14	MT15	Totals
(1) Citizens / Businesses	Value for money	Pricing	(A)															(A)
			(B)															(B)
	Quality of Service	Availability		(A)														(A)
				(B)														(B)
		Reliability			(A)													(A)
					(D)													(D)
		Accuracy				(A)												(A)
		Responsiveness					(A)											(A)
		Courtesy and Helpfulness						(A)										(A)
	Efficient Transactions	Usability							(A)									(A)
									(B)									(B)
		Timeliness								(A)								(A)
		Privacy									(A)							(A)
											(B)							(B)
		Security										(D)						(D)
	Strategic Data	Accountability											(A)					(A)
(2) Operational / Internal Business	Citizens' & Businesses' Satisfaction	Productivity												(A)				(A)
														(B)				(B)
														(C)				(C)
		Interoperability													(A)			(A)
		Technology														(A)		(A)

																	(B)		(B)
(3) Innovation / Learning	New mPayment Facilities	Productivity												(A)					(A)
														(B)					(B)
														(C)					(C)
		Usability							(A)										(A)
									(B)										(B)
	Better Operational Efficiency	Availability		(C)															(C)
				(D)															(D)
				(E)															(E)
				(F)															(F)
		Reliability			(B)														(B)
					(C)														(C)
					(E)														(E)
		Accuracy				(A)													(A)
		Responsiveness					(B)												(B)
							(C)												(C)
							(D)												(D)
		Security										(A)							(A)
												(B)							(B)
												(C)							(C)
												(E)							(E)
	More Value for Constituents	Usability							(A)										(A)
									(B)										(B)
		Timeliness								(B)									(B)
(4) Financial / Economic	Value for money	Profitability	(A)																(A)
			(B)																(B)
	Reduced Cost																		
	Economic Growth																	(A)	(A)

Value of Mobile Payment Service Metrics		V
MT1	(A) Percentage of mPayment service charges to those of other ordinary methods of payment	
	(B) Percentage of reduction in costs	
MT2	(A) Customer uptime percentage	
	(B) Number of disconnections	
	(C) Number of repeat disconnections	

	(D) Number of unplanned disconnections
	(E) Number of "maintenance events"
	(F) Number of planned disconnections
MT3	(A) Failed service attempts percentage
	(B) Service downtime percentage
	(C) Dropped transactions percentage
	(D) Failed transactions percentage
	(E) Failed user disconnects percentage
MT4	(A) Number of errors
MT5	(A) Average help desk response time
	(B) Average one-way delay/latency
	(C) Average round time delay/latency
	(D) Average response time
MT6	(A) Degree of satisfaction
MT7	(A) Degree of understandability
	(B) Degree of learnability
MT8	(A) Degree of citizen's perception of on-time transactions
	(B) Percentage of transactions completed by due date
MT9	(A) Size-of-anonymity-set metrics
	(B) Entropy-based metrics
MT10	(A) Number of security breaching incidents reported externally to law enforcement (Office of Management and Budget 1996)
	(B) Percentage of transaction that had formal risk assessments performed and documented
	(C) Percentage of total transactions that have been processed following certification and accreditation
	(D) Percentage of perceived security
	(E) Percentage of employees with significant security responsibilities who have received specialized training
MT11	(A) Accountability-for-result metric
MT12	(A) Number of transactions per (period of time)

	(B) Number of finalized transactions per (period of time)
	(C) Number of transactions per employee
MT13	(A) Level of Systems Interoperability (LISI)
MT14	(A) Type of facilities offered by the technology
	(B) Ubiquity degree of the technology
MT15	(A) Return on Investment (ROI), (services targeted at businesses tend to have higher usage than those targeted at citizens and, consequently, deliver the highest value (Accenture 2003).

Table B-1: A Multi-Perspective Effectiveness Evaluation Methodology for mGovernment. Source: (El-Kiki & Lawrence 2005)

GQM Conceptual Level Constructs		Value for Money Construct α=.687 N=5		Quality of mService Construct α=.923 N=16							Efficient Transactions Construct α=.842 N=9					Strategic Data Construct α=.852 N=3	
GQM Operational Level Indicators		VfM_Price	VfM_Cont	QoS_Aware	QoS_Access	QoS_Avail	QoS_Reliab	QoS_Accur	QoS_Resp	QoS_Court	ET_Usable	ET_Time	ET_Trust	ET_Privacy	ET_Security	SD_Account	SD_Transp
VfM_Price1	Q9	.597															
VfM_Price2	Q41	.763															
VfM_Cont1	Q10		.713														
VfM_Cont2	Q25		.602														
VfM_Cont3	Q34		.652														
QoS_Aware1	Q11			.592													
QoS_Aware2	Q26			.629													
QoS_Access1	Q27				.644												
QoS_Avail1	Q12					.612											
QoS_Avail2	Q28					.758											
QoS_Avail3	Q35					.719											
QoS_Reliab1	Q13						.727										
QoS_Reliab2	Q29						.770										
QoS_Reliab3	Q36						.831										
QoS_Accur1	Q14							.784									
QoS_Accur2	Q30							.770									
QoS_Accur3	Q37							.858									
QoS_Resp1	Q15								.652								
QoS_Court1	Q16									.593							
QoS_Court2	Q31									.713							
QoS_Court3	Q38									.594							
ET_Usable1	Q17										.640						
ET_Usable2	Q32										.665						
ET_Usable3	Q39										.618						
ET_Usable4	Q40										.768						
ET_Time1	Q18											.654					
ET_Time2	Q33											.700					
ET_Trust1	Q19												.663				
ET_Privacy1	Q20													.650			
ET_Security1	Q21														.695		
SD_Account1	Q22															.814	
SD_Transp1	Q23																.916
SD_Transp2	Q24																.908

Table B-2: Cronbach's alpha and factor loadings for four main constructs collated by the indicators

End-user Profile

Q42 * Gender Crosstabulations

		Gender		Total
		Male	Female	
Q42	I will try using government mobile services.	48	20	68
	I will learn more about government mobile services.	35	18	53
	I don't think I will be taking any action regarding government mobile services.	15	6	21
Total		98	44	142

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	.356(a)	2	.837
Likelihood Ratio	.354	2	.838
Linear-by-Linear Association	.020	1	.887
N of Valid Cases	142		

(a) 0 cells (.0%) have expected count less than 5. The minimum expected count is 6.51.

Q42 * Age Crosstabulations

		Age					
		<18	18-24	25-34	35-49	50-65	Total
Q42	I will try using government mobile services.	8	25	26	8	2	69
	I will learn more about government mobile services.	15	24	10	2	1	52
	I don't think I will be taking any action regarding government mobile services.	4	6	7	4	0	21
Total		27	55	43	14	3	142

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	14.032(a)	8	.081
Likelihood Ratio	14.835	8	.062
Linear-by-Linear Association	1.763	1	.184
N of Valid Cases	142		

(a)5 cells (33.3%) have expected count less than 5. The minimum expected count is .44.

Q42 * Education Crosstabulations

		Education					Total
		High School	Vocational /Trade School	Bachelor's Degree	Master's Degree (MSc, MA, MBA)	Doctorate Degree (Ph.D)	
Q42	I will try using government mobile services.	5	2	20	30	12	69
	I will learn more about government mobile services.	4	1	22	20	6	53
	I don't think I will be taking any action regarding government mobile services.	1	0	5	10	5	21
Total		10	3	47	60	23	143

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	4.910(a)	8	.767
Likelihood Ratio	5.308	8	.724
Linear-by-Linear Association	.195	1	.659
N of Valid Cases	143		

(a) 7 cells (46.7%) have expected count less than 5. The minimum expected count is .44.

Q42 * Occupation Crosstabulations

		Occupation								Total
		Student	Civil Servant	Company Owner	Company Employee	Self Employed	Retired	Un-employed	Other	
Q42	I will try using government mobile services.	16	8	5	32	9	1	1	14	86
	I will learn more about government mobile services.	23	10	1	25	9	1	0	2	71
	I don't think I will be taking any action regarding government mobile services.	8	4	0	7	0	2	0	6	27
Total		47	22	6	64	18	4	1	22	184

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	25.278(a)	14	.032
Likelihood Ratio	29.533	14	.009
Linear-by-Linear Association	1.820	1	.177
N of Valid Cases	184		

(a) 12 cells (50.0%) have expected count less than 5. The minimum expected count is .15.

Q42 * Income Crosstabulations

		Income p/a						Total p/a
		$10,000 - $30,000	$30,000 - $50,000	$50,000 - $70,000	$70,000 - $90,000	$90,000 - $110,000	Over $110,000	
Q42	I will try using government mobile services.	25	27	11	2	7	9	81
	I will learn more about government mobile services.	28	19	10	5	1	0	63
	I don't think I will be taking any action regarding government mobile services.	10	4	3	5	0	4	26
Total		63	50	24	12	8	13	170

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	25.491(a)	10	.004
Likelihood Ratio	30.228	10	.001
Linear-by-Linear Association	.329	1	.566
N of Valid Cases	170		

(a) 8 cells (44.4%) have expected count less than 5. The minimum expected count is 1.22.

Q42 * Know_mServ Crosstabulations

		Know_mServ					Total
		Less than 6 months ago	6 to 12 months ago	More than 1 year ago	More than 2 years ago	I have never heard of mobile government services	
Q42	I will try using government mobile services.	8	10	12	25	33	88
	I will learn more about government mobile services.	5	1	5	2	57	70
	I don't think I will be taking any action regarding government mobile services.	2	5	3	4	13	27
Total		15	16	20	31	103	185

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	38.832(a)	8	.000
Likelihood Ratio	43.082	8	.000
Linear-by-Linear Association	2.170	1	.141
N of Valid Cases	185		

(a) 4 cells (26.7%) have expected count less than 5. The minimum expected count is 2.19.

Q42 * Using_mServ Crosstabulations

		Using_mServ					Total
		Yes, I am a business	Yes, I am a citizen	No, but I occasionally participate in activities such as	No, but I am interested in using one in the near future	No, I'm not interested	
Q42	I will try using government mobile services.	4	6	13	53	12	88
	I will learn more about government mobile services.	0	0	2	48	19	69
	I don't think I will be taking any action regarding government mobile services.	0	3	2	11	11	27
Total		4	9	17	112	42	184

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	26.942(a)	8	.001
Likelihood Ratio	31.863	8	.000
Linear-by-Linear Association	10.239	1	.001
N of Valid Cases	184		

(a) 7 cells (46.7%) have expected count less than 5. The minimum expected count is .59.

Q42 * Skill_mDev Crosstabulations

		Skill_mDev				Total
		Basic	Average	Above average	Advanced	
Q42	I will try using government mobile services.	2	20	30	36	88
	I will learn more about government mobile services.	2	15	31	22	70
	I don't think I will be taking any action regarding government mobile services.	1	6	11	9	27
Total		5	41	72	67	185

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	2.304(a)	6	.890
Likelihood Ratio	2.299	6	.890
Linear-by-Linear Association	.502	1	.479
N of Valid Cases	185		

(a) 3 cells (25.0%) have expected count less than 5. The minimum expected count is .73.

Q42 * Dura_mDev Crosstabulations

		Dura_mDev					Total
		Less than a year	One year	Two years	Three years	Over three years	
Q42	I will try using government mobile services.	0	1	1	1	84	87
	I will learn more about government mobile services.	1	3	0	2	64	70
	I don't think I will be taking any action regarding government mobile services.	0	0	2	2	23	27
Total		1	4	3	5	171	184

	Value	df	Asymp. Sig. (2-sided)
Pearson Chi-Square	14.155(a)	8	.078
Likelihood Ratio	12.895	8	.116
Linear-by-Linear Association	2.310	1	.129
N of Valid Cases	184		

(a) 12 cells (80.0%) have expected count less than 5. The minimum expected count is .15.

Value for Money Construct

Pricing Indicator

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.736
Bartlett's Test of Sphericity	Approx. Chi-Square	101.747
	df	10
	Sig.	.000

Table B-3: KMO and Bartlett's Test Value for Money Construct

		VfM_Price1	VfM_Price2
VfM_Price1	Pearson Correlation	1	.380(**)
	Sig. (1-tailed)		.000
	N	183	181
VfM_Price2	Pearson Correlation	.380(**)	1
	Sig. (1-tailed)	.000	
	N	181	184

** Correlation is significant at the 0.01 level (1-tailed).

Table B-4: Correlations of VfM_Price Indicator

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.500
Bartlett's Test of Sphericity	Approx. Chi-Square	27.891
	df	1
	Sig.	.000

Table B-5: KMO and Bartlett's Test

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.551	.551	2

Table B-6: Reliability Statistics

Content Indicator

		VfM_Cont1	VfM_Cont2	VfM_Cont3
VfM_Cont1	Pearson Correlation	1	.312(**)	.367(**)
	Sig. (1-tailed)		.000	.000
	N	186	182	185
VfM_Cont2	Pearson Correlation	.312(**)	1	.195(**)
	Sig. (1-tailed)	.000		.004
	N	182	182	182
VfM_Cont3	Pearson Correlation	.367(**)	.195(**)	1
	Sig. (1-tailed)	.000	.004	
	N	185	182	185

** Correlation is significant at the 0.01 level (1-tailed).

Table B-7: Correlations of Content Indicator

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.593
Bartlett's Test of Sphericity	Approx. Chi-Square	45.779
	df	3
	Sig.	.000

Table B-8: KMO and Bartlett's Test

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.550	.552	3

Table B-9: Reliability Statistics

Quality of mService Construct

Awareness Indicator

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.910
Bartlett's Test of Sphericity	Approx. Chi-Square	1175.146
	df	120
	Sig.	.000

Table B-10: KMO and Bartlett's Test Quality of mService Construct

		QoS_Aware1	QoS_Aware2
QoS_Aware1	Pearson Correlation	1	.377(**)
	Sig. (1-tailed)		.000
	N	186	184
QoS_Aware2	Pearson Correlation	.377(**)	1
	Sig. (1-tailed)	.000	
	N	184	184

** Correlation is significant at the 0.01 level (1-tailed).

Table B-11: Correlations of Awareness Indicator

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.500
Bartlett's Test of Sphericity	Approx. Chi-Square	27.837
	df	1
	Sig.	.000

Table B-12: KMO and Bartlett's Test

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.544	.548	2

Table B-13: Reliability Statistics

Availability Indicator

		QoS_Avail1	QoS_Avail2	QoS_Avail3
QoS_Avail1	Pearson Correlation	1	.482(**)	.335(**)
	Sig. (1-tailed)		.000	.000
	N	186	179	183
QoS_Avail2	Pearson Correlation	.482(**)	1	.543(**)
	Sig. (1-tailed)	.000		.000
	N	179	179	177
QoS_Avail3	Pearson Correlation	.335(**)	.543(**)	1
	Sig. (1-tailed)	.000	.000	
	N	183	177	183

** Correlation is significant at the 0.01 level (1-tailed).

Table B-14: Correlations of Availability Indicator

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.639
Bartlett's Test of Sphericity	Approx. Chi-Square	108.920
	df	3
	Sig.	.000

Table B-15: KMO and Bartlett's Test

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.713	.715	3

Table B-16: Reliability Statistics

Reliability Indicator

		QoS_Reliab1	QoS_Reliab2	QoS_Reliab3
QoS_Reliab1	Pearson Correlation	1	.539(**)	.530(**)
	Sig. (1-tailed)		.000	.000
	N	185	182	185
QoS_Reliab2	Pearson Correlation	.539(**)	1	.552(**)
	Sig. (1-tailed)	.000		.000
	N	182	182	182
QoS_Reliab3	Pearson Correlation	.530(**)	.552(**)	1
	Sig. (1-tailed)	.000	.000	
	N	185	182	185

** Correlation is significant at the 0.01 level (1-tailed).

Table B-17: Correlations of Reliability Indicator

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.703
Bartlett's Test of Sphericity	Approx. Chi-Square	147.313
	df	3
	Sig.	.000

Table B-18: KMO and Bartlett's Test

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.773	.779	3

Table B-19: Reliability Statistics

Accuracy Indicator

		QoS_Accur1	QoS_Accur2	QoS_Accur3
QoS_Accur1	Pearson Correlation	1	.586(**)	.676(**)
	Sig. (1-tailed)		.000	.000
	N	184	183	183
QoS_Accur2	Pearson Correlation	.586(**)	1	.723(**)
	Sig. (1-tailed)	.000		.000
	N	183	184	183
QoS_Accur3	Pearson Correlation	.676(**)	.723(**)	1
	Sig. (1-tailed)	.000	.000	
	N	183	183	184

** Correlation is significant at the 0.01 level (1-tailed).

Table B-20: Correlations of Accuracy Indicator

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.710
Bartlett's Test of Sphericity	Approx. Chi-Square	247.961
	df	3
	Sig.	.000

Table B-21: KMO and Bartlett's Test

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.850	.854	3

Table B-22: Reliability Statistics

Courtesy and Helpfulness Indicator

		QoS_Court1	QoS_Court2	QoS_Court3
QoS_Court1	Pearson Correlation	1	.442(**)	.349(**)
	Sig. (1-tailed)		.000	.000
	N	185	185	184
QoS_Court2	Pearson Correlation	.442(**)	1	.450(**)
	Sig. (1-tailed)	.000		.000
	N	185	185	184
QoS_Court3	Pearson Correlation	.349(**)	.450(**)	1
	Sig. (1-tailed)	.000	.000	
	N	184	184	184

** Correlation is significant at the 0.01 level (1-tailed).

Table B-23: Correlations of Courtesy and Helpfulness Indicator

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.654
Bartlett's Test of Sphericity	Approx. Chi-Square	86.888
	df	3
	Sig.	.000

Table B-24: KMO and Bartlett's Test

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.674	.679	3

Table B-25: Reliability Statistics

Efficient Transactions Construct

Usability Indicator

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.783
Bartlett's Test of Sphericity	Approx. Chi-Square	516.354
	df	36
	Sig.	.000

Table B-26: KMO and Bartlett's Test Efficient Transactions Construct

		ET_Usable1	ET_Usable2	ET_Usable3	ET_Usable4
ET_Usable1	Pearson Correlation	1	.303(**)	.272(**)	.501(**)
	Sig. (1-tailed)		.000	.000	.000
	N	182	176	181	180
ET_Usable2	Pearson Correlation	.303(**)	1	.450(**)	.538(**)
	Sig. (1-tailed)	.000		.000	.000
	N	176	179	178	177
ET_Usable3	Pearson Correlation	.272(**)	.450(**)	1	.617(**)
	Sig. (1-tailed)	.000	.000		.000
	N	181	178	184	182
ET_Usable4	Pearson Correlation	.501(**)	.538(**)	.617(**)	1
	Sig. (1-tailed)	.000	.000	.000	
	N	180	177	182	183

** Correlation is significant at the 0.01 level (1-tailed).

Table B-27: Correlations of Usability Indicator

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.693
Bartlett's Test of Sphericity	Approx. Chi-Square	198.713
	df	6
	Sig.	.000

Table B-28: KMO and Bartlett's Test

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.743	.759	4

Table B-29: Reliability Statistics

Timeliness Indicator

		ET_Time1	ET_Time2
ET_Time1	Pearson Correlation	1	.453(**)
	Sig. (1-tailed)		.000
	N	182	182
ET_Time2	Pearson Correlation	.453(**)	1
	Sig. (1-tailed)	.000	
	N	182	184

** Correlation is significant at the 0.01 level (1-tailed).

Table B-30: Correlations of Timeliness Indicator

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.500
Bartlett's Test of Sphericity	Approx. Chi-Square	41.270
	df	1
	Sig.	.000

Table B-31: KMO and Bartlett's Test

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.624	.624	2

Table B-32: Reliability Statistics

Strategic Data Construct

Transparency Indicator

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.690
Bartlett's Test of Sphericity	Approx. Chi-Square	205.315
	df	3
	Sig.	.000

Table B-33: KMO and Bartlett's Test Strategic Data Construct

		SD_Transp1	SD_Transp2
SD_Transp1	Pearson Correlation	1	.809(**)
	Sig. (1-tailed)		.000
	N	183	181
SD_Transp2	Pearson Correlation	.809(**)	1
	Sig. (1-tailed)	.000	
	N	181	181

** Correlation is significant at the 0.01 level (1-tailed).

Table B-34: Correlations of Transparency Indicator

Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		.500
Bartlett's Test of Sphericity	Approx. Chi-Square	189.558
	df	1
	Sig.	.000

Table B-35: KMO and Bartlett's Test

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.892	.894	2

Table B-36: Reliability Statistics

		ACTIVE USERS		PASSIVE USERS		TOTAL	
		N	Percent	N	Percent	N	Percent
VfM_Price[a]	Strongly Agree	7	30.4%	54	20.8%	61	21.6%
	Agree	8	34.8%	118	45.4%	126	44.5%
	Uncertain	6	26.1%	79	30.4%	85	30.0%
	Disagree	1	4.3%	5	1.9%	6	2.1%
	Strongly Disagree	1	4.3%	4	1.5%	5	1.8%
Total		23	100.0%	260	100.0%	283	100.0%
VfM_Cont[a]	Strongly Agree	6	17.1%	69	17.6%	75	17.5%
	Agree	15	42.9%	202	51.4%	217	50.7%
	Uncertain	9	25.7%	99	25.2%	108	25.2%
	Disagree	4	11.4%	18	4.6%	22	5.1%
	Strongly Disagree	1	2.9%	5	1.3%	6	1.4%
Total		35	100.0%	393	100.0%	428	100.0%

[a] Group of questions

Table B-37: Value for Money construct indicators frequencies by active and passive users

		ACTIVE USERS		PASSIVE USERS		TOTAL	
		N	Percent	N	Percent	N	Percent
QoS_Aware [a]	Strongly Agree	2	8.3%	34	13.0%	36	12.6%
	Agree	10	41.7%	119	45.4%	129	45.1%
	Uncertain	2	8.3%	61	23.3%	63	22.0%
	Disagree	5	20.8%	38	14.5%	43	15.0%
	Strongly Disagree	5	20.8%	10	3.8%	15	5.2%
Total		24	100.0%	262	100.0%	286	100.0%
QoS_Access	Strongly Agree	1	8.3%	48	37.8%	49	35.3%
	Agree	6	50.0%	54	42.5%	60	43.2%
	Uncertain	3	25.0%	21	16.5%	24	17.3%
	Disagree	1	8.3%	3	2.4%	4	2.9%
	Strongly Disagree	1	8.3%	1	0.8%	2	1.4%
Total		12	100.0%	127	100.0%	139	100.0%
QoS_Avail [a]	Strongly Agree	4	11.1%	126	32.5%	130	30.7%
	Agree	17	47.2%	179	46.1%	196	46.2%
	Uncertain	10	27.8%	56	14.4%	66	15.6%
	Disagree	4	11.1%	20	5.2%	24	5.7%
	Strongly Disagree	1	2.8%	7	1.8%	8	1.9%
Total		36	100.0%	388	100.0%	424	100.0%

QoS_Reliab [a]	Strongly Agree	3	8.3%	96	24.6%	99	23.2%
	Agree	12	33.3%	169	43.3%	181	42.5%
	Uncertain	13	36.1%	89	22.8%	102	23.9%
	Disagree	7	19.4%	27	6.9%	34	8.0%
	Strongly Disagree	1	2.8%	9	2.3%	10	2.3%
Total		36	100.0%	390	100.0%	426	100.0%
QoS_Accur [a]	Strongly Agree	2	5.9%	83	21.2%	85	20.0%
	Agree	9	26.5%	175	44.6%	184	43.2%
	Uncertain	12	35.3%	97	24.7%	109	25.6%
	Disagree	7	20.6%	30	7.7%	37	8.7%
	Strongly Disagree	4	11.8%	7	1.8%	11	2.6%
Total		34	100.0%	392	100.0%	426	100.0%
QoS_Resp	Strongly Agree	0	0.0%	21	16.2%	21	14.8%
	Agree	6	50.0%	71	54.6%	77	54.2%
	Uncertain	4	33.3%	27	20.8%	31	21.8%
	Disagree	1	8.3%	10	7.7%	11	7.7%
	Strongly Disagree	1	8.3%	1	0.8%	2	1.4%
Total		12	100.0%	130	100.0%	142	100.0%
QoS_Court [a]	Strongly Agree	0	0.0%	47	12.0%	47	11.0%
	Agree	14	38.9%	151	38.5%	165	38.6%
	Uncertain	9	25.0%	114	29.1%	123	28.7%
	Disagree	8	22.2%	66	16.8%	74	17.3%
	Strongly Disagree	5	13.9%	14	3.6%	19	4.4%
Total		36	100.0%	392	100.0%	428	100.0%

[a] Group of questions

Table B-38: Quality of Service construct indicators frequencies by active and passive users

		ACTIVE USERS		PASSIVE USERS		TOTAL	
		N	Percent	N	Percent	N	Percent
ET_Usable [a]	Strongly Agree	1	2.2%	112	21.7%	113	20.1%
	Agree	29	63.0%	280	54.2%	309	54.9%
	Uncertain	12	26.1%	98	19.0%	110	19.5%
	Disagree	2	4.3%	20	3.9%	22	3.9%
	Strongly Disagree	2	4.3%	7	1.4%	9	1.6%
Total		46	100.0%	517	100.0%	563	100.0%
ET_Time [a]	Strongly Agree	2	8.3%	63	24.4%	65	23.0%
	Agree	14	58.3%	129	50.0%	143	50.7%
	Uncertain	5	20.8%	51	19.8%	56	19.9%
	Disagree	2	8.3%	13	5.0%	15	5.3%
	Strongly Disagree	1	4.2%	2	0.8%	3	1.1%
Total		24	100.0%	258	100.0%	282	100.0%

ET_Trust	Strongly Agree	0	0.0%	16	12.2%	16	11.2%
	Agree	4	33.3%	32	24.4%	36	25.2%
	Uncertain	3	25.0%	57	43.5%	60	42.0%
	Disagree	4	33.3%	20	15.3%	24	16.8%
	Strongly Disagree	1	8.3%	6	4.6%	7	4.9%
Total		12	100.0%	131	100.0%	143	100.0%
ET_Privacy	Strongly Agree	1	8.3%	20	15.3%	21	14.7%
	Agree	4	33.3%	33	25.2%	37	25.9%
	Uncertain	4	33.3%	38	29.0%	42	29.4%
	Disagree	2	16.7%	28	21.4%	30	21.0%
	Strongly Disagree	1	8.3%	12	9.2%	13	9.1%
Total		12	100.0%	131	100.0%	143	100.0%
ET_Security	Strongly Agree	1	8.3%	22	16.9%	23	16.2%
	Agree	6	50.0%	43	33.1%	49	34.5%
	Uncertain	4	33.3%	45	34.6%	49	34.5%
	Disagree	0	0.0%	14	10.8%	14	9.9%
	Strongly Disagree	1	8.3%	6	4.6%	7	4.9%
Total		12	100.0%	130	100.0%	142	100.0%

[a] Group of questions

Table B-39: Efficient Transactions construct indicators frequencies by active and passive users

		ACTIVE USERS		PASSIVE USERS		TOTAL	
		N	Percent	N	Percent	N	Percent
SD_Account	Strongly Agree	1	8.3%	9	6.9%	10	7.0%
	Agree	5	41.7%	45	34.6%	50	35.2%
	Uncertain	2	16.7%	45	34.6%	47	33.1%
	Disagree	3	25.0%	22	16.9%	25	17.6%
	Strongly Disagree	1	8.3%	9	6.9%	10	7.0%
Total		12	100.0%	130	100.0%	142	100.0%
SD_Transp[a]	Strongly Agree	2	9.1%	24	9.2%	26	9.2%
	Agree	5	22.7%	87	33.5%	92	32.6%
	Uncertain	7	31.8%	89	34.2%	96	34.0%
	Disagree	4	18.2%	47	18.1%	51	18.1%
	Strongly Disagree	4	18.2%	13	5.0%	17	6.0%
Total		22	100.0%	260	100.0%	282	100.0%

[a] Group of questions

Table B-40: Strategic Data construct indicators frequencies by active and passive users

Appendix C:

Local Government Interview Guide

Council's Address

Date:

Dear <<Name>>

Pursuing to our telephone conversation, allow me to thank you very much for accepting taking part in my research interviews of local government officials.

To confirm, the interview will be conducted on (day & date), at (time). It shall be recorded and securely saved as a reference for this research. Anonymity of participation in this interview is guaranteed under the research Ethics clearance number UTS HREC REF NO. 2006-74A granted by University of Technology, Sydney (UTS).

For your interview preparation, please find the following attachments:

1. a hardcopy of the interview questions
2. a hardcopy of the online service survey which is accessible on: http://surveys.uts.edu.au/surveys/localgovernmentservices/index.cfm This hardcopy is sent to you for your comfort, in case you want to think, or ask someone else, about those services whilst being away from your computer.

All that is needed in that survey is checking whether those services are rendered (or are liable to be rendered) utilizing mobile technology. There may be some services currently offered electronically via the council's website; these services are also needed to be figured out.

Once again, thank you for your participation.

Sincerely,

<<signature>>

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Local Government Interviews

20-MINUTE INTERVIEW GUIDE

INTERVIEWER INTRODUCTION

Interviewer to explain proceedings and emphasise to the interviewee that participation is completely voluntary, and opinions, views and thoughts will be completely anonymous; which is guaranteed under this researcher's Ethics clearance number UTS HREC REF NO. 2006-74A granted by University of Technology, Sydney (UTS).

INTERVIEWER TO TAKE PERMISSION TO RECORD THE INTERVIEW

BASIC DISCUSSION FLOW

1. *Introduction (3 mins.)*
2. *The council's current electronic services (2-4 mins.)*
3. *The council's current mobile services (2-4 mins.)*
4. *Impact of mobile technology on the council's internal and external operations (6 mins.)*
5. *Problems in using the mobile technologies (2-4 mins.)*
6. *The council's opinion about research outcomes (2-4 mins.)*
7. *Impact or reaction of applying mobile services at the council (2-4 mins.)*

1. Introduction - (3 minutes)

Objective: *To make the interviewee feel as comfortable as possible/ build rapport, explain research, to provide context for discussion*	*[Researcher starts the interview]* 1. Thank-you for agreeing to take part in the mGovernment research. 2. I'd like to introduce myself; I am Tarek El-Kiki, researcher at the Faculty of IT at UTS. 3. I really do appreciate you giving some of your precious time for this interview. 4. First of all I'd like to highlight a few points pertaining to this interview: ○ That there are no right or wrong answers to the questions of this interview. ○ That your opinions, ideas and thoughts are what we are interested in not those of other people. *[Researcher asks the interviewee to introduce him/herself]* 5. Name 6. Occupation *[Researcher briefs the research hypothesis and findings]* The research revolves around the hypothesis that success of mServices depends on the effectiveness of the service project management which gives its first priority to satisfying end user's needs. This interview is a step in the process of approving or disapproving this hypothesis. As you know, end users' needs for a mobile service are those drivers which stimulate the use of such service. The researcher found that these needs are divided into four main categories: Value for money, Quality of service, Efficient transactions and Strategic data, as per the research paper previously sent to you.

2. *The council's current electronic services (2-4 mins.)*

Objective: *To explore the extent of eGovernment application by the council.*	1. What sort of problems did you encounter in rendering electronic services? 2. Since when have you implemented electronic services? 3. As you have filled in the online service survey, there are some services that aren't rendered neither electronically nor via mobile technology, how do you see them rendered in the following five years? *(Researcher gives examples of these services from the interviewee filled in survey)*

3. *The council's current mobile services (2-4 mins.)*

Objective: *To explore the extent and the prospect of mGovernment application by the council.*	1. How does the council view the mobile technologies? *(In other words, are they important, worth trying, negative application effects..etc)* 2. Are there any near future plans to expand the usage of mobile technologies in your council? 3. (If no), what do you think are the barriers to utilize mobile technologies to render some of your council's services? 4. (If yes), since when have you implemented mobile services?

4. *Impact of mobile technologies on the council's internal and external operations (6 mins.)*

Objective: *Understand how effective mGovernment's implementation is for the Council's different types of operations*	1. Could you please explain the impact of mGovernment on internal processes and ways of working *(e.g. increased / decreased)*: a. Office running costs b. Cost of providing information to public c. Cost of completing transactions for public d. Ability of staff to work more 'flexibly' e. Requirements for office space f. Time spent providing information to public g. Time spent processing transactions for public h. Service quality i. Public access to information and services j. Public take-up of information and services

5. *Problems in using the mobile technologies (2-4 mins.)*

Objective: *To pinpoint the problems that may be caused by adopting of mobile technologies at the local government level*	1. In your opinion, what are the problems which could be created from implementing or using mobile technologies in your council?

6. The council's opinion about mService success/failure factors (2-4 mins.)

Objective: *To gain an expert and practical opinion about mobile service success factors*	1. In your opinion, what are the factors which if implemented any mobile service will be successful?

7. Impact or reaction of applying mobile services at the council (2-4 mins.)

Objective: *To find out about the impact of application of mobile services*	1. How do you see mobile services changing the way work accomplished by the council? *(Where do you think are we going?)*

Council's Address

Dear <<Name>>

Thank you for taking part in my research interviews of local government officials last (day & date). I hope you enjoyed talking about your council's mobile services rendered or planned to be rendered. I certainly learnt a great deal about the council of (name of the council) in addition to the challenges and rewards of public service.

With your help and the assistance of the other councils' officials, I gained a deeper understanding about the local government services and how some of them can be rendered by using mobile technologies.

Once again, thank you.

Sincerely,

<<signature>>

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Appendix D:

Mobile and Electronic Services Rendered by the Local Councils

		A Council		B Council		C Council	
Service Category	Services	mService	eService	mService	eService	mService	eService
Accommodation	Emergency Accommodation		A				
	Independent Living Units		A				
	Low Cost Accommodation		A				
	Residential Care		A				
	Retirement Accommodation		A				
	Strata Titles	A	A				
	Supported Accommodation		A				
	Tenancy		A				
	Youth Accommodation		A				
Arts and Culture	Community Arts		A		B		C
	Entertainment		A		B		C
	Galleries and Museums		A				
	Literature		A				
	Performing Arts		A				C
	Theatres		A		B		
	Visual Arts		A				C
Citizenship	Electoral Matters		A		B		C
	Settlement Assistance		A				
Communication	Communication Aids		A				
	Communication Skills		A				
	Interpreting		A				

	Media		A				C
	Monitoring Services		A	B			
	Post Offices		A				
Community Organisation	Business and Professional Groups		A				C
	Business Development		A		B		C
	Community Centres		A				C
	Community Development		A		B		C
	Community Service Groups		A				C
	Co-operatives		A				
	Lobby Groups		A				
	Reconciliation		A				
	Resident Action Groups		A				
	Self Help		A				
	Senior Citizens Organisations		A				
	Voluntary Welfare Services		A				
Conservation and Environment	Coastal Conservation		A				C
	Historic Buildings		A				C
	Environmental Action	A	A		B	C	
	Land Conservation		A			C	
	Local History		A		B		C
	Parks and Reserves		A			C	
	Pollution Control		A	B		C	
	Water Conservation		A			C	
	Wildlife Conservation		A			C	

Education	Community Education		A	B			
	Continuing Education		A				
	Education Resource Centres		A				
	Health Education		A				
	Language Education		A				
	Literacy Programs		A			C	
	Living Skills Programs		A				
	Migrant Education		A				
	Personal Development		A				
	Remedial Education		A				
	Schools		A				
	Tertiary Education		A				
Emergency Services	Abuse		A				
	Ambulance Services		A				
	Child Protection		A				
	Crisis Counselling		A				
	Crisis Intervention		A				
	Disaster Services		A		B		C
	Emergency Accommodation		A				
	Emergency Material Aid		A				
	Emergency Medical Services		A				
	Fire Brigade		A				
	Police		A				
	Rescue		A				

	Sexual Assault Services		A				
Employment	Business Development		A				
	Employment Conditions		A		B		
	Job Placement		A				
	Job Seeking Skills		A		B		
	Job Training		A				C
	Overseas Qualifications		A				
	Superannuation		A				C
	Supported Employment		A				
	Vocational Counselling		A				
	Voluntary Work		A				
	Workers Compensation		A				C
Government	Electoral Matters		A				C
	Federal Government		A				
	International Affairs		A				
	Local Government		A	B	B	C	C
	Political Parties		A			C	
	State Government		A			C	
	Statutory Authorities		A				
	Members of Parliament		A			C	
Health	Health Information		A				
	Health Services		A	B			

Income	Child Support		A				
	Compensation		A				
	Financial Assistance		A				
	Financial Counselling		A				
	Taxation		A				C
Information Services	Community Information Services		A		B		C
	Information Hotlines	A	A	B			C
	Libraries		A		B		C
Law and Justice	Adoption		A				
	Appeals and Tribunals		A				
	Civil Liberties		A				
	Complaints Procedures		A				
	Consumer Protection		A				
	Divorce and Separation		A				
	Family Law		A				
	Justices of the Peace		A				
	Law Enforcement		A				
	Legal Aid		A				
	Legal Services		A				
	Mediation		A				
	Organ Donation		A				
	Power of Attorney		A				
	Reconciliation		A				
	Strata Titles		A				

	Tenancy		A				
	Trustees		A				
	Wills		A				
Leisure	Community Arts		A				C
	Crafts		A				C
	Entertainment	A	A				C
	Exercise		A				C
	Hobbies		A				C
	Holidays	A	A				C
	Physical Fitness		A				C
	Social Clubs and Groups		A				C
	Sports		A				C
	Tourism		A				C
	Youth Clubs		A				C
Practical Support Services	Care		A				
	Child Care		A				C
	Community Aid		A			C	C
	Companionship		A			C	C
	Counselling		A				
	Home Delivery		A	B		C	C
	Disability Support		A				
	Disaster Services		A				
	Emergency Material Aid		A				
	Equipment		A				

	Family Support		A				
	Human Relationships		A				
	Low Cost Goods and Services		A				
	Social Work		A				
Public Safety	Accident Prevention		A		B		
	Law Enforcement		A			C	
Sport and Leisure	Leisure Activities		A				C
	Leisure Facilities		A				C
	Sport		A				C
Target Groups	Aboriginal and TSI		A				C
	Adults		A				
	Broad Community		A				C
	Children		A				
	Ethnic Groups		A		B		C
	Low Income Earners		A				
	Men		A				
	Older People		A				C
	Other Target Groups		A				
	People with Disability	A	A	B		C	C
	People with Mental Illness		A				
	Religious Groups		A				
	Sexual Orientation		A				
	Women		A				

	Young People		A				
Transport	Ambulance Services		A				
	Community Transport		A				C
	Motor Vehicles		A				C
	Public Transport		A				C
	Special Needs Transport		A				
	Transport Concessions		A				C
Utilities	Electricity		A				
	Gas		A				
	Phone		A				
	Postal Services		A				
	Road and Traffic Services		A				
	Sewerage and Sanitation		A				
	Water		A				
Volunteering	Business Management Volunteers		A				
	Community Arts Volunteers		A				
	Companionship Volunteers		A				
	Computer Training Volunteers		A				
	English Language Volunteers		A				
	Environmental Volunteers		A				
	Gardening Volunteers		A				
	Home Maintenance Volunteers		A			C	C
	Home Tutoring Volunteers		A				

	Hospital Volunteers		A				
	Housework Volunteers		A				
	Library Volunteers		A				
	Meals on Wheels Volunteers		A			C	C
	Office Work Volunteers		A				
	Pet Care Volunteers		A				
	Preschool Volunteers		A				
	School Volunteers		A				
	Shopping Assistance Volunteers		A				
	Volunteer Carers		A				
	Volunteer Cooks		A				C
	Volunteer Drivers		A				C
	Volunteer Interpreters		A				
	Youth Work Volunteers		A				

Table D-1: Mobile and Electronic Services Rendered by the Local Councils

Appendix E:

Scripts of Local Government Interviews

A Council Interview Script

Interviewer: Thank you very much for agreeing to take part in the mGovernment research for services. I'd like to introduce myself. I'm Tarek El-Kiki, researcher at the University of Technology in the IT Faculty. I really do appreciate you giving some of your precious time for this interview. First of all I'd like to highlight a few points pertaining to this interview. That there are no right or wrong answers to the questions of this interview and that your opinions, ideas, thoughts are what we are interested in. Not those of other people. Would you like please to introduce yourself. Your name and occupation.

Interviewee: My name is ( ). I am the team leader at Corporate Planning at ( ) Council.

Interviewer: Thank you very much. The research revolves around the hypothesis that the success of mServices depends on the effectiveness of the service project management which gives its first priority to satisfying end user's needs. This interview is a step in the process of approving or disapproving this hypothesis.

As you know, end users' needs for a mobile service are those drivers which stimulate the use of such service. The researcher found that these needs are divided into four main categories: Value for money, Quality of service, efficient transactions and Strategic data, as per the research paper previously sent to you.

I'm heading now to the first question of the interview. What sort of problems did you encounter in rendering electronic services please?

Interviewee: I suppose some of the problems that we do find from time to time in terms of electronic services, web based services, is probably the size of the documents that we put on the server. Ensuring that the size isn't too great, such that users can download them. I suppose that's one of the main issues that we have. To enable residents to actually access, and it's more the information services on the web. That's probably the main issue that we've got.

Interviewer: I see. Since when have you implemented electronic services?

Interviewee: I believe it's been around since about '97. I haven't got an exact date but we've had it for a reasonable period of time. I think it was around '97, '98 when we got it.

Interviewer: Well actually I went through the survey online, and I found that most if not all the services that are online were ticked electronically by you.

Interviewee: Correct.

Interviewer: And this is very interesting actually compared to other Councils. The question here was, assuming that there are some services that are not rendered neither electronically or through the mobile technology .... I'm changing this question now to ask you, what do you think or which services do you think, in other words, would be rendered via

electronic services in the next five years for example. I'm talking about electronic services on the webs. Actually I can see that they are all here ticked.

Interviewee: Yeah, and I suppose to give you a context why I've done that.... We have a community service directory and one of the bases of electronic services providing information. All those categories are categories within the community services directory which is a static document that you can access on the web. Now not all of those services that we provide - deliver ourselves directly. But it provides a pointer to organisations locally that they can access those services through. For example, accommodation. We don't provide accommodation yet we have available on the website through the community directory, details of organisations that do deliver those services.

So in terms of what services do I believe will be delivered electronically in future, I would have to say, and this is based in discussions we've had with the IT staff here .... We're currently in the process of replacing all our major systems here. Our finance system, our land information system, our geographic information system. Part of the reason why we're doing that is some of the technology we've been using has been around for a while. It's not integrated. But I suppose the other aspect is we're wanting to move across to a .NET environment which will therefore allow us to turnaround and start to provide more things electronically or use those sorts of mediums.

In terms of future plans as to roll out, there's nothing .... I suppose a lot of work has gone in over the last 18 months, 2 years to get to the point where we are at the moment. To actually get that platform in place. Over the next 12 months we're actually going to be rolling out those systems. So in terms of firm plans for actually delivering specific services online over the next 5 years we haven't got any clearly identified at the moment. However, I suppose speaking to the customer service manager; I should say these are things people would like to do not necessarily something the organisation is committed to do. We'd like investigate use of voice over internet protocol. So we can turnaround and deliver some more services online and utilise our telephony system a bit better, turnaround and achieve that. To try to move away from ... give people options opposed to face to face services so that they can actually access services out of hours and things of that nature. I don't know if I've answered your question there adequately.

Interviewer: Yes, of course. Thank you very much. Going forward in our questions, how does the Council view the mobile technologies? In other words are they important, worth trying, negative application etc.

Interviewee: I would have to say that we have a positive outlook in terms of the use of mobile technologies. And I say that essentially we recognise that they will potentially give it other avenues of communicating with our customers. And ways that our customers are probably better attuned to receiving. We know that we do have a high percentage of people that live locally that have mobile telecommunications such as mobile

phones. So it's something whereby we are conscious that we need to move our business in a direction in terms of the way the customers want to interact with us.

Interviewer: Do this mean there are some near future plans to expand the use of mobile technologies?

Interviewee: In terms of hard and defined plans, we haven't got the specific areas we've targeted at the moment we want to achieve. But we recognise that in acquiring the new platform that we've got that we actually need ..... it needs to be capable of us being able to deliver services beyond what we deliver now. Needs to be able to grow with us as an organisation in terms of being able to meet the challenge and demands of our community.

Interviewer: So, what do you think the barriers are for implementing the mobile technologies?

Interviewee: Did you jump ahead there?

Interviewer: No, no, no I'm still in the same section which is the third section. I'm just enquiring about the barriers in your opinion ....

Interviewee: I suppose the barriers at this point have been we haven't had the infrastructure in place to turnaround and be able to do it. I suppose that's the basic .... What it basically comes down to is we can't move affectively in that direction because our systems won't turnaround and support it. So that's probably the key barrier. And I have

mentioned the fact that we're changing systems which will hopefully allow us to I suppose move as an organisation in the directions our customers want us to move.

Interviewer: I see. Alright, so now I'm just heading to the 4th section here. It's enquiring about the impact of mobile technologies on Council's internal .....

Interviewee: Sorry. Just before we move off that one, I did say platform was one of them. In terms of platforms it was one, in terms of the barriers, I suppose the other issue, it's always the cost benefit. We need to consider that in terms of any mobile technologies that we move towards. What's the cost of it and what are the benefits. Are there tangible benefits that we can measure and quantify and if not, if they're intangible how does that stack up. So that's probably not actually a barrier but a consideration.

Interviewer: I see. Just to elaborate on this point, do you think that citizens themselves present a barrier for using mobile technologies?

Interviewee: Culturally? What you're saying is, and correct me if I'm wrong, that what you're saying is are the customers wanting to interact with Council in a different way than what they have now. I would say we're probably in a position like a lot of businesses at the moment whereby some of our customers, particularly the younger ones, are very much into technology and they want to be able to access services on their terms in their time. While an older demographic that probably hasn't

been as accepting of technology and still want to deal face to face with people so there is that.

We as an organisation do recognise that we still need to provide services that meet the needs in ways that people want to interact with us. In other words ..... banks back in the 90's and even in 2000 turnaround and started to move staff away from the front counter and tried to focus people on using automatic tellers and things of that nature. I don't think that's probably an approach us as an organisation can take. I think the local government the community has higher expectations of us and probably wouldn't let us get away if they didn't want to interact with us in that fashion.

Interviewer: Fantastic. When or if the mobile technologies are applied to render services to both internal employees and citizens outside and businesses of course. Could you please just explain the impact of those mobile services on internal processes and ways work is proceeded.

Interviewee: I would have to say we haven't done ... I'm not aware of anything in terms of .... Any government in terms of delivering services directly to the community. We do use it to make our own practices efficient. An example I'll use there is, for instance our rangers have PDA's which they use to issue parking infringements. They use to communicate with the office. In terms of their operational effectiveness they're a lot more effective and efficient. But that's not delivering a service directly

to the community which is what I think is the focus of what you're on about. Correct?

Interviewer: That's right.

Interviewee: In terms of office running costs, it's hard to say whether it increases or decreases. It would depend on the nature of the technology and the uptake by our customers. If there's no great move over to... you know that mobile sort of way of engaging, we're probably not going to be able to move people off the front line. We'd need to look at each case and do a bit of a cost benefit analysis to see whether there would be an increase or decrease.

In terms of cost for providing information to the public, I think generally speaking if we can move people to engage in either through eGovernment or mGovernment, lead more people through engaging of this way, from a face to face perspective and from a front line staffing perspective, I think the cost for providing information will go down because we can make some savings in terms of front line staff. And I suppose it's also a case of can we get first contact resolution there. So for instance if someone receives the information they're after from mobile technology the first time round rather than having to contact us back. I can see the cost of providing that information would possibly be quite low.

I suppose in terms of internal processes there's probably a decrease in the cost in completing transactions ..... to the public ..... If they're able to access the information through mGovernment and do

it without having to interface with council staff, I would say that the cost of the transaction for the public, if they can get the information readily and without .... And they can get the information right the first time, the cost of the transaction would decrease.

Interviewer: I see. Regarding the ability of staff to work more flexibly.

Interviewee: I think that's probably would increase. And I suppose my efforts is there, it would potentially free up front line staff. Would potentially free up staff who have been contacted through other means. Than to engage with Council. So I think it would probably improve.

Interviewer: Fantastic. What do you think aobut the requirements for office space? This is built on the previous question/point regarding the ability of staff to work more flexibly.

Interviewee: Correct. And I think it depends on the mobile technology we're talking about. And I'll give an example here. For instance, telephony. Whereby .... At the moment extensions are fixed to the one desk. If we had some form of mobile technology whereby you could hot desks and take your number with you. That would obviously free up desk space. And if you could actually .... By the same token, if you were out in the field the customer could contact you direct. Again I think that would free up office space because there would be more greater flexibility in the work environment and how you actually move around.

Interviewer: Fantastic. Regarding time spent.

Interviewee: Time spent. Look again I think that there's probably definitely opportunities. I think that would decrease. If the customers, again can get their information online through mGovernment and get it as efficiently as they would in terms of contacting a staff member. Most definitely I think it would free up Council resources. I suppose the other issue there is Council offices are only open for limited hours, with mGovernment, the way it would work I would imagine that you could access it 24 hours, 7 days a week. So I would imagine that would be the case.

Interviewer: So would the quality of the service decrease or increase?

Interviewee: I think the quality of the services would increase because there'd be no arbitrary limits placed on when people could actually see information.

Interviewer: Fantastic. I think this question was fully answered even the rest of the points were already covered in some other comments.

Interviewee: OK. The only other thing I was going to say was, in terms of quality... mGovernment, you're probably going to have less errors if the systems set up right. That's probably about it. OK the next question?

Interviewer: Regarding problems in using mobile technologies. In your opinion, what are the problems which could be created from implementing or using mobile technologies in your council?

Interviewee: I suppose this is more a challenge than a problem. Information. Ensuring the information that you do put out doesn't breach any privacy regulations. And that's more a systems control of a business rule around that.

I suppose the other thing that was identified was probably cultural change. Trying to balance .... And this is in terms of the customer and also Council staff. Actually turning around and becoming adept using the technology, the mobile technology. But also customers in general in the sense that..... Getting them to move away from the traditional ways of engaging Council to the mobile technology. So I suppose I'm trying to look at it as a glass half full rather than a glass half empty being a problem with the technology.

Interviewer: I see. So in order to overcome these problems or challenges, what do you think the factors that would make any implemented mobile service successful?

Interviewee: Sorry, can you say that again?

Interviewer: In your opinion, what factors would make any implemented mobile service successful?

Interviewee: I suppose having a strategy to ensure that the population is aware of it and takes it up. So they engage with it. So actually, rather than just saying it's available, actually having a plan for how you can encourage people to use it and become aware of it and road test it and the system through the process.

Interviewer: OK. That's fantastic. Any other point or..?

Interviewee: And I suppose the only thing .... No that's probably it for that one. Yeap.

Interviewer: I see. I'm just heading to the last question. How do you see mobile services changing the way work is done by the council? Yes we said that employees have to learn more about using the technology itself...

Interviewee: Now I think this is very important in the sense that, and the example that I gave at the start around our rangers that use mobile technology. There's an element there that technology was completely new to them. They had to ... and their role doesn't necessarily involve lots of work on computers and things of that nature. So actually taking up and become adept and being comfortable with using mobile technology I think is a challenge for the organisation. Particularly any change to the technology you're using. Actually having a good strategy in place to actually manage not only the training of it, the ongoing training to make sure that in utilising that you're actually getting the best that you can out of it. So I see those as kind of the major changes for Council as an organisation.

Interviewer: That's it. Thank you very, very much. Actually it's been a very precious interview and I believe it will be enriching my current findings and I really hope that one day once you find the mobile technologies are applied to your Council just remember me.

Interviewee: I will mate. All the best with the rest of your work. I hope you get A+'s or high distinctions whatever they are.

Interviewer: Thank you very much.

Interviewee: Cheers.

Interviewer: See you later. Goodbye.

B Council Interview Script

Interviewee: (Name de-identified) speaking, good morning.

Interviewer: Good morning ( ). This is Tarek El-Kiki, how are you today?

Interviewee: Good thank you.

Interviewer: Shall I start the interview?

Interviewee: Yes, sure you can.

Interviewer: Fantastic. Thank you very much for agreeing to take part of the Mobile Government Research. I'd like to introduce myself I am Tarek El-Kiki, Researcher at the Faculty of IT, UTS. I really do appreciate you giving some of your precious time for this interview.

First of all I'd like to highlight a few points to begin the interview. There are no right or wrong answers to the questions of this interview. Your opinions, ideas and thoughts are what we are after. Not those of any other people. We'd like, for the sake of recording actually to introduce yourself. Name and occupation please.

Interviewee: My name is ( ). I'm the manager of corporate information technology at B Council.

Interviewer: Fantastic. Just to quickly brief you with the hypothesis of this research. This research revolves around the hypothesis that success of mServices or mobile services depends on the effectiveness of the service project management which gives the first priority to satisfying

end user's needs. As you know, end users' needs for a mobile service are those drivers which stimulate the use of such service. The researcher found that these needs are divided into four main categories: Value for money, Quality of service, efficient transactions and Strategic data, as per the research paper previously sent to you.

Well I'm just heading towards the first question....

Interviewee: Can I just.... from the questions you've provided are you classifying mobile services as an electronic services or its mobile services basically technology on the road? Is it technology on the road or does it include electronic service delivery?

Interviewer: Electronic service delivery as well, but through the mobile devices. For example the inspectors on the road, they have their devices with which they can immediately book people who are parking in different places or .....

Interviewee: That's right. But that would be a mobile solution it's not necessary an electronic service offering because the public cannot do transactions with that service.

Interviewer: Well actually my research involves both of them.

Interviewee: OK. Yeah. I just wanted to clarify that, that's all.

Interviewer: Alright. I'll head towards the first question... What sort of problems did you encounter in rendering electronic services? The normal electronic services.

Interviewee: OK. I think from B Council's prospective, electronic service is an extension of the current services Council offers to the community. So for example you may be able to check for your development application, it's on the web. You normally, in the traditional service offering you would have been able to come to customer service and check, or you would be able to ring on the phone but now you would have the ability to see, ok where is my development application anything like that on the web, so .... We make a little bit of a difference between electronic service delivery and mobile service.

So in terms of electronic service delivery, I think probably the issues are that were confronting are, it's the community that B Council serves.... who's the consumer of the service solely. In the case for example of development applications clearly the local community is, but so are developers and so are private businesses. So you need to be very careful who you're targeting your business and it may be in stage approach that you offer the service. Now that's in terms of your external communication and your assessment of the market like with any product or service.

On the other hand, on the back end you have to be very sure that your back end processes have been reviewed and they're actually supporting your electronic offering. So for example you know that consumers or for electronic services have expectations of some level of immediacy. So if you requested, or if you fill a form and request something you expect a 24 hour response. If your back end processes don't support them, then it becomes very frustrating and a number of

us have had experience with this when you call and do a transaction and you never hear anything or you hear two weeks from today, so you end up with a particular form.

The biggest challenge is to do that. For example, at the moment we offer very few electronic services. Because we don't feel that.... we also have the language issues here, B is a ethically diverse community and there are key languages, key people that speak language other than English and need to understand and comprehend of the services being offered. So all that needs to come into the assessment of is it time or not to offer an electronic service.

And so we're taking a very slow approach, there are some things we offer, for example we have been putting information online, we have a live catalogue online, we have DA tracking as I was referring to so you can actually log in and find out where your development application's at a particular time.

We..... I suppose.... we provide rate payments online and we do that in cooperation with a security mail company. So we are in very good service in terms of how we introduce those.

Interviewer: I see. Since when have you implemented electronic services?

Interviewee: Probably we started about 4 years ago.

Interviewer: I see. As you have filled in the online service survey, there are some services that aren't rendered neither electronically nor via mobile

technology, such as the utilities and laws & justice. How have do you think they will be rendered in the following 5 years for example?

Interviewee: Well some of those services don't actually apply to us. Not all local governments provide the same type of services. So we definitely don't provide any of the law & justice services. It's not under our responsibility.

And you referred also to other things I think, what was your other example?

Interviewer: The utilities for example.

Interviewee: Utilities, I'm just having a look here. Utilities, yeah well we also don't offer any of those. I mean we do have a role in roads and traffic monitoring, if you like, but its down as part of an overall community and there are certainly some initiatives that are being looked at at the moment in that area, but again that points to the readiness. At the moment not all data is easily accessible electronically so the initial discussions in that area is making sure that data is available and that type of data needs to also be available in stationary information.

So for example one of the things we're doing at the moment is reviewing whereas before we used to just call them graphical information systems. We undertook a preliminary report last year in terms of service chain or not. It is clear now we're looking at spatial information rather than geographical information. So this year we're

going to actually document all the requirements in order to determine whether we get the right technologies to put those online.

Interviewer: I see. Well .. actually that pulls me to the following question, how does the council view the mobile technologies? In other words, are they important, worth trying, negative application effects..etc.

Interviewee: Definitely council thinks they're important. I suppose mainly the areas of improving information access, accessibility, improving service delivery and also in income areas. Improving response times and productivity and I'll refer later on as to the sorts of things we've done and what we have found.

Interviewer: I see. So are there any near future plans to expand the usage of mobile technologies in B Council?

Interviewee: There are particular mobile technologies much more so than electronic services, and I think we're a little bit more conservative with electronic services than with mobile devices.

Interviewer: Since when have you started implementing the mobile services?

Interviewee: Mobile services probably a couple of years ago, but that's grown significantly quickly. It's taken up more and more. For example, let's look at what we've looked at in terms of mobile devices. One of the things that we've done from is the investigation of the mobile .... Of the status of the roads from the council accountable for roads maintenance. So there is a maintenance program in an ideal situation

of the status of the roads and there is investigation of that. That's an electronic format but we're part of a general plan to use mobile devices and so the data is more immediate and whatever.

This is proven useful. However, we have decided to slow down in that area. The people that actually do the work are not very computer literate so we need to bring some knowledge back in that area. Now the other area that we introduce mobile devices as you know is the traffic authority, the parking infringement area. They all use PDAs and they issue infringements on the spot, and that's very much a mobile solution in NSW especially where complaints come from those areas, but what's happened is they have been more effective and more accurate because most Councils have automated that process into a mobile solution.

Interviewer: I see. That means there's some sort of effect of mobile technology.... In regards to the internal processes, could you explain the impact of the mobile technology.....

Interviewee: There are. I'll give you another example. One of the areas that we introduced mobile devices and we continue to do is in the compliance area. So Council has started environmental health mobile service that will investigate compliance to set down regulation just like a regular job or they will respond at some point.

Now they have a mobile device and through that mobile device with wireless broadband access they can access the same systems as though in the office. Basically they don't need to come into the

Council to start their job. They can start immediately ... they all recoup from Council for their travel so they can start immediately on the job.

We've done the first stage of that and we have been actually quantifying at the moment, but clearly there have been cases on paper. For example in the past they used to print everything on single invoice for every single job they had to do. They took the piece of paper, and then they came back and gave the piece of paper, and it was admin staff who actually then entered it into the system. So clearly there have been piles of paper.

There have been problems duplicating in terms of administration tasks, and I suppose also in other areas. There have also been some improvements that is turnaround time. For example the other day someone rang and said they had a problem with their storm water and within half an hour there was someone there at the door so they were surprised.

There's been improved accountability in terms of the officers themselves and the processes they have. There has also been some overhead cost reductions that we hope for each division because we know they need to have a desk for everyone. The office is being redone to be more efficient .... Where they need to relate a little bit but they don't need an office space necessarily.

Interviewer: I see. Excellent. Effected costs? did it affect the flexibility of the work; did it affect the promptness of the service delivery .....

Interviewee: Improved service delivery.

Interviewer: Excellent. In your opinion, what are the problems which could be created from implementing or using mobile technologies in the council? Now we are talking about the side effects.

Interviewee: Yeah well, I have eluded a copy of them. Clearly you need to invest in time management and training because you're talking to workforce that in the past didn't need to be computer literate and the Councils more or less still have a significant employment population that are baby boomers or pre baby boomers. In this particular Council we are about 50% marks in that area. So those people haven't grown with computers, some of them have never used computers. So you have to be careful with that.

It does have an impact in terms of the IT infrastructure itself t in terms of its availability and reliability.

Interviewer: I see. So in your opinion the success or failure factors would be summarized in which categories?

Interviewee: In terms of service delivery it needs to be a very good service analysis. What are the objectives and benefits we're trying to achieve for the consumer of the services that we offer? Then their needs have to be very effective timing. Mobile services and electronic services highlights is the interdependences between one area, one section of Council to the area to another. So we need to really have a process documented from beginning to end. So you need to invest time on

that. So you've done that and you've got the management committee members to do that. And you obviously need to address, like I said all the other financial and management issues. Identify those. All the HR issues and then you have a very good implementation, and that's been the case for us. For example the rangers and the road patrols it's been a very smooth process.

Interviewer: I see. Last question is where do you think B Council is heading through the implementation or using of mobile services?

Interviewee: I think we've had some samples of some good successes. And I think that the more people, more areas looking at benefits clearly mean the .....and I would say in the next eighteen months to two years development applications is an area where there'll be heavy concentration and the ability to lodge online, the ability to enquire about it, and all the regular, the type of licenses and certificates that Council issue, that's where the focus is going to be.

Interviewer: I see. Well that comes to the end of this very interesting interview. I do appreciate your participating in this study and I believe what you've just said now will enrich the case study of Bankstown Council. Thank you much.

Interviewee: Thank you. I hope I can have a look the project when it's completed.

Interviewer: By all means. Thank you very, very much.

C Council Interview Script

Interviewee: (Interviewee's name de-identified)

Interviewer: Hello Mr ( ), this is Tarek El-Kiki.

Interviewee: G'day. How are you?

Interviewer: Good thanks. Can we we start the interview if you don't mind?

Interviewee: Excellent. Thank you.

Interviewer: I really appreciate your time.

Interviewee: My pleasure.

Interviewer: I'll start by thanking you for agreeing to take part in this mGovernment research and I'd like to introduce myself. I am actually recording. I'm Tarek El-Kiki, researcher at the Faculty of IT at UTS. I really appreciate that you give me some of your precious time for this interview.

First I'd like to highlight a few points pertaining to the interview. That there are no right or wrong answers to the questions of this interview. Your opinions, ideas, thoughts are what we are interested in not those of other people. Would you like, please to introduce yourself?

Interviewee: Sure. I'm ( ). I'm manager information systems at C Council.

Interviewer: Fantastic. This research revolves around the hypothesis that success of mServices or mobile services depends on the effectiveness of the

service project management which gives its first priority to satisfying end user's needs. This interview is a step in the process of approving or disapproving this hypothesis.

As you know, the end users' needs for a mobile service are those drivers which stimulate the use of such service. The researcher, who is me, found that these needs are divided into four main categories: Value for money, Quality of service, Efficient transactions and Strategic data. And actually we happened to send you a copy of the paper.

In order to explore the extent of eGovernment applications like C Council, what sort of problem did you encounter in rendering electronic services please?

Interviewee: Well the electronic services that we've, sort of, have been cutting into are not sort of illustrated in your questionnaire, but some of those things for instance a debtor payments online are service requests. Lodgement and tracking online and things like certificate planning, certificate lodge requests lodgements online. They're some major ones.

Some of that stuff is around ... certainly for technology but perhaps more importantly understanding what our internal business processes are in terms of dealing with those things and then translating that simply so that the folk can understand it. Yeah that is instead of having an individual interpret a request at the desk and then deal with each request differently we need to have, you know a clearer sense of

what our processes are that we follow each time so that we can make it more efficient.

So in essence I think the key challenge in delivering an eService is actually working out what your own business processes is first, and then, you know getting some technology that supports that. So to that extent I do agree that with your thesis that it's necessary to work out what the end user needs and then work out how, in a cost effective and quality way, those transactions can be decided with the correct answer really.

Interviewer: I see. Alright, so since when have you implemented electronic services at C Council?

Interviewee: Well we've been.... our first major foray into this was online tracking of development applications, and that's been in place several years now. 3 years? That's particularly popular with the mums and dads. We call them the mums and dads developers. They may just want to put a room on the house or out a swimming pool in. There often people who rely on professionals like architects and so forth to lodge the plans, but instead of them having to ring the architect everyday, they can actually log on and see where it's up to and the process themselves. It's been very popular and also helped to boost transparency. So it's actually helped to move the process along..... Putting efficiency down for it.

The other major success we've had in the last year is, we've had a trial of using remote working devices, PDAs for mapping street trees using

GS spatial coordinates and that's significant to us because we have mapped now to 8,000 trees on our property .... on public streets. It's essential in terms of planning an asset renewal program for those trees so that there's a green canopy in the city. We're particularly proud of that because when we look at aerial photographs from even 40 years ago there were no street trees. There were some trees in people's properties but essentially (C)'s probably got about 300% or 400% more street trees than it had 40 years ago and we of course want to make the city even greener so that sort of asset renewal program is critically important. Our program for cultivating, harvesting and cultivating species that are generic to the area. So that species that naturally occur in particular streets, we harvest those seeds and plant more seedlings of that particular type so that we're actually protecting the micro-environment as well.

Interviewer: I see. Well as you have filled in the online service survey, there are some services that aren't rendered neither electronically nor via mobile technology, such as law and justice services how do you see them rendered in the following five years, for example?

Interviewee: Well one of the services that we're going to be providing in the next 5 years is close circuit television in the centre of the city. And that's obviously an electronic services source. Another service that we'll be providing in the next 5 years, a major service for us is part of our strategic asset management process is capture .... barcoding RSID of major assets but in any case geospatial capture of assets and just to put that into perspective, we have an annual budget of around $150

million but we have around $3 billion worth of assets and it's much cheaper for us to draw a greater return on investment of those assets. So not just being concerned about whether we can maintain it but rather looking at development or whatever to help us draw a greater return from those. So that's really asset capture, electronic asset capture and the interface with the sort of name and management of those assets is the next major project that we're starting in the next couple of weeks.

Interviewer: I see. Well let's move forward. In order to explore the extent and the prospects of mGovernment application by C Council how does the Council view the mobile technologies? In other words, are they important, worth trying, negative application effects etc.

Interviewee: I mean ... local government is very case specific. It's about local community and I guess it's.... most of our service provision is from static locations like for instance childcare centres. Where mobile government is really coming into its own is through that geospatial understanding of streets and communities. So for instance, if you had to get a truck crew to deal with a major problem like a burst water main is not one of ours, but say if it caused something wrong on a footpath that had become acute and someone had fallen and injured themselves. Increasingly the community expects that we will, while we're in that street, deal with the other service requests that are before it, and not necessarily because they're just as urgent, but because people expect a sort of theme or service from us.

So having the capacity to have a geospatial understand of the street and the service request, the nature of those and to be able to, for the overseer of the truck crew, to look at all of that while they're in the street and just quickly deal with those other problems is a really major step forward for us for instance.

I mean other mobile services that are absolute critically important, they would be Meals on Wheels. You probably see those. They're almost totally mobile and that's got, you know as research demonstrates, when all the people have good nutrition, they live longer, they liver healthier, they stay at home longer. But also worth in community safety issues. You know if the meal is not being consumed then we know to look into the safety of a person. Have they fallen down, do they need some assistance. So really a mobile service within our communities is a critical to what we currently do from our static facilities.

Interviewer: I see. So are there some near future plans to expand use, or usage of mobile technologies?

Interviewee: Oh, absolutely. The major one that I mentioned earlier is the asset one so that the compliment of the eCapture of assets is the eManagement of assets I guess.

Interviewer: I see. I see. Just a last question in this section, when did you start actually implementing mobile services or thinking about planning to?

Interviewee: 5 years ago.

Interviewer: 5 years ago? Fantastic. Moving forward, I'm just trying to understand how effective mGovernment implementation, for C Council's different type of operation. So, I'll just ask this question to help actually pinpoint. And what I'd like is comments on these. I'll mention these pinpoints one point after the other and if you can give me your comments as clearly as you can. So this question is phased like, could you please explain the impact of mGovernment on internal processes and ways of working. Has the product increased or decreased. The first point is - office running costs.

Interviewee: Well, it actually increases it in the short term. Because we don't have the technology to properly maintain an effective mobile office I guess. I'm not sure if it reduces it.

Interviewer: second point - costs of providing information to public.

Interviewee: Well, it probably increases though, but it makes it more information available so overall it's a real positive for the public.

Interviewer: Interesting. Cost of completing transactions for public.

Interviewee: It reduces the cost of those transactions.

Interviewer: The ability of staff to work more flexibly.

Interviewee: Increases it more.

Interviewer: Requirements for office space.

Interviewee: It decreases that.

Interviewer: Time spent providing information to public.

Interviewee: It reduces that.

Interviewer: Time spent processing transactions for public.

Interviewee: It reduces that.

Interviewer: Service quality.

Interviewee: I guess it increases that but you really need to, I think it allows you to serve more customers more quickly and I think quality services depends on other factors as well like how well trained your staff are, how well you understand your business processes. There's not an essential relationship, but certainly it allows you to serve more people.

Interviewer: Fantastic. The last one, public access to information and services.

Interviewee: It certainly increases it.

Interviewer: Public take up of information and services.

Interviewee: Increases.

Interviewer: Fantastic. Now actually to the 5th section, I'm just trying to find out about the problems in using the mobile technologies in C Council. In your opinion, what are the problems which could be created from implementing or using mobile technologies in C Council?

Interviewee: Well I think one of the problems we've had is that we believed to be using technology for solutions, and I think that we've now come from more considered perspective which is we need to improve our business processes and understand those before we can really apply mTechnology to the situation.

So that's one problem and with the solution we have, with the other thing we.... there's the potential for information, loosing information, before the merge. For instance, young people who are able to effectively use mTechnology.... there's the potential to get better access than maybe older people who are from a non English speaking background. I think it needs to be worked through with this as well.

Interviewer: Fantastic. The 6th section here is about gaining an expert and practical opinion about mobile services success factors from you. In your opinion what factors would make any implemented mobile service successful?

Interviewee: As I said before, we've had our own business processes and are improving them as part of the implementation is essential. I think that understanding the purposes of where you're putting the technology to before you try and apply it is rated critically important. And what I mean by that is I think that it's important that people understand more about mServices... There's no real point in trying to do everything at once. You've really got to pick what will impact in order to maintain a meaningful investment to demonstrate doing something constructive I guess.

Interviewer: Fantastic. The last question is about the future. How do you see mobile services changing the way work is done by the Council? Or in other words, where do you think we're going?

Interviewee: Well where we're going is largely a paperless record management. Certainly our transactions are largely on digital record now, and I have here paper from 1846 stored in fixed location. We haven't created paper files now for 3 years. We've managed a clean break with the product. We are now looking at more sophisticated programs for managing data maps. So I guess the products of mServices needs to be stored and managed in digital repositories or in way it wasn't created before. So I think that's one major way work has changed. We have in the meantime 2 floors of files in this building. Now we've gotten rid of all those...that's one thing.

Having too, a major change of technology I think that people tend to be on duty longer work wise, and this is a challenge in that as well. Having said that I think work will be much more flexible. You know you get to take your work home while there are your family commitments, I say.

Interviewer: I really appreciate your invaluable opinions and answers and I believe after analysing this interview the data I'm getting will be enriching my analysis.

Interviewee: Good luck. Thank you very much.

Interviewer: Well if you're interested in getting a copy of the research in about 4/5 months time from now, by all means just send me an email and follow up with me.

Interviewee: Thank you.

Interviewer: Thank you very much. Goodbye.

Appendix F:

Experts' Questionnaire

Section One

1. Your age:

- [ ] 20 - 35
- [ ] 36 - 50
- [ ] 51 - 65
- [ ] Over 65

2. Your gender:

- ( ) Male
- ( ) Female

3. Country where you live:

4. Which of the following best describes your organisation?

5. Job title:

6. Have you ever used a mobile government service?

- ( ) Yes
- ( ) No

7. If yes, which mobile service was it? Otherwise go to Question 9.

8. How would you rate this service?

- Very Satisfactory
- Satisfactory
- Neutral
- Unsatisfactory
- Very Unsatisfactory

9. Have you been involved in developing a mobile government service?

- Yes
- No

10. If yes, which mobile service was it? Otherwise go to Section Two.

11. How would you rate the mobile service you were involved with?

- Very Successful
- Successful
- Neutral
- Unsuccessful
- Very Unsuccessful

Section Two

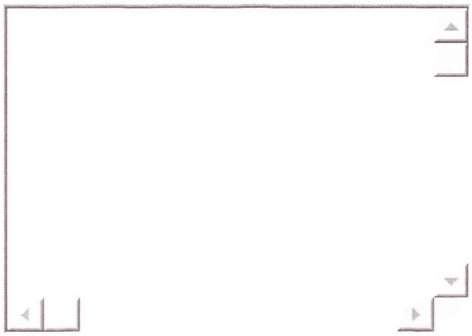
This section aims to find out the reasons which will motivate or de-motivate those who have never used a government mobile service before, but are willing to speculate on the use of it.

1. Would you be willing to use a mobile service such as paying your parking fees,

voting, submitting your tax return or ordering an extract of birth certificate by phone?

- Yes
- No

2. In your opinion, what would motivate you to use that mobile service?

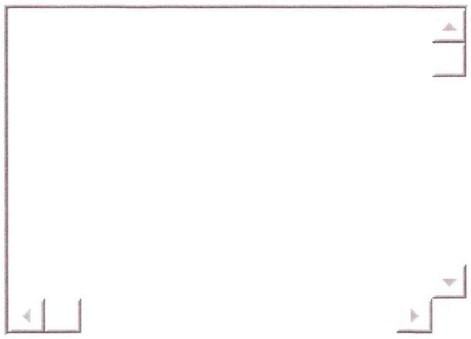


3. What are your reasons if you prefer not to use a mobile service?

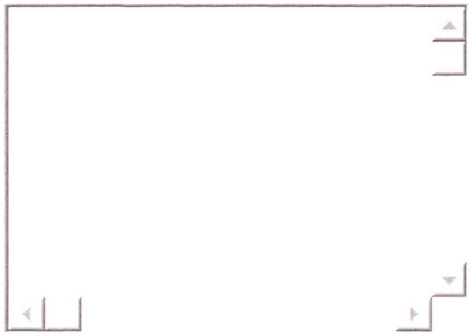


Section Three

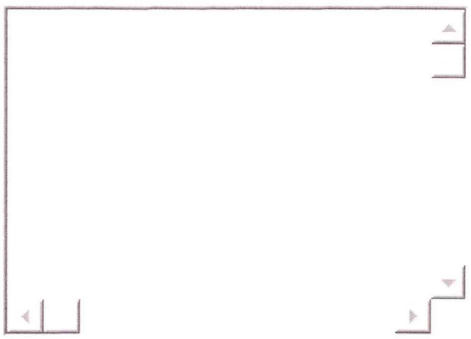
1. In your opinion, what are the main barriers to success in mobile service projects?



2. Would you please outline your suggestions for overcoming those barriers?



3. If you are interested to be amongst those respondents who may be contacted for further clarification, please provide your email address and telephone number in the space below:



That is it. Thank you very much for your time and invaluable participation. As a reminder, for the results of this survey, please visit this site in about three months. Meanwhile, please feel free to contact us at any time for a feedback.

Researcher: Tarek El-Kiki
Supervisor: Dr.Elaine Lawrence

Appendix G:

End-Users' Questionnaire

Introduction

Mobile government services are those services rendered to end users, be they citizens or businesses, through the use of mobile communication technology within the government administration. Examples include: general informative government SMS services, such as traffic jams and anti-pollution messages; and mobile payment for information and services e.g. public parking. More information can be obtained at this link.

This survey is part of the research undertaken by Tarek El-Kiki for his PhD in Computing Sciences at the Faculty of Information Technology, University of Technology Sydney, under the supervision of A/Prof Elaine Lawrence. The survey consists of only four sections so please take as little or as much time as you would like. Your answers will help us find out how government services could be delivered to you via your mobile device regardless of your location saving you time and effort.

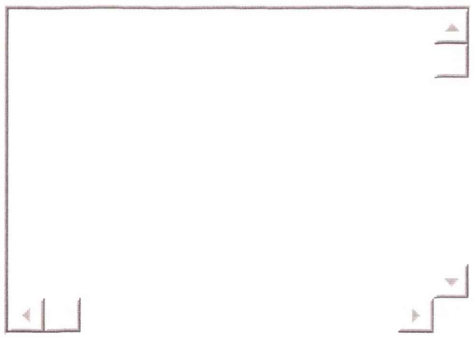
If you wish to withdraw from the study for any reason, you may simply quit the survey by closing your browser window. Your replies will remain completely anonymous (not even your IP address will be sent to us). The research data gathered from this project may be published in a form that does not identify participants in any way. Thank you very much for your participation. Please email Tarek at tarek@it.uts.edu.au with any questions or comments about this research, or if you would like to receive a copy of the conclusion of the study.

SECTION 1

Q1. Which type of mobile device do you usually use? (please, select from the following)

- ☐ Mobile Phone
- ☐ Palm PDAs are based on Palm OS
- ☐ PocketPCs are based on Windows OS
- ☐ Tablet PC
- ☐ Laptops/Notebooks
- ☐ Other devices (please answer the following question)

Q2. If you are using another mobile device that was not mentioned in the above question, please tell us what it is:



Q3. You are using mobile devices for: (please, select one of the following)

- ○ Less than a year
- ○ One year
- ○ Two years
- ○ Three years
- ○ Over three years

Q4. Your skills of using a mobile device can be assessed as: (please, select one of the following)

Poor

Basic

Average

Above average

Advanced

Q5. When did you first become aware of mobile government services? (please, select one of the following)

Less than 6 months ago

6 to 12 months ago

More than 1 year ago

More than 2 years ago

I have never heard of mobile government services

Q6. Are you currently using a government mobile service?

Yes, I am a business

Yes, I am a citizen

No, but I occasionally participate in activities such as forums, conferences, etc. (please go to question 8)

No, but I am interested in using one in the near future (please go to question 8)

No, I'm not interested

Q7. If you are currently using a government mobile service, how long have you been using it for? (please, select one of the following)

Less than 3 months

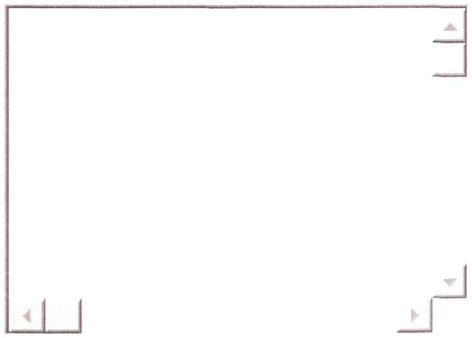
Between 3 and 6 months

Between 6 and 12 months

More than 1 year

More than 2 years

Q8. Which government mobile service you are currently using or interested in?



- If you happened to use one of the government mobile services, please proceed to the following SECTION 2.
- If you are interested in using one of the government mobile services but haven't yet done so, please proceed to SECTION 3.

SECTION 2

This section is to be answered by users who have already used a government mobile service at leat once. Please indicate how much you agree with the following statements regarding your utilization of government mobile services. This is a core question in the research so it will be highly appreciated if pay it your full attention:

	Strongly Agree	Agree	Uncertain	Disagree	Strongly Disagree
	SA	A	U	D	SD
1. I consider using government mobile services saves money.	SA	A	U	D	SD
2. I think the mobile service provides sufficient information.	SA	A	U	D	SD
3. I have previously been informed about government mobile services.	SA	A	U	D	SD
4. I believe government mobile services are available everywhere.	SA	A	U	D	SD
5. I consider government mobile services provide reliable information.	SA	A	U	D	SD
6. My government mobile service is always error-free.	SA	A	U	D	SD
7. I am satisfied with the speed by which the pages appear on the screen.	SA	A	U	D	SD
8. I find it easy to find somebody to answer my questions.	SA	A	U	D	SD
9. I understand how government mobile services work.	SA	A	U	D	SD
10. I get the information I need in time through					

government mobile services.

SA A U D SD

11. I have full trust in government mobile services.

SA A U D SD

12. I feel confident about my privacy protection when using government mobile services.

SA A U D SD

13. I feel my transaction is secure when using government mobile services.

SA A U D SD

14. I am able to communicate with government officials through mobile services.

SA A U D SD

15. I am enabled through mobile services to actively give my opinion to the government.

SA A U D SD

16. I am enabled through mobile services to protest unfair or ill-advised decisions.

SA A U D SD

17. I think the rendered content of the service is relevant to my culture.

SA A U D SD

18. I have previously been trained to use government mobile services

SA A U D SD

19. I think government mobile services provide access to people with disabilities.

SA A U D SD

20. I believe government mobile services are available anytime.

SA A U D SD

21. I think government mobile services are fault-tolerant

SA A U D SD

22. I am always provided with correct

information when using government mobile services.

SA A U D SD

23. I receive the expected assistance when I need it.

SA A U D SD

24. I consider government mobile services are easy to use.

SA A U D SD

25. I am provided with up-to-date information when using government mobile services.

SA A U D SD

26. I think the language of the service is easy to understand.

SA A U D SD

27. I believe government mobile services are available to everybody.

SA A U D SD

28. My connection session to the government mobile service is always recoverable even if there is any interruption.

SA A U D SD

29. I am always provided with accurate information when using government mobile services.

SA A U D SD

30. I receive courtesy calls after my request is fulfilled.

SA A U D SD

31. It was not difficult learning how to use government nobile services.

SA A U D SD

32. I find it easy to understand the language of government mobile services.

SA A U D SD

33. I think using a government mobile services

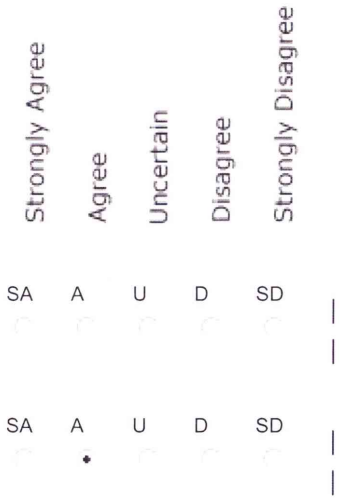
costs less than using the same traditional one.

34. How do you imagine using government mobile services in the future? (please select one of the following)

- I will be using government mobile services more.
- I will be using government mobile services less.
- I will be more or less using government mobile services to the same extent.

SECTION 3

This section is to be answered by users who want, and are expecting, to use government mobile service in the near future. Please indicate how much you agree with the following statements regarding your utilization of a government mobile service. This is a core question in the research so it will be highly appreciated if you pay it your full attention:



	SA	A	U	D	SD
3. I believe I would be informed about government mobile services before they started.					
4. I think government mobile services should be available everywhere.					
5. I expect government mobile services to provide reliable information.					
6. I expect my government mobile service to be always error-free.					
7. I expect to be satisfied with the speed by which the pages appear on the screen.					
8. I assume that it would be easy to find somebody to answer my questions.					
9. I expect to understand how governement mobile services work.					
10. I expect to get the information I need in time through government mobile services.					
11. I would have full trust in government mobile services.					
12. I would feel confident about my privacy protection when using government mobile services					
13. I assume that my transaction is secure when using government mobile services.					

SA A U D SD

14. I consider I will be able to communicate with government officials through mobile services.

SA A U D SD

15. I expect I will be able through mobile services to actively give my opinion to the government.

SA A U D SD

16. I expect I will be able through mobile services to protest unfair or ill-advised decisions.

SA A U D SD

17. I believe the rendered content of the service should be relevant to my culture.

SA A U D SD

18. I assume some training would be provided to users before they started using government mobile services.

SA A U D SD

19. I expect government mobile services to be accessed by people with disabilities.

SA A U D SD

20. I assume that government mobile services would be available anytime.

SA A U D SD

21. I assume that government mobile services would be fault-tolerant.

SA A U D SD

22. I expect that I will always be provided with correct information when using government mobile services.

SA A U D SD

23. I assume that I would receive the expected assistance when I need it.

SA A U D SD

24 I expect government mobile services would be easy to use.

SA A U D SD

25. I expect to be provided with up-to-date information when using government mobile services.

SA A U D SD

26. I assume that the language of the services is easy to understand.

SA A U D SD

27. I expect government mobile services would be available to everybody.

SA A U D SD

28. I expect my connection session to the government mobile service would always be recoverable even if there is any interruption.

SA A U D SD

29. I expect that I will always be provided with accurate information when using government mobile services.

SA A U D SD

30. I assume I would receive courtesy calls after my request is fulfilled.

SA A U D SD

31. I assume it would not be difficult learning how to use government mobile services.

SA A U D SD

32. I expect the language of government mobile service to be easy to understand.

SA A U D SD

33. I expect using a government mobile services costs less than using the same traditional one.

34. How do you imagine your future using government mobile services? (please

select one of the following)

- I will try using government mobile services.
- I will learn more about government mobile services.
- I don't think I will be taking any action regarding government mobile services.

SECTION 4

Your gender:

- Male
- Female

Your age:

- Under 18
- 18 - 24
- 25 - 34
- 35 - 49
- 50 - 65

- Over 65

Your education:

- Elementary School
- Junior High/Middle School
- High School
- Vocational/Trade School
- Bachelor's degree
- Master's degree (MSc, MA, MBA)
- Doctorate Degree (Ph.D)

Your occupation:

- Student
- Civil Servant
- Company Owner
- Company Employee
- Self-employed
- Retired

- Unemployed
- Other

If you answered "Other" for your occupation, would you please name your profession?

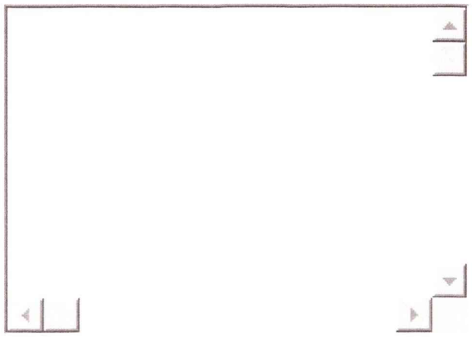
Your income category (in Australian Dollar which is approximately equal to USD 0.77, and EUR 0.60):

- $10,000 - $30,000 p/a
- $30,000 - $50,000 p/a
- $50,000 - $70,000 p/a
- $70,000 - $90,000 p/a
- $90,000 - $110,000 p/a
- Over $110,000 p/a

SECTION 5

In your opinion, what are the best 3 (three) things about mobile government

services?



And lastly, what are the worst 3 (three) things about mobile government services?

