

Mobile Government Framework – A Step Towards Implementation of Mobile Government in Nigeria

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Abstract M-government is largely a matter of getting public sector Information Technology systems geared to interoperability with citizen's mobile devices. In this regard, developing a coherent m-government framework in the public sector is an important factor and this will encourage implementation of mobile government in Government parastatals. The basic concept for good framework is that it is principle-driven. A common mobile public services framework is presented, its major components discussed and the major principles: Interoperability, Security, Openness, Flexibility and Scalability are highlighted. A case study of E-Payment is presented as means of effective tax collection system in Nigeria. The major challenges Mobile Government can impose is discussed and solution proffered.

Keywords Framework, Interoperability, Scalability, Flexibility, Security

1. Introduction

Mobile Government is extending the concept of government further with delivery of information and services to the doorsteps of the citizens in a personalized way via what they already have, the mobile phone.

Mobile Government is the next inevitable direction of evolution of e-Government. It is about modernizing the public sector organizations using mobile technologies, applications and services. M-government is not only about technology but rather how technology revolutionizes the public sector activities and how the society adopts these technologies. Africa is one of the leading continents with growing mobile penetration.[9]

The basic cornerstone of good governance are quality of service, quick response mechanism and above all, accountable and transparent process mechanism but the existing systems does not reflect most of these in its activities across all sectors and arm of government in Nigeria.

1.1. E-government

E-government is defined as the use of information and communication technology to enhance access to, and delivery of government services for the benefit of all. It is also known as electronic government (e-govt), digital government, online government, or connected government. It can be described as digital interactions between government and citizens (G2C), government and businesses

/Commerce (G2B), government and employees (G2E), and also between government and governments/agencies (G2G).

A common feature of e-government is the automation or computerization of existing paper-based procedures to enhance access to, and delivery of government services to the citizens. More importantly, it aims to help strengthen government's drive towards effective governance and increased transparency for better management of resources, growth and development. E-government also aims at integrating government ministries, departments and agencies in a manner that promotes their interaction.

1.2. Information and Communication Technology (ICT)

Information and Communication Technology (ICT) is an umbrella term that covers all technical means for processing and communicating information. The convergence of information technology (IT) and telecom technology gave birth to ICT. Practically speaking, ICT finds expression in digital technology and all its uses and variants, including the computer, the internet, mobile telephony and the different electronic applications (e-banking, e-government and e-commerce for example),

1.3. Mobile Government

Mobile Government can be defined as a strategy and its implementation involving the utilization of all kinds of wireless and mobile technology, services, applications and devices for improving benefits to the parties involved in e-government including citizens, businesses and all government units[1]

Governments around the globe utilize the Information and Communication Technology (ICT) to improve services' delivery to citizens by introducing e-government. In the last

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decade, some of the governments have noticed the rapid evolution of wireless technologies and the widespread of internet-enabled mobile devices in many countries. This encouraged these governments to move naturally towards mobile government (m-government) as a next step to enhance the quality and delivery of their services. M-government is an added value to the e-government since citizens will be able to access e-government services using mobile technologies such as mobile phones. The main forces that influence the move from e-government to m-government are mobile device penetration, emergence of mobile internet and mobile net applications and services. Internet enabled mobile devices penetration rates are incrementally growing compared to the traditional wired PCs as well as internet penetration rates. This spectacular growth has changed how citizens perceive the mobile phones functionality. It is no longer used only for voice communication, but also as a way for convenient connectivity to the internet used for transferring data, exchanging emails and doing business transactions.[2]

Mobile government, (m-Government), can be described as the extension of e Government to mobile platforms, as well as the strategic use of government services and applications which are made possible using cellular/mobile telephones, laptop computers, personal digital assistants (PDAs) and wireless internet infrastructure. Mobile government involves using mobile tools to enhance either the interactions between users and government or the processes of government. Tools in use for mobile government include mobile networks, mobile devices (tablets, smart phones, feature phones), their associated technologies (voice calling, SMS text messaging, location detection, internet access), and software in the form of network services and applications.[3]

This paper is organized the the following way, section 1 introduces the paper with background information, explain the term M. Government and E Government. Section 2 present extensive literature review and case studies of M. Government across the world. Section 3 presents a general frame work that can be used for any M. government domain: M-Education, M-payment, or M-Business. Section 4 contains a case study of E-payment as an effective tax collection system in Nigeria. Section 5 enumerates the advantages, challenges of M-government as well as the recommended solution. Section 6 concludes the write-up.

2. Literature Review

2.1. M-Government around the World

As citizens' demands increase for better public services, mobile technologies are paving the way for governments to deliver better, quick and on time information as well as transactional services to the citizens. M-government helps governments to provide services anytime and anywhere for citizens. The case of deploying mobility to e-government services is beneficial to the developing countries compared

to the developed ones. Developing countries are able to bypass building heavy infrastructure required for regular internet access by adopting the wireless internet technologies that save them cost and time. Therefore, barriers faced by generale-government like the lack of technical infrastructure and low level of citizen's readiness can be overcome with the m-government initiatives[2] Mobile government matters because it has the potential to liberate users from the physical or location-related constraints inherent in conventional service delivery and traditional electronic government services.

There are more than 6 billion mobile telephone subscriptions worldwide in early 2012, and more than four-fifths of the world's population covered by mobile telephone networks,[4] Mobile Government can make public services and processes available and accessible. M-government is largely a matter of getting public sector IT systems geared to interoperability with citizen's mobile devices, anywhere at any time, to almost anyone. M-Government is an emerging discipline concerning the rise of advanced mobile and wireless communication technologies that would improve the quality of service (QoS) that government services offer to citizens. An example of such beneficial use of mobile technologies would be the sending of a mass alert to registered citizens via short message service or SMS.

Considering available statistical data, it becomes apparent that in the future, mobile communication technologies will play an important – and in several countries even leading – role. According to GSM world coverage 2009 as reported in[5] the world wide number of mobile subscribers has grown from 640 millions in the year 2000 to 3.978 billion in the year 2008. To identify the fastest growing markets, the world wide distributions of mobile subscribers for the years 2000 and 2008 have been listed in Table 1

Table 1. Worldwide distribution of mobile subscribers; source[5]

World nation	2000	2008
Africa	2%	9%
Americas	8%	11%
Asia Pacific	31%	43%
Eastern Europe	4%	11%
Western Europe	33%	13%
Middle East	4%	6%
North America	18%	7%

Analysis of the data provided above turns out that Africa, Asia, and Eastern Europe have been the fastest growing markets between the years 2000 and 2008. It is to be expected that this trend will continue especially in developing countries in Asia and Africa.

The second reason for the popularity of mobile devices is the constantly increasing with its set of supported features and functionality. These developments have been enabled by the ongoing miniaturization of electronic components. Mobile phones of the first generations came with relatively low computational power and small internal memory capacities. In contrast, modern smart phones are already equipped with CPUs running at up to 1 GHz and internal

memory of several hundreds of MB. These improved processing and storage capabilities pave the way for the operation of more complex applications on the mobile device. Thus, the increased popularity of mobile devices and their still increasing hardware equipments can be identified as important enablers of m-Government services[5]

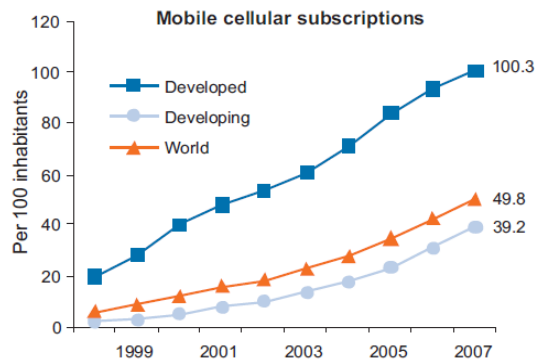


Figure 1. Mobile cellular subscriptions in developing and developed regions; taken from ICT development index[5]

2.1.1. Mobile Government in Egypt

Many governments worldwide have started moving towards mobile government as a next step to improve their interaction with citizens and enhance the quality and delivery of their services. A conceptual model for youth adoption of m-government services in developing countries was introduced using a survey method for data collection. The model was tested and findings showed that perceived usefulness, compatibility, awareness, social influence and face-to-face interactions significantly contribute to the prediction of the intention to use m-government.[2]

The Egyptian e-government program officially started in 2001 with a mission of delivering innovative and value added solutions to deliver government services to citizens and business with a superior quality. Currently, there are more than 100 transactional services provided to the Egyptians. With the expectation to expand in the future and reach up to 700 services, the e-government portal's structure was designed to accommodate this huge number of services in two languages (English and Arabic). The e-government offered services via mobile devices such as sending voting information by SMS.[2]

2.1.2. M. Government in Europe

Antovski and Gusev[6] proposed a comprehensive platform that will enable access to e-government services over variety of mobile and wireless devices. The idea is to develop a discovery service that will enable a mobile European Citizen to travel from one place to another and discover the services available in that area on demand. The security issue is crucial considering the lack of trust from wide number of citizens when the mobile and wireless devices are in question. The security aspect of the research focus on optimized security protocols with light processor power requirements and level of security up to the wired

systems. The proposed application solution is based on the postulates of: Interoperability, Openness, Security, Scalability, Usability and Mobility.

2.2. Specific Mobile Government Case studies

2.2.1. BuitenBeter

BuitenBeter is a smartphone application for iPhone and Android smartphones that offers a direct communication channel between citizens and local governments. Issues in the public space such as destroyed or malfunctioning infrastructure components can be easily reported by citizens using BuitenBeter. This project has been launched in Eindhoven in April 2010 and has immediately scaled up nationwide in the Netherlands. Because of its success, it is already planned to port the application to other mobile platforms as well[5]

2.2.2. TextaParent

TextaParent is an Irish web platform that aims to improve the communication between schools and parents. After registering an account, school principals can send mass SMS messages to parents in case of unexpected events like changes, closures or cancellations. The service can also be used to send regular notifications and reminders to facilitate communication in emergency cases.[5]

2.2.3. Mobile Examinations

Ultralab at Anglia Polytechnic University, the phone company Orange, and CWA New Media in New Zealand have developed a mobile exam system. The system allows students to answer questions through a mobile phone. The questions are automatically generated and asked by a so called robot, which saves time for teachers and allows for efficient examination processes[5]

2.2.4. Cell-Life

According to their web presence, Cell-Life is an NGO located in South-Africa that aims to 'improve the lives of people infected and affected by HIV in South Africa through the appropriate use of mobile technology'. Cell-Life home care workers monitor patients in their homes. Relevant patient related data like medication or symptoms are transmitted by the health care personnel to a central server using mobile technologies. The transmitted data is stored in the central server and necessary responses to the received messages are sent[5]

2.2.5. mPedigree

Counterfeit of legal drugs is a serious issue especially in developing countries. In Ghana, the mPedigree project aims to tackle this issue. Consumers can send the serial number that is printed on the bought drug to a defined and easy to remember short code using their mobile phones. Information about the authenticity of the bought drug is then sent to the consumer via SMS[5]. National Agency for food, Drugs

Administration and Control (NAFDAC) in Nigeria of recent place mobile numbers on drugs for the citizens to contact them for confirmation before application of such drugs.

2.2.6. Learning about Living

According to the Learning about Living project's website, Learning about Living has three basic goals. The first goal is 'to use ICT to educate young people on issues around adolescent reproductive health so that they can make informed decisions'. Furthermore, the project aims to 'improve the information available on sex education and encourage debate'. Finally, Learning for Living also wants to 'help to increase and improve gender equality in a country where male superiority is regarded as the norm'. The project has been carried out in Nigeria and uses mobile technologies basically for two of its initiatives. The MyQuestion initiative allows young Nigerian people to submit questions on the mentioned topics to trained counselors, who answer each question individually. Questions can be transmitted online, through a telephone hotline, or by text message. The second initiative that relies on mobile technologies is MyAnswer. Young people can win prizes by answering a monthly question correctly either online or by text messaging. Learning about Living was a two-year project and was started in 2007. Its success can be seen by the fact that within the first five days more than 2,500 questions have been submitted through the MyQuestion service.[5]

2.2.7. Fire Fighting

The wireless technologies used in firefighting is similar to the way they are used in sales force automation. Basically, mobile technologies allow the fire fighters to know more about critical data related to a fire incident before arriving. These data include pre-fire plans, occupancy demographics, building inspection information and relevant information in the surrounding area of the events. The recent efforts are moving towards embedding the smoke alarm systems and sprinklers with wireless sensors which could allow firefighters to know the level of smoke, a room's temperature and the digital image of the room before they arrive. This would enhance their operations efficiency reducing number of fatalities and improving safety for the firefighters. The wider benefits can be obtained from integrated systems with the police and medical emergency services, resulting in additional savings, efficiencies and community protection[1]

use of ICT solutions for these services range from university matriculation examination to public sector payments and this has enabled government to render these services with greater efficiency and less cost to the citizens.

The national matriculation examination for admission to Nigerian higher institutions of learning are currently making use of ICT for marking the answer scripts, the results released and up-loaded to the website within seven working days. All over the country, what it takes for candidates to know their results was to visit the internet site of the exam body. The revolutionary dimensions of this ICT-enhanced service can only be appreciated when compared with the former system where the exam results were anxiously awaited by the candidates for close to eight (8) weeks. When eventually released, the notifications were sent by surface mail service through the post office. This created all sorts of mix-ups as some notifications may eventually get lost in transit partly because some candidates' addresses would have changed in the interval. Very importantly, manually marked scripts were more prone to errors than computer marked ones.

Government-to-Employee (G2E) services have also benefited immensely from e-government in Nigeria. The central government as part of its public service reforms instituted the use of electronic payments for all public sector transactions. These include salaries of employees and payment for procurements and contracts. Now public servants can draw on their salary accounts just hours after the funds are electronically-transferred on the instruction of the accounts department. Before now it took at least four days for the cheque to be cleared and credited.

3.1.1. Pillars of M Government Framework

The purpose of the general framework principles is to ensure the honoring of the purpose and objectives of the m-government initiative in the area of mobile communications. A common mobile public services framework must first and foremost incorporate the following principles or pillars:[2]

a) Interoperability: Most government services are interdependent and most likely need to share certain things in common. Interoperability is the ability of a system to be able to operate amongst other systems without unwanted interference. It is not just based on reading data on mobile devices from other systems, but that there must be functional coherence between the systems. Interoperability is based on bilateral agreements in which the rules for communication are defined for each new system that is connected. If information is to be easily exchanged between authorities involved, it is necessary for the mobile systems to speak the same language. The core of interoperability is the stipulation of common data models and common protocols for exchanging data. The protocols must support the data models via so-called metadata (i.e. information about data), which describes and defines the data.

b) Security: The security functions should be organized in

3. M-Governments in Nigeria

3.1. Trends of E-government

Government to citizens (G2C) refers to services rendered to members of the public by the public sector establishments. Nigeria is a nation of about 150 million people distributed over a territory of 923,768 square kilometers. It is therefore easy to imagine the logistic challenge that goes with any central government service that is accessed nationwide. The

such a way that the requirements for security of all the stake holders can be met to an extent that is acceptable in the given application scenario. The solution also has to be adjustable for new requirements, without a large part of the previous security implementation becoming worthless. The information should be structured according to sensitivity and access according to the needs of the given parties.

c) Openness: The openness of the system should be considered on several levels: open standards, open interfaces, open specifications and open source codes. In principle, public authorities should use open, formal standards. The architecture is conceived in a modular design where main functionalities are developed separately in modules that, when combined correctly, carry out the whole desired process.

d) Flexibility: this is generally the ability of a system to go through necessary adjustment without been affected negatively.

e) Scalability: Scalability should be built into a system from the start. It is important to be able to maintain both the functionality and efficiency of the solution if the need changes, for example in respect of user numbers, transaction volume or data quantity. Modularity and scalability must also relate to the nature and scope of the work.

f) Quality of Service: Quality of Service defines a set of criteria used to classify the level of service allotted to an application. The term quality of service also refers to the physical parameters and settings which ensure the good quality of service to user applications as the case demands. A satisfactory service to end users should be the major aim of any meaningful project.

3.2. Mobile Government Framework

The frame work, shown in Figure 2, represents a top down approach starting with the analysis of the government services that need to be made mobile. This is followed by necessary research and investigatory studies, technology and infrastructural requirement analysis with the operational platform required of the particular services spelt out. The mobiles channels required for the services delivery is considered and finally the mobile government services delivered to the beneficiaries. Introduction of m-government services depends upon co-operation between the key players to provide the necessary infrastructure and then devise programs and applications that utilize the capabilities of available technology.

3.2.1. Government Services

It is quite possible that most of the services to be make mobile to citizens were probably been rendered through exiting government agencies either electronically (E-Government) or manually. It is very important to identify which of services is already been rendered so as to focus on making the service mobile. This section describes some of the most important service requirement approaches.

a) Purpose

Another important consideration of m-Government is the intended purposes of the mobile service.[5] The following purposes among others for m-Government in the public sector are very essential.

- M-Communication should aims at improving the communication between governments and citizens. Reliable information and communication channels are key requirements for a functioning society. However, especially in developing countries, reaching citizens is often difficult for governments. Mobile devices and appropriate m-Government services should allow governments to easily get in contact with their citizens.

- M-Democracy comprises initiatives to improve the democratic participation of citizens using mobile devices. This includes for instance activities in the fields of m-Voting or political decision-making processes. M-Government can strengthen existing democracies by enhancing existing representative institutions. Furthermore, m-Government should help creating a more vibrant civil society.

- M-Administration aims to improve internal governmental operations within and between public authorities and agencies. Mobile Government should primarily bring government administration closer to the people. A wide gap that exist between the citizen of Nigeria and the government should create a thirst for Mobile Government.

b) User interface Requirement Analysis

The particular types of interface a mobile government service can use mostly depend on the type of service to be rendered. The major thing common to all is that the size of the device through which the service will be rendered be taking into consideration. Web-based services are where interaction between authorities and citizens usually occurs through a web browser running on the citizen's client system and displaying content like web forms being hosted on the particular public authority's server. Modern smart phones or other comparable mobile devices are usually equipped with a web browser. However, because of the limited hardware resources of these devices, the usability of their integrated browsers is in general worse compared to desktop PC systems or laptops. In consideration of the given limitations of mobile devices, many m-Government services forbear from relying on web technologies. Instead, these services make use of other mobile technologies being available on mobile devices. For instance, these services can rely on short text message service (SMS) only and can thus be classified as non-web m-Government.

Other examples for these kinds of services are those relying on voice-based input and output interfaces. Reliable and usable interaction with users is one of the challenges of m-Government. While classical e-Government services mainly rely on web technologies, m-Government services usually make use of a broader spectrum of technologies being available on mobile phones.[5]

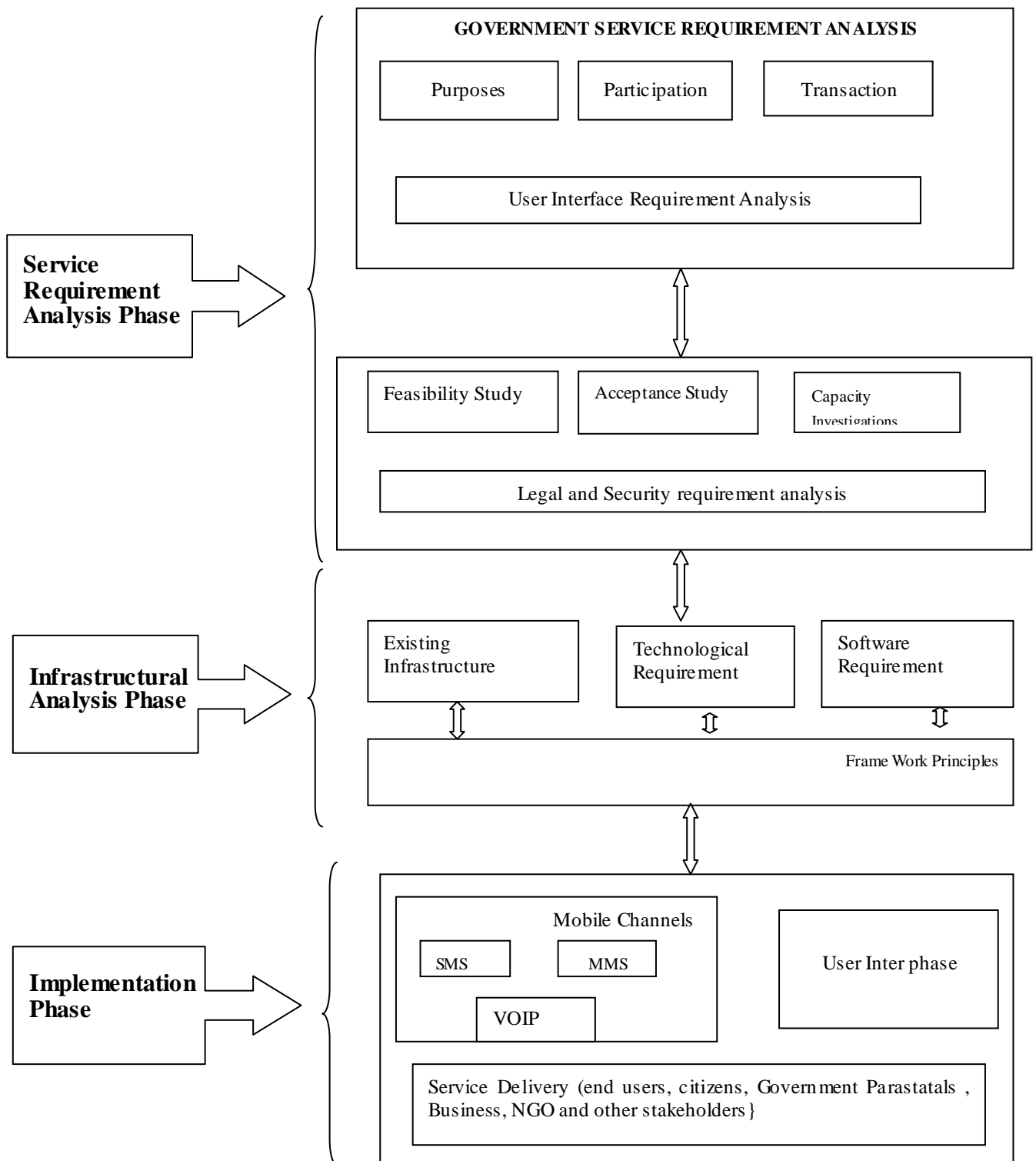


Figure 2. Propose Framework for Mobile Government in Nigeria

c) Mobile Transaction

The type of transaction that will be carried out within an m-Government process is another key property of m-Government. There are three different types of transactions in m-Government[5]

- *Informational transactions* basically include the publishing and broadcasting of messages to end-users. In the

context of m-Government, this includes for instance the sending of alert messages to citizens by governments in case of emergencies. Informational transactions are one-way; hence there is typically no possibility for receivers of published information to reply or to directly interact with the sender.

- *Transactional services* are usually bi-directional.

Citizens are able to interact with the particular authority directly. This interaction is often based on web applications. Using this type of service, users are able to carry out governmental procedures completely online.

- *Operational services* refer to operations that take place within a governmental authority. An example in the field of m-Government is a police officer being equipped with appropriate mobile devices that allow him or her to connect directly to the police's central databases and services.

d) Participation

Traditionally, the development of e-government (i.e., internal and external) interactions have led to four basic avenues of collaboration between parties involved. These are government-to-citizen (G2C), government-to-employee (G2E), government-to-government (G2G) and government-to-business (G2B) interface. These operations occur at all levels of government. A straight line adaptation of m-government would suggest mobile government to Citizen (mG2C), mobile government to employee (mG2E), mobile government to mobile government (mG2G), and mobile government to business (mG2B) linkages. The dissemination of the required services majorly are through SMS, MMS and VOIP through available service providers like MTN, and Globalcomm. Participations are expected from all categories of stake holders

3.2.2. Feasibility and Acceptance Study

The research and innovation components of the framework can be addressed in the following tasks:

- a) Research on the feasibility of implementing mobile and wireless services in e-government. This is the preliminary investigations into the possibility of making a specific service mobile. It details out the requirement and the challenges to make provision for in the M. government structure. Level of acceptance and usability should also be put into consideration. Level of awareness required should also be spelt out. Nigerian Government recently approved free distribution of mobile Phones to all farmers to enable them receive alert of their fertilizer distribution without middle men. The level of acceptance by farmers was very poor.[11]

- b) Specification of Service related components required for service integration must be identified

- c) Specification of Content related components (Metadata- the specification of the content, more specifically the essential data and its format)

- d) Development of Interoperability Framework- that is integration of operations that need to work together without unnecessary interferences.

3.2.3. Technology and Infrastructure

Mobile communication networks are the key technology for any mobile service as they are responsible for any data transmission from or to mobile end devices. With the introduction of GSM, the world-wide success story of mobile communication had begun. Powerful mobile

communication networks can thus be identified as an important enabler of complex m-Government applications

The technology and the speed of the mobile internet have evolved through various generations. Initially mobile telephony systems were analog, circuit-switched. Voice links were poor, capacity was low, and security was almost non-existent. Then comes the second generation (2G) protocols using digital encoding such as GSM and CDMA. These technologies are in use around the world and support high rate of voice but limited data transfers. They offer auxiliary services such as data, fax and SMS. The next generation technologies and protocols, (2.5G) extend 2G systems to provide additional features such as packet-switched connection (GPRS) and enhanced data rates. Third-generation protocols support much higher data rates, and are intended primarily for applications other than voice. Full fledged 3G should support bandwidth-hungry applications such as full-motion video, video-conferencing and full Internet access[1]

Mobile phones are following a trend to become one of the most personalized computing devices. One of the sources of the need for personalization comes from the limitations of devices in terms of their size and processing capacity. It is not really possible to present mobile users with abundance of information, nor is it advisable to put the users to inconvenience extensive browsing. Therefore the recent trends in mobile net applications have been tailoring the services to the user's profile.

3.2.4. Operation Platform

From the outset, the emphasis should be placed on creating a platform that would be easy to use and specifically tailored to the needs of administrations, service providers and end users. That meant designing software that incorporated features such as usability, openness, interoperability and scalability, and would allow for networked operation.

The idea is to enable stakeholders to share the platform and also to adopt a common exploitation framework. The platform should be an interface to mobile operators and all kinds of content providers that participate in the framework.

The broad goal of mobile government should be to harmonize the quality of public services and to overcome problems associated with the digital divide. Based on attractive business models, platform sharing is a means to provide the conditions for cost-efficient mobile services, especially in geographical areas with low internet penetration. Mobile Government should aim at providing new types of services targeting specific user groups as well as the wider public. These services should be configurable, personalized and dedicated to specific service content. It becomes easier and faster to integrate new services if the platform makes provision for core functionalities and interfaces. Though the platform is conceived for mobile services, it should be possible for it to be integrated with other platforms that use other dissemination channels,

typically the internet. Apart from simple messaging, mobile services are browser-based and are thus compatible with virtually all current 2.5G and also future 3G and UMTS mobile devices on the market.

New communication platform that should support highly personalized mobile services, Plug and Play environment for new mobile services; Implementation of optimized interfaces among the service providers, public authorities and citizens; and Innovative Service delivery.

3.2.5. End-users

The framework shows a diverse group of users of M-government. Policies are needed to address the impact of e-services through mobile technologies on the different types of users and, by extension, society as a whole. In a country like Nigeria with diverse linguistic and cultural groups of citizens, support for different languages is a crucial issue. It is essential that the m-government architecture comprises multi-stakeholder partnerships in areas such as policy development, service provision, infrastructure, research and development, technology, with a diverse range of potential beneficiaries including civil society and businesses.

4. M-Payments: A Case Study of Effective Tax Payment System in Nigeria

Nigeria as a nation are still grappling with ability to collect citizens taxes. Inability of Governments in this regards in the past were the cost of collecting small payments across disperse populations and far flung geographic locations.. This can be achievable via mobile payment technologies using retail outlets in the local communities without a need for long Bus trips to pay taxes at central locations or State capitals.

4.1. Service Requirement Analysis

Mobile payment can helps to solve the challenges militating against untapped government revenue. Table 4.1 represents the summary of service components required.

Table 4.1. Service requirement summary

Purpose	Collection of taxes
Participation	Citizen
Transaction	E-payment to Government account
User Interface Required	Enabled interface to capture the financial transactions

4.1.1. Feasibility and Acceptance Study

Of a recent Nigerian Government decided to buy mobile phone for farmers with the help of making Government

closer to the people. The response from the spokesman of farmers indicate that the farmer were more interested in subsidized loan instead of mobile phone. In this case the move by the government was unacceptable to farmers. Therefore, there must be prior study of each environment to determine the level of awareness and motivation required to encourage citizens to cooperate with the government in this regards.

4.12. Security

There is the need to provide human security for the cashiers as well as adequate security restriction needs to be implemented on the software platform to prevent fraudulent acts. Required level of passwords should be implemented as required on the transaction platform.

4.2. Infrastructural Analysis

a) Mobile Device - Nigeria has close to 100 million mobile phone lines, making it Africa's largest telecoms market, according to statistics by the Nigerian Communications Commission[12]. This will be used by citizens to receive the transaction notification from the the system as well as the expected amount before the payment.

b) i) wireless mobile devices for the operators or cashiers collecting the money to work with.

ii) Back Up servers for real time updates

iii) Government central data server at state level.

c) Software Requirement- Application Programmable Interfaces is required and customized for this specific purpose. It should also take into consideration the platform and the size of the device on which the transaction will be carried out.

d) Service Delivery- proper documentation is required from each phase of the framework to make the implementation easier. The major users of this system will non salary earners like artisans, street traders, Market women, farmers who have been enjoying government services without reciprocating by paying their tax.

How it Works

The services can be delivered at significant cost reduction for the government and the citizens using low cost mobile payment technologies. The mobile devices should be made available at different locations of a particular community where citizens can easily get to make payment. The amount to be paid can be communicated to the citizens through their mobile phones. The receiving officers can move from one end of the town to others from time to time to make thing easier since their device is a mobile device. Record keeping capabilities are enhanced through receipt issuance capability of mobile payment technologies which reduces the potentials for fund diversion or fraud. The back end server also updates each payee at the back server which can be connected to the central government data systems for real timely updates.

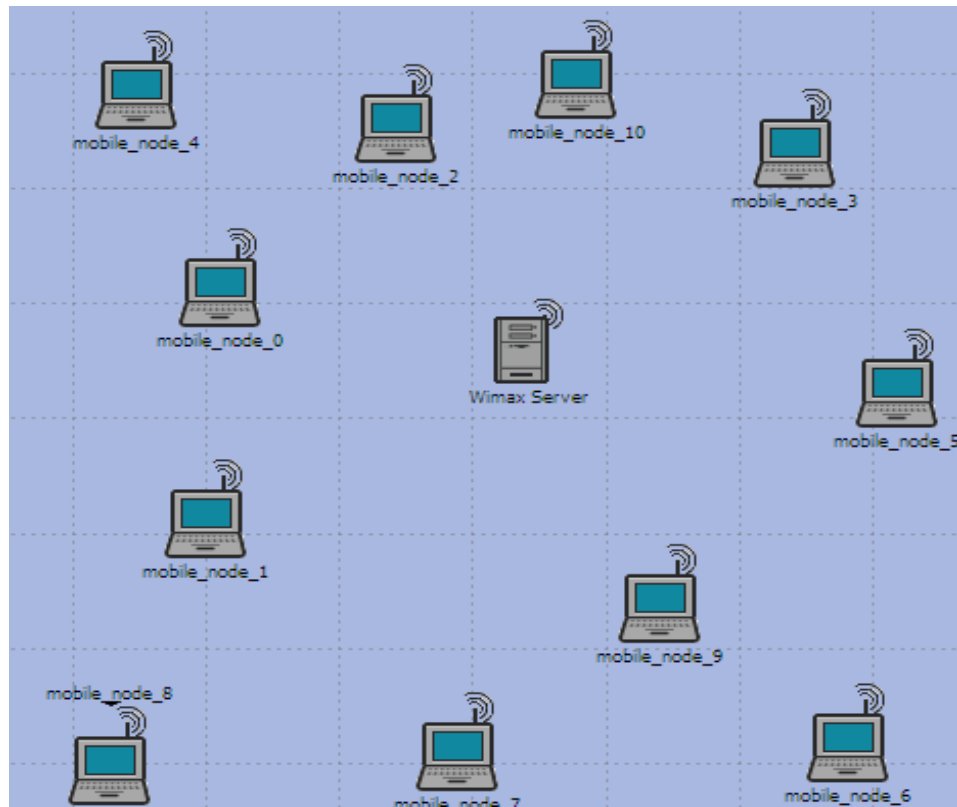


Figure 4.1. A model M. Payment using wireless mobile nodes

4.3. Benefit of the Propose Case Study

Lagos state government (Nigeria) with 20 million inhabitants, more than 700 standard eateries and 600 gas stations, non government workers, artisan and non formal workers, will benefit seriously from such m-payment system. That will go a long way in providing basis amenities that are currently lacking. More than ever before, African Nations can engage the citizens in a more effective and efficient method of collecting government revenues across all strata of the economy for meaningful and purposeful development without dependence on extractive industries which fuels corruption and environmental degradation and leads to unrest like in the case of Niger Delta of Nigeria. [9].

5. Benefits of Mobile Government in Nigeria

Health: Mobile Health is relevant for underdeveloped regions with weak infrastructures. Mobile technologies can be used to improve citizen's awareness regarding health related topic such as HIV or AIDS. For this purpose, informative SMS messages can be broadcasted to the people.

Education: In the context of education, mobile technologies can be used to improve communication between schools, students, and parents. Educational institutions make use of SMS to get in contacts with parents or to deliver personal information such as admission information in a timely manner. In remote areas where internet café are not available, mobile technologies can be

used in the context of education for example to obtain electronic teaching material where wired communication lines are not available.

Agriculture: mAgriculture denotes the use of mobile technologies in the agricultural sector. Mobile technologies can significantly enhance communication between producers and consumers and can contribute to improved market situations, which all participants can benefit from. Information about outbreak of certain diseases can be sent out to register farmers to take adequate precautions in good time.

Security Alerts and Disaster Management: In crisis situations, mobile technologies have proven to be an appropriate means of communication. Several projects all over the world make use of SMS messages to immediately notify citizens about imminent dangers. In the aftermath of disasters, mobile technologies are of importance as wired communication lines are often destroyed and mobile networks are the only way to communicate electronically.

Financial Services: Rural areas often lack the availability of financial infrastructures. Therefore setting up electronic financial services based on mobile phones will be of great advantage. Also in developed countries, mobile technologies play an increasing role in financial services. Transaction alerts from banks inform the account owner of transactions and the available balance in the account. This has reduced considerably the number of customers clouding customer service counter to know their account balances.

Mobile ID and Mobile Signature: Mobile ID and mobile signature are relevant topics especially in Austria,

Scandinavia, and the Baltic countries. Several solutions exist in these countries that enable citizens to reliably prove their identity or electronically sign documents using their mobile phone. Secure user authentication based on qualified electronic signatures is especially important for governmental processes on the transactional level. Hence, mobile ID and mobile signature are important enabler technologies for transactional m-Government[5] Similar to this in Nigeria is the electronic processing of driving license and national identity card.

5.1. Challenges of M. government

Although m-government has a number of benefits, yet this does not mean that there are no challenges associated with. For every good thing there is a price to be paid. A number of issues do arise when it comes to developing and implementing m-government. Privacy and the mobile phone screen limitations are major limitations for m-government. The following itemized challenges should be attended to have a successful Mobile Government.

a) Infrastructure development - the information technology infrastructure must be at a satisfactory level. The physical infrastructure refers to the technology, equipment, and network required for implementation of m-Government. Institutional arrangements and software that make m-government transactions possible are also very important. Wireless and mobile networks and related infrastructure, as well as software, must be developed.

Nigeria as a country have not yet adopted legislation for data and information practices that spell out the rights of citizens and the responsibilities of the data holders (government) b) Security: As governments find more ways to deliver services using mobile and geo-location technologies, concerns over security and privacy are mounting. If used properly, m-Government can promote transparency and accountability of service delivery. However, citizens often express concern about the security of their private and confidential information, and anonymity, among other issues. While location Illegal or unwarranted surveillance must also be avoided. Again, citizens need to be assured that installing applications or using services will not compromise their privacy. Mobile phone numbers and mobile devices are relatively easily hacked and wireless networks are vulnerable because they use public airwaves to send signals.

Governments will need to exercise care in securing their systems and software to avoid any perception of surveillance.

Citizens might seek anonymity as they become more vocal to avoid the risk of reprisals due to their views. Governments may need to consider which services require identification and which services might be more popular if citizens can remain anonymous when they make a report. Citizens might have a great concern about the privacy and security in m-government. The general issue is the convincement that their mobile phone numbers might be traced, when they send

their opinions and inquiries to the government. The government must overcome the mistrust, and assure mobile users that people's privacy is protected and the information will not be sold to third parties.

d) Acceptability: In a nation like Nigeria with high illiteracy level in rural areas, a major challenge is educating and preparing public authorities to move to the mobile channel, build public-private partnerships and adopt networking strategies for sustainable deployment of these services when made available. The bank in Nigeria has to place some measures like minimum amount of money that can be withdraw from the counter before many people make use of ATM cards.

e) User friendliness - the success of mobile government will depend on largely the number of its users, the citizens and other stakeholders. Governments need to offer easy access to m-government information in alternative forms, possibly, using video and voice communications, in order to increase citizen participation and provide citizen-oriented services. The platform should be user friendly and easy to understand.

f) Compatibility and interoperability - one of the technical difficulties might arise from compatibility of the mobile systems with the existing e-government systems. This may get even more serious in the cases of government offices having legacy systems which may not be easily reframed to fit into M-government framework.

5.2. Recommendations

Research support: The Ministry of Information should partner with private sector, other research bodies and academic institutions to provide objective diagnosis of requirements for the m-government infrastructure landscape in Nigeria.

a) Awareness: The users should be carefully educated in order to feel comfortable with m-government. It involves public campaign and benefits that the citizens can clearly see and understand. When implementing new technologies, governments should not force citizens to upgrade their current devices, but rather smart small with applications using current technologies and current bandwidth for data transfers or services. Starting small, but thinking big – basic m-government applications should be cornerstones of wireless strategies for governments worldwide.[7]

b) Principle : The systems should be open to handle new technologies and the strategy should have a clear, long-term vision for the provision of the service and information relating to it. Governments should prepare a complex strategy in close cooperation with the public, private sectors and academic institutions. The implemented solution as discussed above should be based on Interoperability, Security, Openness, Flexibility, and Scalability. The development of mobile public services must be based on sound framework based on the above emphasized principles.

The impact of mobile technologies on government administration is huge as this will have implications for the

success of widely adopted M-Government applications. In order to consume the benefits a sound standardized solution is to be defined.

6. Conclusions

Successful m-government, however, depends on more than merely developing and disseminating services. It also depends on individuals accepting these services into their normal practices. These individuals may be internal to government (employees), have external business relations with government (employees of business partners or private providers) or be consumers of government services (citizens and visitors). The write up present M-Government framework, and it is essentials. The framework presented can be used to guide m-government on the implementation of M-Government in Nigeria. Essentially, the framework shows the different issues that an m-government development and deployment policy must address. A case study on the implementation of M-payment as a powerful tool for the government to recover fund from citizens across the localities is also presented. Adoption of M-Government will definitely enhance use of electronic communication channel between administrative bodies, NGOs, and citizens and thus helps to overcome the digital divide and brings the government closer to the people.

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