

From E-Government to M-Government – Challenges Faced by Sub-Saharan Africa

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ABSTRACT

The rapid proliferation of mobile technology and the subsequent overwhelming penetration of mobile phones in developing countries have created a new platform, opportunity and challenge for the governments to communicate and deliver its services on 24/7 basis to citizens and business. This development paved way for governments to focus on modernizing public service delivery systems to improve the efficiency and effectiveness of their services. This emerging phenomenon in public service delivery is referred to as Mobile Government (m-Government) and is an extension of Electronic Government (e-Government) in which mobile and wireless communication technologies are used in providing and accessing government services.

This paper focus on exploring the migration from e-Government to m-Government service initiatives taking place in sub-Saharan Africa Region and give an analysis of the challenges of such endeavours and posse recommendations on the way-forward to overcome such stumbling-blocks. This study extensively explores contemporary research undertaken in this area to gain an in-depth understanding of the challenges faced by countries in sub-Sahara Africa adopting m-Government.

The study found that sub-Saharan Africa nations face a mammoth of challenges in their endeavours to extent from e-Government to m-Government and most of them are inherently attributed to widespread digital divide, poor outreach on the part of government on m-services and trust. The study provide some vital information and recommendations for policy makers for shaping up the future of m-Government and overcome a host of challenges faced by many countries in sub-Saharan Africa Region.

KEYWORDS

E-Government, m-Government, m-Governance, ICT, Challenges, Sub-Saharan Africa.

1 INTRODUCTION

E-Government (e-Gov) ‘refers to 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 can be less corruption, increased transparency, greater convenience, revenue growth, and/or cost reductions.’ [1]. Information and communication technologies, including the widespread mobile phones, has played and will continue to play a pivotal role in the development of a nation, region, or continent, especially one as underdeveloped as Africa, where the impact of ICT, e-Government and more recently mobile Government (m-Government) will even be greater[2],[3]. The basic and universal cornerstones of good governance are quality of service, quick response mechanisms and above all accountable and transparent process mechanism [4] and this can be easily achieved through the use of e-Government.

Therefore, this paper seeks to outline the relationship between e-Government and m-Government – clearly bringing out the challenges that are encountered by sub Saharan African nations in their endeavours. Briefly, ‘m-government can be viewed as an extension, or supplement of mobile-platforms, to more traditional e-government models’ [5]. According

to [5] & [6], m-government can be defined as ‘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.’ From this definition, it evident that an e-government strategy and structures should be in place first for m-Government to thrive, since in most cases, countries are likely to utilize mobile devices as an alternate or extended delivery channel for services already offered via wired devices [5]. On the same wavelength with m-Government is m-Governance – ‘strategy for the implementation of Governance and its implementation involves the utilization of all kinds of wireless and mobile technologies, services, applications, and devices. It improves upon the benefits for those involved in e-governance, including citizens, businesses, and all government units,’ [4].

The following sections outlines the literature review related to e-Government, m-Government, m-Government, challenges faced and the critical success factors for the sub-Saharan Region.

2 LITERATURE REVIEW

2.1 E-Government overview for Sub-Saharan Region

The United Nations E-Government Survey of 2012 entitled E-Government for the People [7] stated that although Africa as a whole remains at the tail of global regional average e-Government development index; there are some commendable developments in the sub-Saharan Region of the continent. Figure 1 shows that the world average e-Government development index as in 2012 stood at 0.4882 and the African continent as a whole scored the lowest average point of 0.2780. Studies done in [8] also outlined an interesting aspect that gives clue as to why there has been lower growth of e-Government initiatives in Africa. The sub-Saharan African Region constitute the hub of e-Government spearhead in Africa; yet studies in [8] showed that Sub-Saharan African is ranked the lowest in terms of the Human Development Index (HDI), the measure for life

expectancy, literacy, education and standards of living of countries. This aspect has some negative effects on the demand and utility of e-Government, since it determines whether the majority of citizens, living in poverty shall regards the high cost of accessing e-services as essential or luxurious.

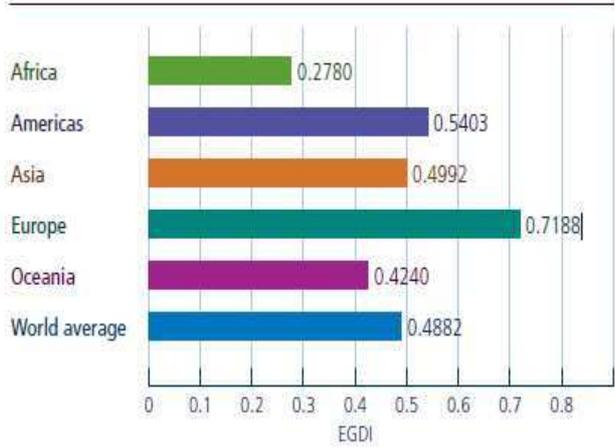


Figure 1.Regional e-Government Development Index [7]

The last decade of e-strategy adoption have witnessed various e-government strategic policy formulations, implementation and a clause in the policies for continuity and growth of e-Gov projects in sub-Saharan Africa [2].

Rapid growth of e-Government projects in some pockets of the Sub-Saharan African Region can be attributed to strong political leadership backed with effective management in various ICT ministerial portfolios and strong financial and technical know-how backing from international donor organizations. These have been identified as fundamental ingredients for the region to flourish in the e-Government frontier. Sub-Saharan countries where notable e-Government implementation has yielded positive fruits are: Seychelles, South Africa, Mauritius, Kenya, Cape Verde, Rwanda, Uganda, Botswana, Tanzania, Namibia and of late in Zambia [7]. Nevertheless, in other sub-Saharan states the lack of visionary leadership, often corrupt, was aggravated by vague ICT and e-Government policy frameworks that are inadequate to deal with modern emerging importance of ICTs in government [9].

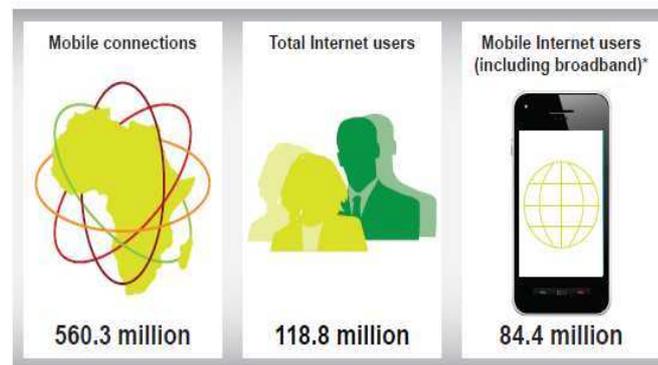
It has emerged from numerous studies undertaken on e-government policy [10], [11], [12] that for many Sub-Saharan African countries ICT and e-Government policies are often outdated, took longer to be updated and in cases where they are up to date, commitment to practical implementation is marred by more pressing social and economic emergencies like hunger, outbreak of diseases, disasters and civil strife [2]. Constant monitoring and evaluation of e-Government policies and the actual e-Government projects are essential for successful alignment, progress and to ensure that the policies remain relevant since Information and Communication Technology (ICT) and e-Gov are very dynamic.

2.2 M-Government for Sub-Saharan Africa Region

The migration from traditional e-Government to m-Government for the sub-Saharan African Region has been anecdotal, with some sporadic achievements in some circumstances.

Mobile government (m-Government) ‘is the extension of e-Government to mobile platforms, as well as the strategic use of government services and applications which are only possible using cellular/mobile telephones, laptop computers, personal digital assistants (PDAs) and wireless internet infrastructure. In addition, m-government is a better option compared to e-Government in delivering services and public information to citizens due to its nature of being available anywhere, anytime and from any internet enabled device. Mobile Government addresses the mobility of Government itself. M-Government is not meant to be a replacement for e-government but a complement to e-government.’ [4].

The extension from e-government to m-government is inevitable, this is especially so in the case of Africa, where the number of people with access to mobile phones is growing, and exceeds the number of citizens with access to the Internet by nearly five to one, Figure. 2.



*Includes all users with access to GPRS, EDGE, WCDMA, HSPA, CDMA2000 1X, CDMA2000 1xEV-DO, CDMA2000 1xEV-DO Rev A/B

Figure 2. Africa, snapshot of mobile vs. Internet usage [13]

2.3 Forms of m-Government Services

M-Government, just like e-Government is targeted for the same beneficiaries, namely Citizens (mG2C), Business (mG2B) and Government (mG2G).

Within the mG2C dimension of service, the governments take advantage of the fact that majority of citizens (nearly 1 in every household), whether in towns or rural areas across the sub-Saharan Regions owns an accessible mobile phone, Figure 2. Although not every mobile phone has got some form of internet connectivity, most of them they do have, especially the modern handsets. As such, governments should capitalize on this opportunity for accessing the citizens by offering services and information that can improve their lives, for instance healthcare awareness campaigns, accessing online diagnosis, updates on agricultural crucial information like weather forecast and market updates; and by so doing bridging the digital divide across the nations. Others services include SMS alerts for tax renewals, passport renewals, security or emergency notifications, payment of fines, public sector employee wages or public transportation ticketing [13].

In the mG2B dimension, ‘applications and services can facilitate business interaction between government and private-sector companies or small businesses, such as corporate administration or advisory services, for a positive impact on the

economy.’ [13]. This is one of the most thriving m-Government service within sub-Sahara Africa mainly due to the fact that the business world has got a strong financial backbone to afford modern smartphones equipped with all sorts of forms of internet and often all key employees are offered them as part of their package and can personally afford to acquire one for themselves. Thus is not surprising to realize that G2B service in most sub-Saharan Africa Region is thwarted by lack of sound m-Government service as opposed to the unaffordability of modern mobile phones with internet access – the case for G2C dimension.

Lastly in the mG2G dimension, government departments can forge ahead and make use of applications and services that can improve their organizational and business processes [13]. For instance in Rwanda and South Africa, in-field GIS mobile workers become more productive through encouraging the use of videoconferencing with the head offices and provided secure co-partner services with other local, regional and international agencies like NGOs on matters of close collaborations.

2.4 Citizens’ Adoption of m-Government: A Theoretical Background

Although the purpose of this paper is to outline the challenges faced by sub-Saharan countries in the transition from e-Gov to m-Gov, there is one essential issue that draws greater attention towards explaining the behavior of end-users regarding adopting and using m-Government services [26]. There are different models which explain how citizens adopt and accept new technologies [26], but in this paper focus is squarely placed on the ‘all-encapsing’ new model called Unified Theory of Acceptance and the Use of Technology (UTAUT) [27] that seeks to overcome the pitfalls of previous models on e-service adoption. The UTAUT ‘is an empirically validated model combining eight major models of technology acceptance and their extensions,’ [28]. These models evolved over time as many researchers endeavours for perfection and include: the ‘theory of reasoned action (TRA); the technology

acceptance model (TAM); the motivational model (MM); the theory of planned behaviour (TPB); a model combining the theory of planned behaviour and the technology acceptance model (C-TAM-TPB); the model of PC utilization (MPCU); the innovation diffusion theory (IDT), and the social cognitive theory (SCT),’ [29]. The most important contribution and relevance of the UTAUT model in this paper is that it integrates the social influence and cultural factors to understand the adoption and acceptance of m-Government services [27] by the citizens, business and government stakeholders. It incorporates other essential factors like trust, awareness, previous experience in internet usage, perceived usefulness and easy of use which has a great bearing on the analysis of encountered challenges in the transition from e-Government to m-government for the sub-Sahara Africa region.

2.5 Suitability of m-Government and Readiness of sub-Saharan Africa Nations

Traditionally radio communication has dominated as the most effective mode of transmitting government information in Sub-Saharan Africa utilizing vernacular languages and requiring small amounts of electricity. Unfortunately, radio communication has got its limitations in that it does not provide two-way communication and as such, mobile government because of its anywhere-anytime services. This paved way for e-Government initially and more recently to m-Government. Studies done by Informa Telecoms and Media [13], [5] identified three reasons as to why mobile communication shall constitute an integral part of sub-Sahara Africa’s m-Government delivery platform:

- The continued growth in wireless access ensures a wide audience reach.
- Messaging and data usage shows consumers are savvy enough to recognize mobile as a potential delivery arm for public services.
- The mobile device market is maturing and smartphone penetration accelerating [13].

Studies done by Informa Telecoms and Media [13] predicted mobile services to dominate broadband services in terms of user numbers as a result of recent infrastructure investments in 3G and 4G networks across the sub-Sahara Africa Region. This is good news for the boosting of m-Government since the majority of urban and peri-urban dwellers are now migrating to adopting and using smartphones with wireless access to internet. Nevertheless, studies done in [16] showed that price of internet connectivity remain high in sub-Sahara Africa and telephony has become drastically more affordable within the last decade. This shade a green-light and good news m-Government as its prospects becomes brighter for the region.

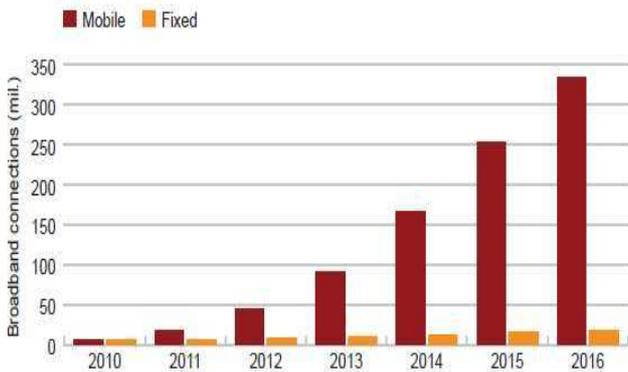


Figure 3. Africa, mobile and fixed broadband connections, 2010-2016 [13]

M-Government Readiness is often determined by m-Government strategic plans that outline a coherent path, integrated across all government ministries. Any nation that adopts m-Government should not consider it in isolation as a general service delivery, but rather as an additional channel available to government, catering for the other sector of the society. One key aspect in assessing m-Government readiness and adoption is on evaluating the ICT-Policy to determine whether policy-makers are placing the requirements of their citizens at the forefront of their minds in developing e-Government and m-Government applications [14]. Table 1 shows key adoption factors for m-government for any nation considering embracing m-Government.

Table 1. Key Adoption Factors for m-Government [5]

National level Policies	Socio-Cultural	Technological	Economical
Fostering sufficient political support, with corollary human and financial resources identified	Bespoke content development appropriate for devices and end users, given country context (i.e. location, demographics, literacy levels)	Infrastructure necessary for the use of mobile devices: base stations, WAP Servers, GPRS Support Node	Removal of tariff/non-tariff barriers to ICT products
Building ICT competencies within government	Building competencies in the use of mobile ICTs	Device and application development	Formation of Multi-Stakeholder Partnerships including telcos, government, regulators, device manufacturers, infrastructure providers, citizen groups and application developers
Development of standards in mobile sector			Measures to align purchasing power and cost of mobile devices
Development of a 'whole of government' m-government strategy			

Informa Telecoms and Media [13] launched the m-Government readiness index Table 2 which identifies markets that are most ready in the sub-Saharan Africa region to implement m-Government. The rankings shows those sub-Saharan African countries that have the cellular technology landscape, state policies and consumer appetite suitable to allow m-Government to work and thrive.

Table 2. Africa, m-Government Readiness Index [7], [13]-[15]

Country	Ranking	Mobile Penetration, end-2010 (%)	Cellular3G Penetration,	Mobile Broadband	Rural Area Population	Public Sector as a (%) of	UN's E-Gov Readiness	Fixed Broadband	Literacy rate - 2010.(%)
South Africa	1	100.4	15.4	78.0	38	15.7	97	11.4	86
Kenya	2	57.9	3.6	28.9	78	5.0	124	0.4	85
Egypt	3	79.4	2.8	37.2	57	9.9	86	6.5	71
Tanzania	4	42.5	0.3	20.8	74	8.9	137	0.7	69
Uganda	5	39.3	0.3	15.8	87	3.0	142	0.3	67
Zambia	6	38.3	0.1	18.4	64	2.4	143	0.2	81
Rwanda	7	32.7	0.6	4.2	81	4.6	148	0.3	70
Morocco	8	88.6	3.4	44.6	42	9.0	126	9.5	52
Nigeria	9	54.5	2.9	32.0	50	0.8	150	1.1	68
Ghana	10	69.0	1.0	28.5	49	6.9	147	3.8	58

Note: the rankings table includes only those countries in Africa with a population size of at least 5 million. Libya scored highly but was discounted on the basis of current government changes.

Analysis of national m-Government readiness based on the identifiable parameters for Africa in Table 2 showed that South Africa has over 100% mobile penetration, with Rwanda scoring the lowest penetration score of 32.7%. Mobile penetration index elucidates cellular accessibility and potential reach of mobile government services (G2C) [13] within a given nation. The higher the index of mobile penetration, the greater the chance of success of the m-Government initiatives. Nevertheless, literacy rate has got a direct bearing on the capabilities of citizens in a G2C service to be able to access m-Government services.

Generally, illiteracy rate serves as a barrier to the potential of m-Government services to thrive. According to this study and report [13] all countries in the sub-Saharan Region under study reported literacy rate ranging from 52% to 86%. This looked quite big percentages, but in reality

most of the population for sub-Sahara Africa nations, especially East Africa resides in rural areas and as such they are well-versed with their vernacular languages. This entails that governments should consider offering m-Government in multiple languages to ensure wider outreach for the e-services. If the governments could device a mechanism for m-Government wide outreach programs, the future for m-Government is brighter.

Cellular 3G and 4G penetration reveals the maturity of cellular networks and the ability with which m-Government services can go beyond just the SMS delivery services. With the exception of South Africa (+15%), for most countries in the sub-Saharan Africa region, the cellular 3G and 4G services are a new-kid on the block – still finding its way into the markets and immature.

‘UN’s E-Government Readiness Index has been used as a means of identifying those markets that have the best-developed e-government policies. As mobile government is an extension of e-government, it is unrealistic to expect mobile government frameworks where e-government services have not been developed.’ [13]. South Africa and Egypt scored very high on the UN E-Government Readiness Index and this showed that likelihood of m-Government thriving under their current e-Government setup is higher.

The last two essential aspects for readiness assessment are the mobile and fixed broadband penetration forecasts for the region. Mobile broadband highlight projected consumer demand for data-intensive services and is widely based on dogle rather than handset usage. Contrary, fixed broadband is based upon fixed cable connections and is very subdued throughout the sub-Saharan Africa. Informa Telecoms and Media [13] and United Nations [7] reported that ‘this is one of the main drivers for mobile government with G2C e-government services less likely to be effective where fixed broadband household penetration is very low.’

Overall, the m-Government Readiness Index gives an insight into those sub-Saharan nations that are geared-up to successfully embark

on the adoption of m-Government services for its citizens and business world.

2.6 Notable Implemented m-Government Projects in sub-Sahara Africa

Despite the lack of clear policies on m-Government for most countries in the sub-Sahara Africa Region, some notable m-Government projects managed to kick-off with some noticeable impact, see Table 3, [13]. For most countries in the region, the lack of m-Government policy frameworks entails that government departments overseeing ICT issues are incapacitated to spearhead m-Government projects and as such, the private sector push forward the m-Gov agenda. Most of the successful implementations of m-Gov are concentrated in East African countries of the sub-Sahara region – namely Kenya, Tanzania, Uganda and Rwanda. In all these countries, multinational companies like IBM, HP, Vodacom, Orange Business Services, and Microsoft have been on the forefront of spearheading key m-Gov projects. However, m-Government initiatives in the southern part of the sub-Sahara Africa have been greatly constrained, with sporadic initiatives noticed in South Africa, Botswana and of late in Zambia.

Much should be done in West Africa and Central Africa to bring-up the lifeline of m-Gov services to the citizens. Studies done in [2] revealed that most of the states in West Africa and Central Africa operate on heavily strained budgets, with funds often diverted and devoted to other pressing urgent needs like hunger, natural disasters and disease outbreaks, and civil strife and wars. As a result, this creates a void in ICT projects and leaves them with no room to prioritize m-Gov agenda; but to focus on pressing political issues.

Table 3. M-Government Implemented Projects in Africa [13].

Country	Project	Type of Service	Notes
Rwanda	TRACnet	G2C	A national program supporting those living with HIV
Kenya	NAFIS/NALEP	G2B	Agricultural

			information service (farmers call in for recorded information)
Tanzania	Agricultural Marketing Systems Development Program	G2B	Commodity price service by SMS, administered by Vodacom and Ministry of Industry and Trade
Uganda	The Question and Answer Service (QAS) Voucher System (VS)	G2B	Voucher system enables personalized advice for farmers, run by the Rural Empowerment Network
Tunisia	Mobile Gov	G2C	Information service, run by central government and delivered by SMS, providing information on travel, weather and schools
Egypt	Government e-Procurement Portal	G2C	SMS-delivered service on government employment opportunities and health; the Ministry of State for Administrative Development worked in partnership with Vodafone Egypt
Egypt	Free SIMs for farmers	G2B	1 million free SIMs for farmers subsidized by central government
South Africa	ID Track and Trace	G2G	Tracking of ID document application via SMS
Uganda	National Water and Sewerage Corp Payments	G2C	Allows consumers to pay water utility bills via MTN Mobile Money

3 CHALLENGES FACED IN TRANSITION FROM E-GOVERNMENT TO M-GOVERNMENT

The biggest dilemma of m-Government adoption in the sub-Saharan Africa is the failure to acknowledge that m-Government is an extension of e-Government and as such, it is unrealistic to expect m-Government frameworks to thrive where e-Government services have not been developed. Nevertheless, the existence of e-Government services is not a prerequisite for deployment of m-Government services [17]. It should be noted that m-Government is ‘aimed at extending the access

of public services to the vast majority of the society who are unable or unwilling to access public services through internet or those which simply prefer to use mobile devices. The key objective of m-Government initiatives is to enhance the bottom-up participation and empower all the citizens by bring public services closer home to the populace [17]. Outlined below are some of the commonly encountered challenges by countries in sub-Sahara region in their transition from e-Government to m-Government:

- i. **M-Government Outreach:** This refers to the status of services offered by a government and its administration [16]. The success of any extension from e-Government to m-Government effort requires assessing both the administration's supply of outreach activities and the potential demand and uptake of services by citizens and businesses [16].

Governments should undertake awareness creation and capacity building exercises for according greater visibility to the m-Government initiative amongst stakeholders and potential beneficiaries across Government, business, and Civil Society [17]. The United Nations E-Government Survey [7] done in 2012, outlined clearly that one major challenge faced by sub-Sahara Africa Region and Africa in general as a continent in line with e-Government and m-Government is the lack of widespread functional literacy and this is compounded by poor e-Government readiness assessment by governments [2]. This has been reiterated by the International Telecommunications Union (ITU) report [18] that "the emerging trend in e-Government is to design services to focus squarely on the needs of citizens," and failure to focus on demand will lead to underutilized e-services.

African countries where outreach campaigns for m-Government have been successful include Mauritius and Seychelles and globally, lessons should be

learnt from other developing nations: Dubai, Saudi Arabia, Singapore, Malaysia and India. Therefore, m-Government outreach by governments in the region is an inevitable commitment that should be overlooked – otherwise the end result of the whole m-Government endeavours will be a failure.

- ii. **M-Government Implementation**

Challenges: For m-Government to flourish, the information communication technology (ICT) infrastructure must be present and sound. Key notable challenges that are often faced with all developing countries around the world, including those in sub-Sahara Africa pertains, but not limited to the following: interoperability; privacy and security; people's readiness; standards, power limitation of the mobile devices; legislation on the m-Services; unsustainable government debts, cost of the mobile devices and infrastructure [17].

The implementation challenge also pertains to soft infrastructures such as institutional arrangements and software that make m-government transactions possible [20]. Due to subdued and turbulent economies in the sub-Sahara Africa region, government ICT agents are finding it tough to retain and pay highly qualified and experienced expertise in this ICT field to deal with both hardware and software aspects required for a sound and smoothly running m-Government network. Often, governments in the region end up resorting to outsourcing technical e-Government and m-Government implementation aspects from private companies and reputed international ICT companies – often at a very exorbitant cost.

In line with the implementation challenges, another crucial technical difficulty faced by most countries in the sub-Sahara Region is to do with compatibility issues of modern smartphones with often existing e-

Government and m-Government legacy systems which may not be easy to integrate both in terms of functionalities and data administration [20].

- iii. **Trust, Privacy, Security and Legal Issues:** For any successful implementation and operation of any e-service, m-Government included, trust and several levels of confidence should be incorporated. Failure to adequately address these aspects in the m-Government transactions may low trust in the service from stakeholders. Typical trust and confidence levels may include: robust authentication procedures for citizen requests and feedback; status notifications for mobile requesting users may include sensitive personal data and as such integrity and confidentiality security aspects must be adequately addressed.

“Furthermore, no communicating entities (citizens, public agencies and any third parties) should be able to repudiate committed transactions. To provide these basic elements of trust, digital signatures and certificates for both requesting citizens and public employees need to form an integral part of the m-Government architecture.” [21], [23], [22]. Studies done in [20] on m-Government on privacy and security on the sub-Saharan Region revealed that citizens have a general fear that their mobile phone numbers will be traced, when they send their opinions and inquiries to the government through the m-Government service; and as such, countries in the region have a mammoth task to uproot this mistrust and fear. This mistrust on privacy and security by citizens and business comes at the background of well-known malpractices of widespread censorship of transmitted information through e-services by government security agencies within most countries in the sub-Saharan Region.

Many countries across the world, sub-Sahara African Region included, they

do not have a sound and adequate Legal and regulatory framework in place to regulate crucial electronic transactions; crimes, data protection; signatures; privacy and security [17] in m-Government. With the exception of few countries in the region like South Africa, Egypt, Tanzania and Kenya, ‘there is no clear legal status for government’s online publications, no regulations and laws for online fillings, online signings, and on online taxable transactions.’ [6].

- iv. **Costs and Telecoms Market Liberalization:** Over the last decade the number of mobile phone users (Figure 2) has drastically increased for the African region. Nevertheless, ownership of smartphones, iPods and PDA that can connect to the internet ‘anywhere and anytime’, is still restricted to a minority sector of the society for most countries in the region. It has been noted in [17] that “the cost of owning the access devices should be affordable and the cost of accessing services should be low.” This is in total contrast to the scenario in practice in most sub-Sahara Africa nations where telecom markets are not liberalized and the implementation of competition law are vague and often nonexistence – these two aspects should exists for viable m-Government since they cause prices of mobile devices to go down and the service quality to go up.
- v. **Public-Private-Donor Organizations Partnership for m-Government:** It has been highlighted in [19] that governments must formulate national strategies which include e-Government and m-Government strategies fostering and forging-ahead sound partnerships and collaborations by the private and public sectors, and the public sector to international donor agencies in order to attain cost-effective and efficient e-Gov projects.

Studies done for developing countries in the Sub-Saharan African Region [2], [19], [24], revealed that for International Corporation on e-Gov-to-m-Gov transition to work smoothly and yield desired outcomes, local leadership trust, risk management, accountability, effective communication and coordination of key stakeholders must exist, otherwise the end results are futile [2]. Key notable international donor partner within the region where the United Nations with its many agencies, the World Bank, Pan African Development Information System (PADIS), Capacity Building for Electronic Communication in Africa (CABECA) and the International Telecommunications Network (ITU), SADAC and African Development Bank.

This study established that most of these international and regional partners play a pivotal role in establishing infrastructure like broadband and wireless networks required for the establishment of wider outreach communication facilities like internet. Lessons learnt from studies done on developing countries [24], [26], [25] revealed that private, regional and international corporation is essential because nearly all states operate on heavily strained budgets, with funds often diverted and devoted to other pressing urgent needs like hunger, natural disasters and disease outbreaks, and civil strife and wars [2].

4 RECOMMENDATIONS FOR WAY-FORWARD TO BOOST M-GOVERNMENT IN SUB-SAHARAN AFRICA REGION

Sub-Saharan Africa Region has witnessed a massive growth in the number of mobile phone holders with access to internet services over the past decade; see Figure 2 and Figure 3. This scenario has created a great opportunity for national governments in the region to rollout e-Government and m-Government services to the benefit of all stakeholders: citizens, business and government.

In spite of the great promise for an opportunity for m-Government to thrive based upon the number of mobile phone holders with access to internet, the onus lies upon national governments in the region to take cognizance of the following crucial aspects required for the booming and uptake of m-Government e-services:

- i. **Have an m-Government Policy Framework within the National e-Governance Plan Framework.** As outline in [6], m-Government is an extension of e-Government services and as such it is the obligation of national governments to recognize m-Government as an appropriate mode of delivery for certain types of services within the National e-Governance Plan framework (NeGP) [30].

Often m-Government projects are very huge, calling for hefty budget and given the socio-economic and political status of most countries in the sub-Sahara Africa region, m-Government projects should be clearly outlined in the National e-Governance Plan Framework to increase their visibility. As evidenced in India, the NeGP shall then provide indirect subsidies to m-Gov projects that can deliver services in rural areas [30]. The importance of having a NeGP in place for any country is to clearly spell out a road-map for the implementation of m-Government projects – which often is accomplished in a public-to-private partnership mode by the respective government agencies. This study established that for most sub-Saharan Africa countries, National e-Governance Plan framework for m-

Government does not exist, or if they do exist, often they are out-dated and irrelevant to the current dynamic requirements of m-Government technology.

- ii. **Define Clear Role for m-Government in e-Delivery of Services.** Before introducing any m-Government service to citizens and business, governments should clearly decide the role to be played by such a service, given the background that m-Gov services are complementary to e-Gov and other traditional services. Therefore, clear thought should be made to ensure that whatever m-Government service is provided becomes relevant to end users and should strive to have a direct impact in alleviating some hustles and inconveniences that might be experienced prior to the introduction of such e-service. This brings us to the supply-driven and demand-driven e-service aspects of e-Government outreach dimension [16]. Governments should have wide consultation with citizens and the business world in their nations to ensure that whatever m-Gov service is rolled out becomes relevant and demanded. Recommended typical m-Government services that could be demanded in the sub-Sahara Africa Region may include m-Payments for public sector employees and welfare claimants for a large proportion of citizens who lack easy access to bank accounts [13] in remote areas.
- iii. **Offer Quality m-Services at low/ no cost to end users.** M-Government is often targeted at a particular sector of the society, and given the fact that for most of citizens for sub-Saharan Africa nations resides in the rural areas and living below the poverty datum line; governments should find ways to promote the uptake of m-Gov services. Possible suggestions are to offer the m-Government services at highly subsidized and lower costs than

non-mobile or non-electronic alternatives for certain targeted groups of the society, for example farmers in remote areas. Another crucial key factor of consideration is that the m-Gov service should be accessible to all citizens who could potentially benefit. [7], [13]. This shall create citizens with alternative access mode to government services and hopefully, promote universal access of m-Gov services. Now that mobile phone sim-cards are cheap, governments and collaboration with cell phone service providers can embark on donating free sim-cards in remote areas and establish kiosks to sale juice cards and offer battery-charging services at very low costs.

- iv. **Do Regular Accurate m-Government Service Performance Evaluation at low-costs.** It has been noted with great concern in [2] that one of the major reasons for the failure of e-Government and m-Government Projects in developing nations, sub-Sahara Africa included, is the lack of e-service performance evaluation over time. Implemented E-Services generate surmountable amount of data, and as such this data should be collected and analysed in order to determine usage trends of the e-service, audit the systems and map the way forward for its future expansion. Furthermore, 'feedback from users can be combined with usage statistics to support the on-going development of the service. [13]. All performance evaluation activities to do with implemented m-Government services should be done at low costs, given the financial quagmire status and misappropriation of funds within most government departments of sub-Sahara African nations.
- v. **Sustainability of m-Government Projects**
Sustainability calls for a business case that yield benefits all stakeholders in the value chain, in terms of both economic and

social outcomes [13]. There are many factors that governments in the region should take note of in-line with the sustainability aspect: Governments must see quantifiable and substantial efficiency gains both in the short and long run for the m-Government service – all e-services projects typifying the best practices should be sources of verifiable data for net cost savings, improvements in GDP per capita and other social or economic metrics [13] that impact on the assessment of national ICT progress and standard of living.

All concerned stakeholders in the m-Government project must be dedicated to ensure that the project achieves its intended goals and blossom to fruitful stages where targeted beneficiaries enjoys the e-service. Studies done in [5]-[6] showed that to ensure longevity of the project, all stakeholders must see the opportunity for net benefits in the short to medium term. This entails that governments in the region should introduce fewer and simpler m-Government services first and then gradually increment them based on stakeholders demand for the service using aggressive user outreach and marketing strategies.

vi. **Consider Adopting Open Standards and Innovations for m-Government**

The hard-strained socio-economic status-core of most sub-Saharan Africa means that the adoption of openness of m-Government systems shall greatly benefit them in some way and this can be considered on several levels: open standards, open interfaces, open specifications and open source codes [31]. The adoption of universal and mandatory open m-Government standards makes ICT solutions fully interoperable, thus allowing reuse, sharing and scalability across organisational and government department boundaries into local delivery chains [32]. Furthermore, such compulsory open

standards adoption will help governments in sub-Saharan Africa region ‘avoid lengthy vendor lock-in, allowing the transfer of services or suppliers without excessive transition costs, loss of data or significant functionality’ [32], which is the required aspect given the high debt status and financial constrains nature for most of these regional countries. This common and secure agreed suite of agreed m-Gov ICT open standard infrastructure should be published and frequently updated and upgraded to remain relevant, given the dynamic nature of changes in ICT.

Governments in sub-Saharan Africa are encouraged to embark on offering m-Government through cloud computing infrastructure and make use of its huge benefits of high scalability and great capacity to handle overwhelming amount of data in m-Government services. Successful cases of implementation of Cloud Computing in m-Government around the world is evidenced in US, UK, Canada, Australia, Hong Kong, China, India and of late in Thailand, Singapore and Malaysia [33]. The benefit for adopting open standards is that they ‘encourage service innovation and diffusion of the best practice while stakeholders can encourage low-cost sources of innovation that build on a grassroots knowledge of the user base.’ [13].

5 CONCLUSION AND AVENUES FOR FUTURE RESEARCH

Findings for this study revealed that m-Government is part of a broader phenomenon of mobile-enabled developments, taking electronic services and making them available using devices such as mobile phones and other ubiquitous mobile devices. M-Government has great potential for making public information and government amenities accessible ‘anytime; anywhere’ to citizens, government officials and business world bottom of the pyramid. A clear picture that

emerged from this study is that although the implementation of m-Government does differ from country to country in the sub-Sahara Africa region, the region is plagued by almost similar challenges and to overcome them, they need to embark on national, regional and international collaborations.

Furthermore, countries in sub-Sahara Arica Region must strategically and carefully plan for smooth transition from e-Government to m-Government and reduce any possible chances for islands of information dilemma - where there is no integration amongst m-Government services.

The study also found out that unless governments in the region are going to adequately address m-Government service issues to do with trust, privacy, security and legal matters, citizens shall resist adopting m-Government services fearing for their protection. One notable aspect of great concern for nearly all rural areas (where the majority of citizens dwells) of the sub-Saharan Africa Region is to with functional literacy – the majority of citizens are conversant with their vernacular languages and as such, governments should consider localization of content for the m-government services.

This study has mainly been exploratory in nature, utilizing existing contemporary studies on the transition from e-Government to m-Government. For future direct, the study seeks to focus on designing a framework that can be used to analyze the transition from e-Government to m-Government. Such framework is essential as it shall assist ICT and National e/m-Governance Planning framework Policy makers, governments and international donor agencies in their endeavours to spearhead the extension of e-Governance services to m-Government services for sub-Saharan Africa Region and any other developing countries across the world, faced with similar challenges. Currently there is no such framework of its kind and this will fill-up the missing knowledge gap in e-to-m-Government migration.

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