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Evaluating a Citizen-Centric m-Government Solution in Practice

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Abstract: Electronic Government (e-Government) adoption and use remains low in Africa. This has coincided with studies that focus on proposing factors of e-Government and mobile Government (m-Government). Little validation is being done in the form of implementing these e-Government solutions in order to better understand their feasibility in a real world context. This study adopted a citizen-centric e-Government framework and developed a mobile application solution that was used to solicit the views of participants. The aim was to evaluate the feasibility of e-Government propositions in the literature in a real world environment. Study findings suggest that m-Government can succeed if there is access to ICTs, ICT skills, community-based partnerships, an understanding of citizen information needs, ICT infrastructure and a positive attitude towards ICTs use. As such, implementers of m-Government could look into these factors if they are to succeed.

Keywords: e-Government, citizen-centric, ICTs, m-Government.

1. Introduction

The subject of electronic government (e-Government) has been of interest for some time. It is believed that e-Government solutions can improve the way governments deliver public services, accountability, efficiency and transparency [1, 2]. However, the adoption of less interactive e-Government solutions is one of the reasons why e-Government adoption by citizens remains low in Africa [3]. Other challenges that have been found impending e-Government in Africa include:

- Lack of Information Communication Technologies (ICTs) supporting infrastructure: electricity, connectivity, network access;
- Societal matters: Culture, skills availability and
- Technology in use: Access or ownership of mobile devices and PCs [3, 4, 5].

In particular to technology use, African governments have been struggling to implement e-Government solutions that are compatible with technologies owned and used by citizens. Failure to successfully implement e-Government automatically dismisses any anticipated benefits. This has prompted a keen interest in citizen-centric e-Government [6, 7]. However, studies that have researched citizen-centric e-Government mainly focus on exploring influential factors [1, 2, 8, 9] with little effort being done to put these propositions into practice. Given limited ICT skills in Africa, the authors of this paper argue that governments may still find it difficult to transition from propositions in the literature to real e-Government solutions or artefacts. As such, the objective of this paper is to bring e-Government solutions presented in the literature closer to a real world artefact that could be adopted by governments. In particular, an m-Government solution was developed in this paper following guidelines proposed in a citizen-centric e-Government model. The m-Government artefact was evaluated by participants using a qualitative research methodology. The study

used Namibia as its testing bed. We believe that findings from this study can enhance the understanding of e-Government adoption and use. Furthermore, findings from this study can be extended to other African countries.

This paper is organised as follows: Section 2 explores the literature and present findings on factors of citizen-centric e-Government. Section 3 presents the research methodology applied in this study. Section 4 present research findings. Conclusions and a summary of recommendations are given in Section 5.

2. Literature review

This study focuses on citizen-centric e-Government [1, 2, 8, 9]. Therefore, it is expected that the interests, aspirations and the technologies used by the citizens should inform the design of e-Government solutions [1, 2]. This study is an extension of research by [10]. As such, this study adopts a citizen-centric e-Government model proposed in [10] and uses it to guide the development of an m-Government artefact. The model introduced in [10] is one of the models that have been proposed in the literature. The authors acknowledge the existence of other citizen-centric e-Government models in the literature [1, 2, 8, 9]. However, the model in [10] was considered for this study as it was developed using empirical evidence that was gathered in Namibia. Furthermore, the development of the model in [10] was informed by a citizen-centric e-Government model proposed by [1]. This model was recently developed and has been empirically validated in China and Sri Lanka [1]. The model in [10] identifies access to ICTs, ICT skills, community-based partnerships, information needs, ICT infrastructure and attitude towards ICTs as key factors for implementing a successful m-Government. These factors are discussed next.

2.1 Access to ICTs

The design of e-Government platforms should be compatible with technologies that are used by citizens. Jaeger and Bertot [11] state that “a system that resides on technologies to which the citizen does not have access will also guaranty failure.” Africa is experiencing a high mobile phone adoption rate and these phones are used to access the Internet [12]. For instance, very few Namibians (2.91 per 100 inhabitants) have access to broadband connection while approximately 107.79 per 100 inhabitants have access to a mobile phone [3, 14]. This is supported by findings from a study conducted in [10], which shows that roughly 70% of the participants indicated that they have access to a mobile phone. Interestingly, 68% from the same study indicated that they have access to the Internet [10]. However, costs of accessing the Internet are seen as high.

2.2 ICT skills

ICT skills can play a key role in promoting e-Government adoption. African countries are arguably the worst affected given the dominance of rural areas that often suffer from ICT skills drain as the young population migrate to urban areas in search of job and study opportunities [14, 15]. The importance of ICT skills is even recognised at government level in some African countries. For instance, Namibia’s e-Government strategic plan for 2014–2018 noted the importance of improving ICT skills in government and among its citizens [13]. According to [4], ICT skills can include: “Operational Skills: The skills to operate computer and network hardware and software; Information Skills: The skills to search, select and process information in computer and network sources; and Strategic Skills: The capacities to use these sources as the means for specific goals and for the general goal of improving one’s position in society”. Arguably, it is down to the availability of ICT skills that promoted the success of homegrown e-Government solutions in Estonia.

2.3 *Community-based partnerships*

There are suggestions that citizen-centric e-Government should be integrated through community-based partnerships [11]. As such, the authors are of the view that it would increase the acceptance of e-Government services should e-Government be distributed through public institutions like educational institutions, public libraries and community halls. Ochara [17] cements this view by suggesting that e-Government need to be understood within the African context and explore ways to make it relevant. This can be achieved by building social structures at community level that support ICTs for e-Government use.

2.4 *Citizen information needs*

The authors of this study agree with Jaeger and Bertot [11] that if e-Government is to be citizen-centric, it is important that the designers of e-Government understand the citizens' information needs. Thus, it is important to understand how citizens search and acquire information on any particular issue of concern [11]. This is important given that the advent of the Internet has changed the way people search and consumes information [5]; e.g. there seems to be a growing trust in information received via a friendship network such as Facebook [5]. Similarly, the Internet and the radio are popular sources among participants [10]. However, Facebook is not considered among the top sources of information.

2.5 *ICT infrastructure*

The success of e-Government in the western world is partly attributed to the availability of a supporting ICT infrastructure. On the contrary, the provision of ICT infrastructure in emerging economies has been a challenge [3]. This is a huge concern in majority of African countries, which are dominated by rural areas where there is still sparse connectivity, no electricity, no access to clean water and a poor road network [14, 15]. Sigwej and Pather [2] add that for a successful citizen-centric e-Government, there is a need for improving Internet penetration, accessibility and increasing the use of multichannel.

2.6 *Attitude*

Attitude towards ICTs use is one of the factors considered important in determining the likelihood of e-Government use [4]. For example, the Republic of Namibia [16] notes that the willingness among various stakeholders to use ICTs can play an important role in the use of e-Government. Attitude, arguably, reflects the extent of shift in the traditional cultural belief that ICTs can be used to facilitate the provision and access to e-Services without the need for human physical contact. Therefore, attitude is considered one of the factors that could influence the design and implementation of citizen centric e-Government. The study suggests that the government need to understand the attitude towards technology in its designing and implementation of e-Government. Such information can be critical in influencing the citizens' attitude towards the use of ICTs in government.

3. Methodology

A qualitative research methodology using a case study approach was applied in this study. Factors of citizen-centric e-Government from [10] were used to inform the characteristics of a prototype mobile government (m-Government) platform. The prototype was designed in such a way that it imitated service delivery of a selected Namibian government Ministry. The selected Ministry offer a wide range of government services that are critical to all Namibian citizens. The prototype assumed one of the services: application for an identification (ID) document. The aim was to establish the perception of participants if a mobile application was used to apply for an ID instead of the current manual system. Below is an overview of the prototype, design factors, data collection and analysis methods and insight into the study participants.

3.1 An overview of the prototype

The m-Government prototype assumed that a citizen wished to apply for a new ID. It should be noted that the manual ID application involves visiting a government Ministry, completing and submitting an application form together with a copy of the birth certificate and selected biometric features. Hence, m-Government prototype was designed in such a way that participants would complete an online application form and attach a fictitious birth certificate before submitting the application. Furthermore, the citizens were to visit the selected government Ministry's offices upon receiving a text message informing them to come for the capture of fingerprints and other biometrics for identification and verification. Figure 1 summarise the steps that were followed during an assumed process of ID application.

The figure displays a sequence of five mobile application screens for an ID application process:

- 1. Basic Details:** A form with fields for Surname, First names, Maiden Name (if applicable), and Date of Birth. It includes a green 'Continue' button and a red 'Cancel Application' button.
- 2. Gender and Marital Status:** A form with radio buttons for Gender (Male, Female) and Marital Status (Never Married, Married, Widow/Widower, Separated, Divorced). It includes a green 'Continue' button and a red 'Cancel Application' button.
- 3. Contact Details:** A form with fields for Street Address, City, Phone Number, and Email Address. It includes a green 'Continue' button and a red 'Cancel Application' button.
- 4. Birth Certificate:** A screen with a 'Choose file' button, a 'No file chosen' message, a green 'Continue' button, and a red 'Cancel Application' button.
- 5. Confirm:** A screen with a large checkmark icon, the text 'Thank you for your application!', and instructions to contact an official. It includes a green 'Submit' button and a red 'Cancel Application' button.

Figure 1. Activities of the m-Government prototype

3.2 Data collection and analysis

It should be noted that this study's methodology went through an ethical clearance process from which, an ethics clearance certificate was issued thereby authorising the conducting of the study. Participants' consent was solicited prior to data collection. Data collection started with face-to-face interviews that were followed by participants taking part in a fictitious ID application using a mobile prototype. Interviews were done prior to exposure to the mobile application in order to gather data on background information about the

participant and their perception on government services. Further questions were asked after exposure to the fictitious ID application process in order to solicit participant's perception on m-Government. All interviews were tape-recorded. Additional data was gathered through observations during face-to-face interviews and participation in the prototype experiment. Triangulation in data collection was meant to enhance the validity of the study findings [18]. All participants were randomly selected. Data analysis started with the transcription of tape-recorded interviews. This was followed by an analysis of response from each participant that saw findings on factors of m-Government implementation being coded according to those found in the literature. In addition, emerging themes were coded on their own. Lastly, themes on factors of m-Government implementation were put together, combining themes from all the participants and making comparisons taking note of similarities and differences.

3.3 Study Participants

Table 1: The profile of participants (WHK: Windhoek, OKH: Okahandja, * -: not given)

Participant	Gender	Age	Profession	Home town	Phone type & usage
P1	Male	-	*-	*-	*-
P2	Female	34	Employed, secretary	WHK	Communication, social media-WhatsApp.
P3	Male	24	Employed, builder	WHK	Internet
P4	Female	47	Not employed-housewife	WHK	Text messages
P5	Male	*-	*-	WHK	*-
P6	Male	33	Employed as a baker	OKH	Feature phone (has awareness of WhatsApp, Facebook, Twitters, those social medias)
P7	Female	31	Part-time student and full-time employee	WHK	Making calls, notes, emails, watching YouTube videos and research
P8	Female	23	Part-time student and administrator	WHK	emails, WhatsApp, texting, calling, internet access
P9	Female	27	Part-time student and IT technician	WHK	Mobile banking,
P10	Male	25	Software engineer	WHK	e-mails, communication, WhatsApp
P11	Female	25	Business consultant	WHK	phone calls, online researching, for work, social media, e-banking
P12	Female	25	Programmer and part-time student	WHK	Texting, calling, social media, diaries and notes on phone as well
P13	Male	23	Full-time student	North	Calls, texting, internet access, mobile banking, no internet banking
P14	Female	24	Web developer	WHK	emails, making phone calls, texting, mostly WhatsApp, reading, and cellphone banking
P15	Male	23	Student	Omatoko	Communication purposes

Fifteen participants were engaged to evaluate the m-Government prototype that was designed with guidance from factors of citizen-centric e-Government. Qualitative research can be conducted with a small number of participants [18]. However, the bigger the sample size the better. Participants that took part in operating the prototype were randomly selected. The first six participants were randomly selected at the selected Ministry's branch based in Katutura, a high-density suburb in Windhoek, Namibia. Targeting participants in a high-density residential area gave an opportunity to engage the poor and enlist their perception of e-Government. The remaining participants were engaged at an international conference that

was held in Windhoek, Namibia. Only Namibian nationals were engaged during the prototype experiment as it was assumed that such a population was more likely to be aware of the services that are being offered by the selected government Ministry. Table 1 summarize the profile of participants that participated in this study. Participants were given labels (e.g. participant 1: P1) to avoid the use of their actual names for privacy reasons. As can be seen in Table 1, the youth dominated the participants of this study because they are the ones who are mostly involved in ID application when compared to other age groups. Furthermore, the dominance of IT professionals in this study could be explained by targeting participants who were taking part at an IT international conference.

4. Results

This section present findings from the evaluation of the factors of e-Government according to the perception of the six participants who took part in the m-Government prototype experiment. Focus was on evaluating the importance of factors that influence the design and implementation of e-Government. These define requirements for a successful citizen-centric e-Government and they include access, ICT skills, community-based partnerships, citizen information needs, ICT infrastructure and attitude towards the technology.

4.1 Access to ICTs

It was observed that the majority of the participants owned a smart or feature phone. Mobile phone adoption is also extending to marginalised rural areas though at a slower pace compared to urban settings. Participant P15 from Omatako, a marginalised rural area, gave a brief overview of ICTs owned by people from his village *“let me say 60% of people have cell phones that they use. But not all can afford it, so only a few. Yeah, especially the young—the young people they do have smartphones but the elder people they just use their normal phones to communicate...”* Furthermore, there are suggestions that there is poor access to other ICTs. Participant P15 states that *“for computers I cannot say much, it’s really rare with our communities, I think not even more than ten people have computers, unless it’s just teachers, I think most of them they have. But I think the community maybe just few, not more than ten people, maybe highest it’s not more than 15.”* These findings are consistent with the literature as it has been shown that, while there is a slow adoption of personal computers, the majority of users own a mobile phone and use them to access the Internet [3,4].

4.2 ICT Skills

The majority of participants except, P4, demonstrated basic ICT skills of at least completing an online form, uploading a file and submitting a form. Participant P4 asked her son to participate in the prototype experiment on her behalf. This suggest older people may not be confident about their ICT skills hence, they may need to engage those close to them. In addition, participant P3 appeared shaky when completing the forms and skipped choosing a file (see step number 4 in Figure 1) something that could be due to lack of knowledge about the feature. Nevertheless, the general feeling was that the prototype application was easy to use as participant P4 summarised his perception by saying that the process was *“very easy, [if the government introduce the app] they will bring that thing it will be very easy to apply for ID”*. Table 1 shows that participants have different skills that include using the social media, email electronic banking, browsing the Internet and text messages. The use of mobile phones to access the Internet and its various services that include emails and social media suggest that there is a section of Namibians who have adequate ICT skills to operate mobile phones [12]. However, the same cannot be said about rural dwellers, especially the elders, due to low literacy rates. Participant P15 indicated that *“most of the people [at my village] stay at the farms and they cannot even speak English. They just speak their home language*

or they use Afrikaans but that is difficult for them.....even for the written language, we the San people, we don't know how to read our own language. So, it becomes a problem. Especially the elder people, I cannot say they do use it [mobile phone] for much purposes, they only use it for communication because they sometimes do not know how to read so they only use it [mobile phones] for calls". In some instances, "people help them [elders] to make phone calls and [they also] use it for music and that's all they use it for. Unlike the young ones that use it for Facebook purposes, different sort of Internet pages." The Namibian government has since acknowledged a lack of ICT skills among its general population especially among the rural poor [16, 19]. Findings in this study on ICT skills might have been exaggerated by the dominance of IT professionals and the youth. Hence, it is important to understand the ICT skills of citizens prior to implementing m-Government. The general perception is that m-Government applications should be simple and easy to use.

4.3 Community-based Partnerships

Community-based partnerships are important for they could provide the necessary technical skills to support m-Government use at local level and provide access to others. Participant P2 indicated that, such an initiative "it's gonna [going to] take a lot of convincing people" for them to adopt e-Government. Furthermore, P4, a 47-year-old lady was not comfortable trying out on the system. This demonstrated a need for technical support if e-Government is to be used by the elderly. When P4 was asked to complete forms on a prototype, she stated that "oh no I don't know what exactly [is] about a form". She continued to state that "can I use my baby, my son? My son he will come and help you, he knows about mobiles." Furthermore, participant P3 skipped a step to upload a fictitious birth certificate something that could be due to a lack of knowledge of the feature. On the other hand, participant P15 from a rural village appear to recommend the need of community-based partnerships that could help locals to adopt m-Government. P15 suggest of a "hub" or "campsite" where the community centre could go and gain access to ICTs for m-Government. Due to the language problem, P15 went on to recommend the use of translators as he stated that "I think there should be even more than three people [at the hub], one should be of San speaking language and the other two they can speak English, then this one can translate for the people." Furthermore, most participants did not read the message that they would need to visit government offices at a specified time to submit fingerprints and a passport size photo during the experiment. These findings suggest that community-based partnerships that could help citizens through these processes and steps involved are a critical requirement for e-Government in Namibia. Such an arrangement was also considered important even for the first world nations such as the United States [11].

4.4 Citizen Information Needs

The majority of participants did not show clearly their sources of information they consider credible. Only participant P6 indicated that the radio and the newspapers are a reliable source of information. Participant P6 explained that "I was reading in the newspaper or I heard on the radio, maybe there is a way... you can send an SMS to [Ministry name given] [to inquire] to know that maybe the ID's already out". This is in stark contrast with the literature that shows a heavy reliance on social media as a source of information [5]. Similarly, a study that was conducted in Namibia pointed to an increased reliance of social media as a source of news by the youth [20]. Understanding trusted sources of information is critical for sharing information about e-Government.

4.5 Attitude Towards Technology

Data was gathered to establish the attitude of participants towards the use of technology in government after being exposed to a prototype for this study. Participants expressed mixed

reaction on using IT in improving government service. There was a group of participants who showed a positive attitude towards using e-Government and or m-Government in light of the hardships faced with travelling to the government offices and waiting in long queues. Participant P4 states that *“maybe people will take, go for that [using Internet to access government services], because now is the time for the Internet and that?”* Participant P8 stressed that the IT *“application would definitely work.”* Similarly, P9 thought it was a good idea *“as long as there could be an option to verify the information submitted by the user. The people the ministry should be able to know the information is true without trusting the user to apply correct information”*. Participant P15 weighed in as he suggested that such an idea would reduce transport costs. He explained that *“it’s less costly because people don’t need to, to just to go move from one place to another just to fill in the details, I think it’s something very good for the community as well. Cause they will just be at home and then everything will be completed without moving up and down.”* In addition, P15 indicated that such a system could save time *“it saves time, and I think maybe for one-one-one house or maybe for people come together in a place where you can do this, it’s faster than [travelling] to towns”* to apply for an ID.

However, a thought of people in the rural areas made participants to have some degree of reservation over the feasibility of using IT driven system. Participant P15 explains *“it will need somebody trained that can help them, cause my community members, especially the elders and even the younger ones, they do not go to school, it’s a problem. So they need somebody that will help them. I think there should be a person that should help. Even three or two to help. Cause our community members, most of them have a communication problem. When it comes to communicating in this official language-English.”* He went on to state that having someone on standby is *“something very good, because then, whenever people come to pop up and need help, they’re [those who can] help”*. Similarly, P10 raised concern over how such systems would be used by those based in rural areas. It was stated that, *“always coming up with these fancy ideas is always an issue [given] that the majority of the people, unfortunately, are staying in rural areas. So, it’s always an issue as to how you would get this out and make it easy for them to use”*. In addition, P10 suggest there is poor network access in rural areas as she stated that *“the closer the people are to the rural areas they wouldn’t have access to for example this e-services that government actually advocating for. So, I think that’s a big issue currently.”* Similarly, P8 indicated that, while those at school might be ready to use IT in government, people in the rural areas might not be ready as she explained that *“it [m-Government] will work, but only for us who are at school. Imagine taking it to a village where people don’t even know how to use computers, they would even run away, they would be scared. You know people are very scared of technology. The moment that you take out the computer they will definitely run away. But for students at schools, especially in urban areas or in towns it would be better but the more you go deeper, I don’t think digital will work, not all the time.”*

4.6 ICT Infrastructure

Interviews with participants revealed a number of ICT infrastructural concerns. Participant P2 indicated that *“they have a lack of infrastructure”* in rural areas. She went on to explain that rural areas *“don’t have the MTC [Namibia’s leading mobile phone service provider] towers close. They don’t have access to Internet.”* Participant P15 went on to suggest that, while there are sections with base stations in the rural areas, signal reception remains poor. Participant P15 stated that *“at least, at our village we have Internet tower. But it’s not that high, but it can cater for the surrounding. The other village we were yesterday, it’s a problem, there’s no Internet connection. So in terms of even emails, when you want to check your email and go on Facebook on different sites on internet, you won’t access”*. Similarly, one would need to position themselves strategically to get mobile phone reception in the

villages as P15 went on to state that *“Only maybe when you try to call you can at least access but you have to stand in a way that the phone can be.....I mean it should be put stable in order for you to communicate....network is very weak”*. The same applies to supporting infrastructure for other ICTs. For instance, there are indications that there is a poor radio signal reception in Omatako village. Participant P15 states that *“we don’t have radio connection. So we need an aerial in order for us to connect to radio”*. Similarly, electricity access is poor in the village. Most households are not connected to the national electricity grid. Participant P15 explains that *“electricity [access] also is a problem”* in his village. Its *“very much a problem, we don’t have electricity at all, and it’s only the school and the clinic that has. Even with the phones, its very difficult cause we have to go to the school and ask if they can help to charge our phones.”* ICT infrastructure remains a challenge in most parts of the African continent [15, 17].

5. Conclusions and Summary Recommendations

Citizen-centric e-Government is seen as one of the solutions that could improve government service delivery [6, 7]. This study used a prototype to validate factors of citizen-centric e-Government. Below is a discussion of the study findings:

In particular to access to ICTs, the study found that the majority of participants own a mobile phone. However, this statistic may change in rural settings where few people own a phone and the most commonly owned phones in rural areas are the feature phones. This result could be explained by the fact that rural areas are twice as much likely to be poor compared to their urban counterparts [19]. As indicated by P15, only a few are able to own and use a smart phone, teachers and elder people who have been working. When asked if people own computers in rural communities, the response was that there are only few. As such, a citizen centric e-Government suitable for Namibia would be one that is compatible with technologies owned by citizens. In this case, m-Government that is accessible on both smart and feature phones would be ideal. In addition, ICT skills were found popular among the youth and the working class. Elders based in rural areas are likely to struggle when it comes to operating a mobile phone. This is down to the fact that some of the rural dwellers cannot read. Hence, they mainly use phones for making calls and playing music. Besides, some of the elders need assistance to make a call. As such, the government needs to look at how m-Government can be delivered through community-based partnerships for support. The use of community-based partnerships can help address challenges of low literacy rates and limited ICTs access. Clinics and schools in rural areas that have access to electricity can be instrumental in providing centres for community-based partnerships in m-Government. Besides, the rural populace already make use of local schools to charge their phones. Hence, schools can provide the necessary support where citizens find it difficult to operate m-Government systems and the needed ICT supporting infrastructure. Furthermore, the attitude towards technology appears positive in light of challenges faced. However, more need to be done in promoting awareness, imparting the necessary skills and supporting ICT infrastructure. The study noted that mobile phone reception remains a challenge in rural areas. So does access to electricity. Namibia Statistics Agency [19] shows that the majority of rural households (85%) have limited or no access to the main electricity grid as they use firewood for cooking. Nonetheless,

Limitations: the sample of this study is dominated by the youth and IT professionals. Future studies can explore the use of m-Government in rural areas and among elders to establish their perception on m-Government. The study findings suggest that elders, especially those in the rural areas can barely make use of mobile phones. Hence, introducing m-Government to such a populace could be an interesting area for future research.

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