Designing Reality Fit m-Voting

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Abstract
In this paper, we examine the declining trends in voter turn-up in Uganda and other developing countries. We also look at the possibility of using ICT especially the widely used mobile phones to improve citizen participation in voting. We also assess the current citizen perception and responses towards using their mobile phones for voting. In addition we discuss political, technological, social and cultural factors that are likely to affect the use of mobile phones for voting.

Categories and Subject Descriptors
C.3 [**Special-Purpose and Application-based Systems**]; J.1 [**Administrative Data Processing**]: *Government*

General Terms
Design, Human Factors

Keywords
Developing Countries; Mobile Phone Voting; Demographics; Acceptance Patterns

1. INTRODUCTION
According to [30], voter turn-up in many developing democracies is declining- with the African continent having the lowest voter turn-up of 65%. For instance, in Uganda, the 2005 referendum had only 47% voter turn-up [21], while in the 2011 presidential elections, more than 40% of the registered 13.5 million voters did not turn up to vote [12][19]. Voter turnout in developing countries has been largely ignored [30]. If a big percentage of citizens do not express their opinions through voting, elections would create no incentives for politicians to adopt or implement policies in the public interest [30].There is need to curb this vice. Proponents of using Information and Communications Technology (ICT) in elections such as [22][20] [5][6] believe that ICT offers a lot of promise in improving voter turn up because of its potential benefits of anonymity, scalability and speed.

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Many developing countries could take advantage of the most available type of ICTs-notably mobile phone technology to improve voter turn-up. Any developing country wishing to cost effectively increase citizen participation in decision making through ICT should take advantage of the opportunities provided by the explosive spread of mobile phones in the developing world [15]. Mobile phones are the most adopted electronic communication devices in developing countries, with its penetration more than all other electronic devices put together [3]. For example, to date there are six giant telecommunication companies in Uganda and over 14 million subscribers [28]. By December 2009, the coverage for mobile telephony in Uganda reached 100% with a total of 2300 base stations erected throughout the country [28]. Therefore, mobile phones would present a wide reaching voting platform in Uganda. Mobile phone technology has supported various successful projects in Africa. These projects range in variety and scope, for example, mobile phones have been used for monitoring measles outbreaks in Zambia, supporting diagnosis and treatment by health workers in Mozambique, and sending health education messages in Benin, Malawi and Uganda [1]. The focus should now be on new and innovative ways of integrating mobile technologies into sensitive processes like national voting [29]. Mobile phone voting if adopted well, promises much cheaper and more secure voting processes than paper ballots, far simpler vote counting and high voter turn-up compared to other voting technologies. Mobile phone technology would pass as the cheapest and most appropriate and reliable form of technology to be used in national voting in developing countries [33][11].

1.1 Java Card Technology (JCT)
One of the technologies that would enhances the use of mobile phones as an end device for voting is Java Card Technology (JCT). This technology is normally deployed in a number of smart cards including; some SIM cards used in cell phones on most wireless networks and financial cards which support both online and offline transactions [27]. Hundreds of millions of SIM cards based on Java Card technology are already powering innovative services including voting applications in cell phones. [27][7][23] forwarded the unique properties in java cards technology which can be exploited in mobile phone voting, these include: Multi-Application-Capable, Interoperable, Secure, Dynamic and Compatible with Existing Standards. However, despite all the opportunities mobile phones provide as an end device for voting over other ICTs, mobile phones have failed to gain much acceptance and satisfaction as an e-voting tool in developing countries [26][14][3]. According to [2], ICT acceptance in developing countries is more than a technological

matter as it is influenced by many factors including organizational, human, social and cultural issues. Social, cultural, political and economic challenges rather than technical and security factors are the major causes of failure in ICT aided elections in developing countries [31][17][16][14]. Whereas Java Card Technology may be useful in addressing technical issues like security and privacy, these technical issues may not be as difficult to overcome as social-cultural, political and economic acceptance by the citizens [15]. It is therefore paramount to first understand the extent to which social-cultural, political, and technological factors influence the use of mobile phones as an end device for voting before it is adopted. For instance, surveys that were carried out in Nigeria and Malaysia revealed constructing results where 27.4% and 50% respectively- of the surveyed population in the urban settings do not prefer using mobile phones as end devices for voting [4][26]. Mobile phones are perceived by many as tools used more by youth for fun and entertainment rather than serious activities like political participation [14]. [13] acknowledges that the factors affecting adoption and acceptance of any given technology normally differ from one place to another. This is as a result of different needs, perceptions and interests in different societies. Therefore, there is need to assess the different dynamics in each societies, hence this study in Uganda.

2. THIS PAPER

This paper, discusses the current citizen perception and interest towards using their mobile phones as an end device for national voting in Uganda.

3. METHODOLOGY

In selecting the sample for this study, the targeted respondents were the eligible voters in urban, peri-urban and rural areas of three districts in Uganda. The three districts included; Soroti, Serere and Kumi. These districts were mainly chosen because the urban, peri-urban and rural settings were clearly defined. These districts could easily be accessed by the investigators without much financial difficulty, and the respondents were of different political alignments. This study used a quantitative approach where 900 questionnaires were given to respondents of different age groups (from 18 and above), gender, literacy levels, income level, occupation and type of mobile phone owned. Of these, 786 were fully filled and returned for analysis, thereby contributing to 86.9% response rate. The completion of these questionnaires was entirely voluntary and responses were anonymous.

3.1 Data analysis

Descriptive statistics were mainly used to provide simple summary statistics of the respondents' social demographic characteristics such as age, gender, education levels, income levels andoccupation.56.4% of the respondents were male and 43.2% were female. The study received feedback from all the three settlement areas, 33% rural, 31% peri-urban and 35% urban.

4. SURVEY RESULTS

In order to assess their perceptions and interests towards using their mobile phones for voting, the major statement that was presented on a Likert scale of 7 was; *''I would prefer using my mobile phone as an end device for national voting".* Based on the above statement, the study reveals that 449 (58%) of 778 of the respondents did not preffer using their mobile phones for voting, while 281 (36%) were willing.

In summarizing the findings, there is evidence that close to 60% of the respondents did not prefer using their mobile phones as an end device for voting. However, some categories of voters averagely prefer using their mobile phones for voting, for example the female respondents(40%), age group between 18-39 (41%), those who worked in NGO and Private Sector (46% and 43% respectively), those who have attained A-level (40%), voters who earn more than *UgShs* 600,000 (40%) and voters who mainly live in peri-urban areas (40%).Among the voters who are highly expected not to prefer using their mobile phones for voting include; Male voters (57%) voters of the age of 50 years and above(70%), voters who work in civil and informal sectors (70% and 60% respectively), voters who stay in urban areas(70%), those who have no education and those that have a diploma and above (70% and 60% respectively) and those who earn less than UgShs 100,000 (60%).

5. CHALLENGES

In order to assess the extent to which different socio-cultural, political and technological factors would affect the use of mobile phones for voting, an equal number of socially, culturally, politically and technologically related statement and questions were presented to the respondents based on a Likert scale of 7. For example; *''I would not use my mobile phone for voting because I do not trust the Electoral Commission''*. Secondly, the respondents were also asked to grade which among the social, cultural, political and technological factors had a higher influence towards their acceptance or rejection of mobile phones as an end device for voting. The study found out that, political factors to a greater extent would determine either the rejection or acceptance of mobile phones for voting. In summary, a bigger percentage of the respondents were not willing to use their mobile phones for voting. This was mainly as a result of four (4) categories of factors.

5.1 Political Factors

The study reveals that political factors are top on the list representing 31% of the total factor that affect the use of mobile phones as an end device for voting. For example 69% of the respondents were not willing to use their mobile phones for voting because they did not trust the government, while 70% said they do not trust the Electoral Commission. There is discontent on how the government and the Electoral Commission have been carrying out elections. All in all, 56% of the respondents believe that the existing laws and policies on elections will determine whether or not they would use their mobile phones for voting.

5.2 Technological Factors

Technological factors represent 29% of total factors affecting the use of mobile phones for voting. For example, 61% of the respondents did not trust the mobile phone company mainly because of the past experience they had with the mobile phone

company such as un-necessary charges on loaded airtime, expensive call and text message rates to mention but a few. 54% of the respondents would not use their mobile phones for voting because of the poor network connectivity in areas where they live. 63.5% also believe that it is easier to rig using this technology than it is with manual ballot procedure.

5.3 Social Factors

Social factors contribute to 21% of the total factors affecting the use of mobile phones for voting. For instance, 58% responded that it has never been their dream or desire to use their mobile phones for voting.24% of the respondents agree that they would not use their mobile phones for voting because of their status in the society, while 36% agree that it was childish to use their mobile phones for voting. 55.6% believe that they will not get satisfied if they voted using their mobile phones.

5.4 Cultural Factors

The less significant factors in affecting the use of mobile phones for voting are cultural factors. Cultural factors contribute to 19% of the total factors affecting the use of mobile phones for voting. For example, 35.5% of the respondents believe that their cultural beliefs would hinder them from using their mobile phones for voting, 41% accepted that their spiritual values conflict with the use of mobile phones for voting.

6. DISCUSSION

Using mobile phones as an end device for voting can provide an opportunity for the 14 million Ugandan mobile phone subscribers to vote easily and enjoyably from anywhere at any time. This can tremendously improve voter-turn up in Uganda. However, it is important to carry out an assessment of the people's perceptions towards using their mobile phones for voting. This would guide the design and implementation process of mobile phone voting system. For any successful deployment of mobile phones as an end device for voting, there is a need to study different dynamics in each environment. In Uganda, the study found out that political factors play the biggest role towards the acceptance of mobile phones for voting. The case of building trust in government and Electoral Commission is very important. Although technological factors may not be as difficult to overcome like the political factors, technological factors were the second most important factors to address if mobile phones were to be used for voting. Poor network connectivity, network congestion and un-necessary deduction of air-time from the customers would be among the first challenges to be addressed in order to build citizen trust to use their mobile phones for voting. Social and cultural factors are the third and fourth, respectively. Changing people's attitudes towards using their mobile phones for voting would be a first step.

7. ONGOING WORK

Future work will focus on developing a Socio-cultural Technology Design Model (STD) for designing mobile voting solutions that are appropriate to the social-cultural and technological environments in a developing country like Uganda. The STD model will be useful for developing a social culturally relevant technology in a politically conducive environment. The model will suggest a need to first build trust and confidence in the government and Electoral Commission. Secondly, the model will envisage appropriate persuasive designing that aims at changing any negative attitudes towards the technology. Thirdly, the model will puts emphasis on designing for acceptance especially in culturally sensitive environments.

8. CONCLUSION

Voter turn-up in many developing countries is declining. in order to address this problem, government can use legislative approach by passing a law that makes it illegal not to vote, however, this would tantamount in to breaching the citizens right not to vote. Voting is a choice, the cheapest way to improve voter turn-up would be through the use of mobile phones as end devices for voting. There are 14 million mobile phone subscribers in Uganda which can be utilized to improve citizen participation in elections. However, this study reveals that only 36% of those who owned mobile phones are willing to use them for voting citing a number of political, technological, social and cultural issues which need to be addressed first before any government can deploy mobile phones as end devices for voting.

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