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University Students' Perceptions on the Adoption of Electronic Voting

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Abstract

There is always the assumption that the development of a new system will be accepted and used by users. However, users' acceptance of a new system are influenced by several factors. As such, the study was undertaken with the objective of assessing students' perceptions on the adoption of e-voting. The study used descriptive research design and TAM as the theoretical model. The population comprised of university students and University of Ghana students served as the participants for the study. Using simple random sampling technique, 193 students were selected for the study. Structured questionnaires served as the data collection instrument. Data were analyzed using SPSS Version 20. Descriptive statistics (frequencies and descriptives) were performed and statistical tools (mode, frequency and percentage) were used. The results indicate that students' acceptance of e-voting are influenced by their perceived ease of use, usefulness, social acceptance and security of the system. The recommendations are that, system developers must consider these factors in the design of a new system and also calls for a countrywide study to be conducted in Ghana to improve the acceptance of e-voting and e-governance, as the use of only university (University of Ghana) students limited the study.

Keywords: *E-voting, Information Technology, TAM, University of Ghana, Ghana.*

1. Introduction

The advancement of science and technology has widened the possibility and use of Information and Community Technology (ICT) in health, education, finance, governance and democracy. Misuraca, Broster and Centeno (2012) have expressed that ICT is a catalyst for innovation and creativity while Bonsu (2012) emphasized the impact of ICT in health system in Ghana. In the views of Achieng and Ruhode (2013), democratic and governance processes have experienced global changes owning to the advancement of ICT. They agree with Garson's opinion that ICT has promoted e-democracy that serves as the umbrella under which all democratic and political activities are carried out (Garson, 2006). For Norris (2001), the application of ICT in democracy and governance has enhanced simplicity and effectiveness of the processes.

Democracy is simply understood as the government of the people, by the people and for the people. The ability of the people to express their views and ideas in the process of governance constitute democracy. The expression of views and ideas could take the form of deciding the political system, the choice of government, allocation and distribution of resources.

Certain principles and pillars are fundamental to democracy. These according to Gill (2005; 2009), include rule of law and equality before the law, free and fair elections, peoples' participation, transparency and accountability. The Institute for Economics and Peace also expressed that for democracy to function and for peace to be maintained in society, there is the need for people to enjoy freedom of speech, expression and association as fundamental principles of democracy.

ICT is used as an important platform for promoting democracy and advancing the democratic principles and pillars. E-governance, e-participation, e-democracy and e-voting are means with which ICT is used in promoting the democratic principles and pillars. E-governance ensures simple, moral, accountable, responsive and transparent government while e-voting allows free and fair elections by the use of ICT to cast votes over/via the internet. Hence, e-voting promote citizen participation in the choice of government and leaders. Research have it that, there is high preference of e-voting over the manual paper-based voting. To support this argument, Achieng and Ruhode (2013) indicate that e-voting adoption and implementation tends to be very high particularly in developed countries. Nevertheless, some developing countries such as Estonia, India and Brazil have successfully implemented e-voting while others are in the process of piloting e-governance in their electoral systems (Achieng and Ruhode, 2013; Abdalla and Samani, 2013).

In spite of the high preference of e-voting over the manual paper-based voting and the advantages of e-voting over paper-based voting, a recent phenomenon indicate that e-voting is losing its competitive preference and advantage. For instance, Netherlands in 2008 dumped its electronic system for the manual system. Likewise,

Germany has taken a swipe to ban its e-voting system while Ireland discontinued its e-voting pilot projects (Achieng and Ruhode, 2013). Achieng and Ruhode (2013), opine that e-voting system has been questioned in United States which has generated debates about its prospects. The question that remains unanswered is 'is e-voting the best option to conduct elections'.

Despite the fact that Ghana has not adopted e-voting in its Presidential, Parliamentary and District Assembly elections, tertiary institutions have taken bold steps in the adoption of e-voting. The success factor for the adoption of e-voting pertains to the high literacy of students. The ability of students to interact with computer over the internet served as a catalyst for the adoption of e-voting in tertiary institutions. Illiteracy hinders the implementation of e-voting in Ghana's electoral systems. Mass of the Ghanaian population are rural dwellers who have no access to computers and internet. However, in recent times, efforts and policies of the government are geared towards promoting ICT education in rural areas of Ghana (National Communication Authority, 2003; Ministry of Education, 2008; Ministry of Local Government, 2008). The political commitment, lack of centralized database, level of education and infrastructure imped the adoption and implementation of ICT to support governance in developing countries particularly in African (Boateng, 2013; Achieng and Ruhode, 2013, Hwang et al, 2004). Nevertheless, the United Nations report of the significant efforts made in the application of ICT for advancing governance systems in Ghana and other developing countries (UN, 2010; 2014).

E-voting has gained predominance in tertiary institutions' elections in Ghana. Instead of the usual ballot boxes and papers used in elections, computer screen are displayed and used as the medium of casting and counting of votes by students. This is particularly so in the case of Students' Representative Council (SRC) elections or departmental and hall levels elections. For instance, in the case of the University of Ghana**,** the traditional halls such as Commonwealth, Legon, Akuafo, Volta and Sarbah have all resorted to e-voting in their annual hall executives elections. At the Department level, Information Studies, Geography, Computer Science, Psychology and Political Science departments have all adopted e-voting. The general election which is conducted annually to elect students to represent the entire students front (SRC) is also done by e-voting. Notwithstanding, some institutions still make use of the manual paper-based voting.

To this, the researchers seek to achieve the objective of assessing students' perceptions on the adoption of e-voting in tertiary institutions' elections.

2. The Adoption Model

Theoretical support becomes very necessary in explaining the adoption of ICT. Hence, Diffusion of Innovation (DOI) Model, Technology Acceptance Model (TAM) and Theory of Reasoned Action can all be applied in the explanation of ICT adoption. With reference to this work, the researchers adopted TAM as the theoretical support for their study.

The Theory of Reasoned Action (TRA) (Fishbein & Ajzen, 1975) served as the basis for determining the conscious intended behaviour of people in social psychology (Priyanka and Kumar, 2013). On the basis of TRA, several attempts have been made by researchers to understand the behaviour of people. A typical example of such attempts is the introduction of Technology Acceptance Model (TAM) by Davis to understand the behaviour of people in the acceptance of a particular Information System (IS) (Davis, 1986; Priyanka and Kumar, 2013). Thus, TAM is an extended form of Fishbein and Ajzen's TRA (Davis, 1986; Priyanka and Kumar, 2013).

TAM has become an important model to predict and explain why people accept technology or IS. Notwithstanding, both TAM and TRA share common similarities but with distinctions as well. While TRA is used to predict human behavioural intentions, TAM is used to predict as well as explain the actions of people. Again, Davis et al (1989) stipulate that TAM does disagree with the subjective norm contained in TRA as there is the "difficulty in an attempt to disentangle the direct effects of subjective norm (SN) on behavioural intent (BI) from indirect effects via attitude (A)". However, TRA provides the theoretical support for TAM (Davis, et al., 1989; Bradley, 2009).

TAM opines that people's acceptance of IS are affected by Perceived Usefulness (PU) and Perceived Ease of Use (PEOU) which together affect the attitudes of the person (Davis et al., 1989; Lee et al., 2003; Schwarz and Chin, 2007; Van der Heijden, 2004; Bradley, 2009). PU is better understood as a user's perceptions, opinions and probability that using a particular IS will enhance, improve and increase performance (Davis et al., 1989; Bradley, 2009). Thus, when a user's has a positive subjective opinion about a system in relation to performance, such a user is likely to accept the system, else a negative subjective opinion will lead to the rejection of the system. According to Davis et al (1989), PU has direct impact on user's A with an indirect impact on BI to use a particular IS. PEOU, on the other hand, is defined as a prospective user's belief that a particular system will be free of efforts (Davis et al., 1989; Van der Heijden, 2004). Thus a high degree of ease of use and flexibility of a system will attract users' acceptance. Complex and effort-requiring system will lead to the rejection of the system by users. Both PU and PEOU influence user's A to use a system which leads to the BI of the user to actually use the system (Davis et al., 1989). However, PEOU has influence over PU (Davis et al., 1989; Bradley, 2009). Just like TRA, TAM also envisaged the influence of external variables on a user's acceptance or rejection of a system. The external variables include but not limited to social acceptance, security, political and economic environments as well as the specific

features of the system, user's knowledge and use of information technology (Davis et al., 1989; Venkatesh, 2000; Bradley, 2009; Priyanka and Kumar, 2013).

Research has revealed that, the wide acceptance and use of TAM in determining users' acceptance of IS, is partly because TAM has been empirically proven and tested to have a high validity (Davis et al., 1989; Priyanka and Kumar, 2013). In the words of Davis et al (1989), "TAM is parsimonious and theoretically justified". However, TAM has received several criticisms (Bagozzi, 2007; Priyanka and Kumar, 2013). According to Priyanka and Kumar (2013), most of TAM's criticisms have to do with methodology, relationships among variables and theoretical framework. In their views, some critics have questioned the method used in testing TAM's reliability, the relationships between TAM's variables as well as theoretical foundation that underpins TAM (Priyanka and Kumar, 2013).

3. Methodology

To carry out this study, the researchers adopted a descriptive research design. According to Bhattacherjee (2012), descriptive research helps in making careful observations as well as detailed and an in-depth documentation of a phenomena of interest to the researcher on the basis of scientific method. For Kumekpor (2002), descriptive design helps to give a vivid and precise empirical account of an event. Descriiptive research becomes appropriate to be used when the reseracher seek to describe as well as record the frequency or rate of occurrence of an event. When a study has to do with opinions, facts, perceptions and attitudes (Kumar 1999; Kusi, 2012; Kumekpor, 2002; Dick-Sagoe & Ahyiah, 2015), recommend the use of descriptive design. According to Kumar (1999), "a good description is a vital foundation in order to understand, explain, make decisions and predict accurately on a problem or phenomenon". Nevertheless, the descriptive design was supported by the quantitative approach.

The study was conducted in University of Ghana and the university's students served as the participants for the study. 200 students were randomly selected to participate in the study. Of the 200, 193 students agreed to willingly participate in the answering of questionnaires for the study. Self-administered, structured questionnaire was used as the data collection instrument. In the words of Kothari (2004), "structured questionnaires are those questionnaires in which there are definite, concrete and pre-determined questions. The questions are presented with exactly the same wording and in the same order to all respondents. Resort is taken to this sort of standardization to ensure that all respondents reply to the same set of questions". Structured questionnaire ensures simplicity in its design and helps in easy and inexpensive analysis of data (Kothari, 2004). However, one disadvantage is its inability to collect qualitative data in the words of the participants (Kothari, 2004). The questionnaire comprised of two sections. Section 'A' collected personal information of the participants such as students' age, gender, level of study and degree type. On the basis of literature, section 'B' was designed to serve the objective of the study. Variables such Perceived Usefulness (PU), Perceived Ease of Use (PEOU), Social Acceptability (SA) and Security (S) were used to collect the perceptions of students on the adoption of e-voting. Section 'B' made use of a five point Likert scale that comprised of 1= Very Low, 2= Low, 3= Average, 4= High and 5= Very High.

Data was analyzed using SPSS Version 20 and the researchers made use of statistical tools such as mode and percentages. The use of mode help determine the rate of occurrence of answers of the respondents and hence serves as perfect analysis for Likert scale. The researchers then converted the five point scale to a three point scale for the purpose of analysis. The new scale consisted of 1=Disagree, 2=Neutral and 3=Agree.

Cronbach alpha test was performed to ensure the reliability and internal consistency of the instrument. Pallant (2005) opines that, the ideal Cronbach alpha should be greater than 0.7 which indicate a high degree of internal consistency of the instrument. Cronbach alpha of 0.86 was obtained which indicates high degree of internal consistency of the instrument.

The review of literature helped in ensuring the validity of the instrument. Literature review on TAM provided the basis for ensuring that instruments were measuring what they were intended to measure. Thus, TAM provided the variables for the design of the questionnaire. The initial questionnaire was designed and given to experts to peruse and their feedbacks helped in the final design of the questionnaire, hence ensuring instrument validity.

For the purpose of adhering to the ethical principles of social science research, the researchers sought for the informed consent of the participants. The questionnaires were distributed upon agreement of the participants to take part in the study. The design of the questionnaire also promoted ethical principles of research. The introduction to the questionnaire clearly stated the objective of the study to prevent deception. Again, it reaffirmed confidentiality, inform consent, privacy, and voluntary participation. In addition, it also emphasized that participants' responses will be used for academic purpose only.

4. Results and Discussion

4.1. Respondents' characteristics

193 students participated in the study, out of which 101 (52.3%) were males and 92 (47.7%) were females. About 168 (87%) of the students reported their age to be between 18-24 years old, while 11.9% were between age 25-30 years old. The remaining 2% of the respondents had their age of 31 years old and above. Regarding the level of study of the participants, 36.3% and 23.8% were in level 300 and 100 respectively while participants in level 200 and 400 were 17.6% and 15% respectively. Level 600, representing masters' students were 7.3%.

4.2. Students' perceptions on e-voting

Table 1: Perceived Usefulness (PU)

Variables	Mode	Agree	Neutral	Disagree
E-voting is easy to use	3	81.4%	9.3%	9.3%
E-voting ensures convenience of election	3	77.7%	15.0%	7.2%
E-voting promotes fast declaration of results	3	87.1%	7.8%	5.2%
E-voting ensures flexibility of election	3	66.3%	20.7%	13%
E-voting helps me to cast my vote without fear	3	57%	27.5%	15.5%

Source: Fieldwork, 2016

Data from Table 1 indicate that students tend to use IS when the system is useful and beneficial to them. As shown in the table, 81.4% of the students agree with the statements '*e-voting is easy to use*' while about 87.1% of the students believe that e-voting system will promote fast declaration of results. However, about 27.5%, 20.7% and 15% remain neutral when asked if electronic voting '*helps to cast vote without fear', 'ensures flexibility of elections'* and *'promotes fast declaration of results'* respectively. Likewise 15.5% and 13% disagree that e-voting helps to cast their votes without fear and also ensures flexibility of elections respectively. Thus, the students have shown that they will use a system if that system is very important and useful to them. The usefulness of the system can be best assessed from the users' perspectives and not necessarily from the system developers' perspectives. As shown by the findings of Davis et al (1988) and Achieng and Ruhode (2013), a new system will likely be accepted by users if the system is useful to the users and help them in the accomplishment of their activities. In the case of e-voting, the students expressed that they make use of e-voting system because it helps in the fast declaration of election results, cast their votes without fear and ensures convenience of elections. Thus, e-voting helps get rid of the stress of queuing up to cast votes. Perceived usefulness and perceived ease of use are the two most important factors used by TAM to predict users' acceptance of a new system.

Table 2: Perceived Ease of Use (PEOU)

Variables	Mode	Agree	Neutral	Disagree
E-voting is easily accessible	3	68.4%	16.6%	15%
E-voting is easily manipulated	3	64.2%	19.2%	16.6%
E-voting software is user friendly	3	63.7%	27.5%	8.8%
E-voting is less time consuming	3	74.7%	12.4%	12.9%
E-voting ensures flexibility	3	43.5%	26.5%	30%

Source: Fieldwork, 2016

Table 2, provides data that pertains to students' adoption of e-voting system on the basis of the ease of use of the system. The table indicates that 74.7% of the students are of the opinion that e-voting system is less time consuming while, 12.4% and 12.9% remain neutral and disagree respectively with their opinion. Again, about 63.7% agree with the statement '*e-voting is user friendly'* while 27.5% remain neutral as to e-voting being user friendly. On the issue of flexibility, 43.5% agree that e-voting is easy to use because it ensures flexibility. However, 30% disagree with e-voting being flexible while 26.5% remain neutral as to whether e-voting is flexible or not. The findings also agree with Achieng and Ruhode (2013), a system that provides ease accessibility and usage, flexibility, user friendly and less time consuming will be adopted and accepted by users. As pointed out by the students, they will use any system that they perceive to be easily used.

Table 3: Social Acceptance (SA)

Variables	Mode	Agree	Neutral	Disagree
Have you ever heard of e-voting	3	86.6%	6.7%	6.7%
Have you used e-voting before	3	85.5%	6.7%	7.8%
Does e-voting promote accountability	3	58%	30.6%	11.4%
Is e-voting the best option for elections	3	63.3%	25.4%	11.3%
Does e-voting improve knowledge of I.T.	3	75.2%	15.5%	9.3%

Source: Fieldwork, 2016

86.6% of the students said they have heard of e-voting while, 85.7% expressed that they have used e-voting before as shown in Table 3. About 58% agree that e-voting promotes accountability. On the contrarily, 30.6% are neutral as to whether e-voting promotes accountability or not while, 11.4% disagree with the statement. Likewise, 63.3% believe that '*e-voting is the best option of elections*' while 25.4% are not sure if e-voting is the best option of elections or not. Abdalla and Samani (2013) indicated in their study that, social acceptance is very important element to be considered in the design, implementation and acceptance of a system. The perceptions, believes and attitudes of the society will arguably affect their acceptance of a new system. The students have indicated that e-voting system is an effective system of elections. According to Parakh and Kak (2007), a "system has social acceptance if it has favorable reception and is perceived as being an effective system by the voting population".

Table 4: Security (S)

Variables	Mode	Agree	Neutral	Disagree
Does e-voting ensures security of elections	3	53.4%	25.9%	20.7%
Does e-voting allow confidentiality, credibility and privacy of results	3	52.9%	32.1%	15%
Can e-voting results be tampered with	3	64.8%	13.4%	21.8%
Can data of voters be tampered with	3	55.4%	28%	16.6%

Source: Fieldwork, 2016

On the issue of security of e-voting, 53.4% are of the view that '*e-voting ensure security of elections*'. However, 25.9% remain neutral while 20.7% disagree that e-voting ensure the security of elections. Moreover, about 52.9% hold the perceptions that e-voting allow confidentiality, credibility and privacy while 15% disagree with the statement. 32.1% are however neutral. Other security issues are the tampering of data or election results. About 64.8% and 55.4% agree that results or voters' data can be tampered with respectively. However, 28% are neutral regarding voters' data been tampered with while 21.8% disagree that '*e-voting results can be tampered with'?* The students have indicated that they will accept a system (in this case e-voting) if it provide security. However, they also agreed that e-voting system can be tampered with. Many researchers have neglected security issues as important elements to measure users' adoption of a system. In recent times, security issues have gained global attention and debates and hence compelled the researchers to find out if security issues of a particular system will influence or affect users' acceptance of the system. The findings from the students reveal that they pay particular attention to the security of a system since it can result in an unauthorized access and use of their personal information by hackers and other third party users.

4.3. Discussion

The findings from the study indicate that users will accept a systems when they perceive it to be useful and easy to use. Other external variables may however, influence users' acceptance of a new system. Research has shown that, system developers particularly show interest in the ease of use as the important factor that influences the acceptance of their system. However, the findings reveal that users of a new system give equal importance to the usefulness of the system as well as the ease of use of the system. As pointed out by Davis et al (1989), users may be willing to use and tolerate a system with difficult interface in order to access a function that is very important to them whereas, users are not willing to use a system that is not useful to them irrespective of the ease of use of the system. In practice, developers of a new system must pay particular attention to these perceptions held by users of the system. System developers must have information relating to users' perceptions, attitudes and behavioural intentions to use a new system in order to predict if their system will be accepted by user or not. This will facilitate the final design of the functional features and interface of the system.

The study also shows that users are careful to use a new system owning to security reasons. They are of the view that a new system should enhance privacy and confidentiality as well as protect their personal information from hackers or unauthorized access and usage. Against this, system developers must also ensure that the new system is secured from unauthorized access.

Users' familiarity with a system will arguably influence their acceptance of the system. However, research has shown that users' acceptance of a new system is faced with challenges at the initial stage of implementation. Hence, prototype test, pilot test and mock-up drills of the new system will help improve users' familiarity as well as their acceptance of the new system.

5. Conclusion

The objective of the study was to assess the perceptions of University of Ghana students on their adoption of e-voting system using TAM as the adoption model. The findings from the study indicate that, students acceptance of e-voting is influenced by perceived ease of used, perceived usefulness, social acceptance and security. Thus, students have indicated that they will use a system if it promises to be useful, ensure easy accessibility and usage. Again, the students pointed out that social acceptance and security of a new system will influence their acceptance of the system

6. Recommendations

The study suggest that for Ghana to fully implement e-voting in its electoral system, attention must be given to the demographic, political and socio-cultural environment. The participants for the study consisted of only university students and hence calls for a countrywide study to assess users' adoption of a new system particularly e-voting and e-governance systems. It also calls for system developers to consider the factors the influence users' acceptance of a new. The researchers recommend future research to look into the challenges of adopting e-voting in Ghana as well as political parties' support for e-voting.

7. Conflict of interest

The authors declare that there is no conflict of interest regarding the publication of this article.

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