# FACTORS AFFECTING THE ACCEPTANCE OF ELECTRONIC VOTING SYSTEMS: A CASE STUDY OF THE E-BALLOT SYSTEM AT THE AMERICAN UNIVERSITY OF NIGERIA (AUN)

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### SCHOOL OF IT & COMPUTING, AMERICAN UNIVERSITY OF NIGERIA, YOLA, ADAMAWA STATE, NIGERIA

**SPRING, 2018**

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### In partial fulfillment of the requirements for the award of degree of Master of Science (M.Sc.) in Information Systems submitted to the School of IT & Computing, American University of Nigeria, Yola

**SPRING, 2018**

## DECLARATION

I, ABUSHAASIN ABUBAKAR, declare that the work presented in this thesis entitled ‘*Factors affecting the acceptance of eballot system in the American university of Nigeria (AUN)’* submitted to the School of IT & Computing, American University of Nigeria, is in partial fulfillment of the requirements for the award of the Master of Science (M.Sc.) in Information Systems. I have neither plagiarized nor submitted the same work for the award of any other degree. In case this undertaking is found incorrect, my degree may be withdrawn unconditionally by the University.

Date: 18th April, 2018 Abushaasin Abubakar

Place: Yola (A00019047)

### CERTIFICATION

This is to affirm that this research has not been conducted or submitted previously for a degree nor has it been submitted as a part of a requirement for a degree except fully recognized within this text.

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DEDICATION

I will like to dedicate this study to the Almighty Allah and to my loving parents and ever supportive siblings for their never ending prayers and encouragement throughout the duration of my research.

#### ACKNOWLEDGEMENT

I will like to recognize the involvement of my supervisors Dr Ago Quaye and Dr Babatunde Ogunleye despite their bust schedules took time out to work on my thesis. They kept boosting me to keep pushing it through to the end. Their impact will not only help in my study but in numerous other researches in the nearest future.

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Lastly, I will like to thank the respondents for their contribution to this study. It was an overwhelming experience.

#### ABSTRACT

Using electronic voting systems is divisive as some countries used such systems and others did not. This thesis discusses countries that have accepted voting electronically and the challenges faced. This study suggests factors that have led to the acceptance of electronic voting systems to tackle some of the challenges faced in electoral processes. Survey questions in the form of a questionnaire was responded to by 227 undergraduates’ students in American University of Nigeria (AUN). The study was built on Structural equation modelling with the integration of literature from technology acceptance theory (TAM), theory of reasoned action (TRA) and theory of planned behavior (TPB) to come up with a framework TAM 2. Hypothesis were drawn and data was gathered and analyzed using the Smart PLS software. The study shows the advantages, compatibility and intension of AUN voters to accept the eBallot system. The study goes ahead to show other motives behind the intention to accept an e-voting system. However, voting is limited to registered undergraduate students hence, the sample size is not generalized in the findings. This research argues that more research should be carried out on Nigerians in diaspora with the infrastructure to participate in their right to vote using an e-voting system. The results showed perceived ease of use (PEU) to have the highest impact and subjective norm (SN) to have the least impact on the acceptance of the eBallot system.

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**Nomenclature**

AUN American University of Nigeria

E-voting Electronic voting

H Hypothesis

SN Subjective norm

PS Perceived security

PEU Perceived ease of use

PT Perceived trust

PU Perceived use

USE Intention to use e-voting system

R2 R square

TPB Theory of planned behavior

TRA Theory of reasoned action

DOI Diffusion innovation theory

TAM Technology acceptance model

INEC Independent national electoral commission CR Composite Reliability

AVE Average variance extracted

# CHAPTER ONE INTRODUCTION

### Introduction

Voting is the obligation to elect your leader. An electronic voting (e-voting) system is the technology that gives individuals the opportunity to vote online without going to the booth physically on the day of voting (Smith & Macintosh, 2013). E-voting certainly reduces the time wasted in carrying out elections. E-voting is seen as a tool for advancing democracy, building trust in electoral management, adding credibility to election results and increasing the overall efficiency of the electoral process. The technology is evolving fast and election observers are continuously updating their methodologies and approaches.

If properly implemented, e-voting solutions can eliminate certain common avenues of fraud, speed up the processing of results, increase accessibility and make voting more convenient for citizens. This study mainly addresses the reasons why students in AUN embrace this technology as their electoral process. The electronic voting system has been accepted by the students of AUN. Using the Internet as an engine for enhancing communication, information access and e-commerce has paved the way for the claim that; the Internet can be used as a tool for voting (Lai, 2016).

The current electoral process in the university is called the eBallot system. The eBallot system “*provides an easy-to-use, fair and secure voting platform that helps organizations make decision, elect leaders and also set new policies”*. An eBallot system is also known as an electronic voting system.

The main focus of this research is to determine the factors and the impact they have on the students’ acceptance of the technology.

### Background of study

Every year at American University of Nigeria a fundamental task of the student community takes place. The students’ election takes place and undergraduates take to the polls to vote in their legislative body at various levels of the student association.

The e-voting system used in AUN is known as the eBallot system. The eBallot system was introduced by the Institute of Electrical and Electronics Engineers (IEEE) AUN chapter in 2013. It was introduced to ensure electoral transparency and reduce congestion at the polling units during the Student Government Association (SGA) elections. Over the years, student elections held in AUN have been conducted using the eBallot system. This system allows registered students to cast their votes for the preferred candidates. Leading up to the elections the dean of student affairs sends a broadcast email to all registered students which will contain a link to the eBallot page. Students are required to register using their email/student ID and password before the votes are casted. This process is different from the card reader method of voting widely accepted in the country. The eBallot page is open for the duration of the voting process and closes automatically when the time runs out. Votes are counted and tallied by eBallot system and the results are posted on the electoral page for students to see. However, the voters are only allowed to view the results of the election

### Problem Statement

Unfortunately not all e-voting systems succeed in delivering on high promises. The modern e- voting system is not problem-free. Web based voting is very convenient and easy because all the tedious efforts of vote sorting and counting is done by the system (Sergei et al., 2011). Even with this benefits, there are some shortcomings with the system. Challenges such as software failure arises, cybercrime and also, the voters’ ability to explore the Internet is put into consideration. (Amankona & Paatey, 2009). Many e-voting solutions lack transparency for voters and even election administrators. Most e-voting systems are only fully understood by the experts and the integrity of the electoral process relies largely on a small group of system developers instead of the poll workers. If not carefully planned and designed, the introduction of e-voting can undermine confidence in the whole electoral process.

Shamos, (2004) made mention that for an e-voting system to be regarded as a clear and transparent solution, certain criteria must be attained to determine the level of precision and

certainty of the results. Smith & Macintosh (2003) says that if there is to be any questions asked about the electoral process then the system used in the election should provide reasonable responses to satisfy the losing candidate. OSCE (2005) mentions the importance of observing all stages of the electoral process: the pre-election stage, during election and post-election. This study focuses on the stages affected by e-voting.

Election software is complex hence, it is more difficult to find and fix bugs because of the vast variety of ballot types used. Errors will be found regardless of the skill and dedication of the developers who design the software. Errors such as misplaced votes, i.e. when votes count on the other candidate instead of the preferred choice .

Before users cast their vote, the online voting system will first have to verify the voters to ensure that non registered voters aren’t allowed to vote. The system has to be highly secure and user friendly for the students to operate.

This thesis will investigate the factors that students in AUN consider in the acceptance of the eBallot technology.

### Research Question

The aim of this study is to answer the research question:

* + - *What are the factors that influence the acceptance of e-voting in American University of Nigeria (AUN)?*

### Aim of Study

The purpose of this study is to use a conceptual framework to identify the factors that influence the users (students) acceptance of electronic voting system in AUN.

### Objectives

The goals of this thesis is stated as follows:

* + - To understand the factors that influence AUN students to accept e-voting.
		- To understand the relationship between the factors and intention to use the e-voting system.

### Scope of the Study

This thesis is on the acceptance of e-voting at AUN and the factors that allows AUN students to accept the technology. The study focuses on students (undergraduates) who are eligible to use the eBallot site.

### Study Motivation

Election voting machines have provided a number of benefits to the election process. For example, direct recording electronic machines can be equipped with audio or tactile devices that allow disable citizen to cast ballot independently, they also help conduct election in more efficient and effective manner, like reducing the cost associated with printing ballot and hiring extra polling staff. Voting machines can also spit out election tallies much quicker and more accurately than exhausted polling station staff; they reduce human errors in generating election result and also reduce the cost of conducting election. So the major benefits of e-voting could be summarizing in the following points: reduced costs, increased participation and voting options, greater speed and accuracy placing and tallying votes, greater accessibility and flexibility for the disable (Data-monitor, 2008).

After pinpointing few benefits of e-voting, some risks are associated with using and depending on electronic systems. Programming errors can be very simple like adding semi-colon in the wrong place can completely change a program. There are many risks experienced during the development stage of any system, product delivery, maintenance between elections and the pre-and post-election intervals. The greatest threat identified involves a person gaining access to a voting system and interring malicious code into the voting system software. This malicious code could exploit vulnerabilities in the voting software to spread virally from machine to machine causing voting machine to fail to record votes, failing to comply with legal requirement and calculating vote totals in a way that is inconsistent with legal requirements. Applying technology to solve one problem may introduce other problems. For example, E- voting systems are introduced to eliminate paper and many other problems, but without a paper copy, the voters cannot check that their votes are correctly recorded and cannot independently validate votes’ totals (Bishop and Wagner, 2007).

### Structure of the study

The structure of this study is described below with an overview of all the chapters:

*Chapter 1* serves as an introductory to the section of this research identifying the aims, objectives and stating the research question to be investigated.

*Chapter 2* contains synthesized literature of the study while it compares various theories used to develop the model of the study.

*Chapter 3* identifies the study method and methodology used in the study.

*Chapter 4* analysis the findings of the data collected.

*Chapter 5* discusses the results obtained in chapter 4 while also drawing the conclusion of the study. This chapter mentions recommendations and shortcomings of the research.

# CHAPTER TWO LITERATURE REVIEW

### Introduction

This section presents studies of literatures on electronic voting in various parts of world looking at the acceptance of this technology. The literature identifies some gaps which this research intends to fill. This chapter looks at various countries that have accepted e-voting and the challenges faced by this countries in relation to the case study. Theories used in the acceptance of technology were also discussed and used to come up with a conceptual framework.

### E-voting in developed countries

Liaw et al (2004) list characteristics of e-voting and their intended results to attain their features. One of the main beliefs behind idea of the e-voting is its similarity to the primitive voting system. Hence, e-voting is only conducted by authorized voters as it is conducted uniformly and undisclosed. The gathering of votes must be done securely, reliably and accountably.

Smith and Macintosh (2003) are of the opinion that the primitive way of conducting elections needed to be restructured. This restructuring can be through e-voting or e-counting. The most efficient form of democracy is that which the masses are involved in all the electoral process to achieve a free and fair elections (Macintosh, 2004). He also states that voting is an affiliation between voters, government and democracy. Oadah and Taha (2007), states that electronic voting is the act of using a computerized system to conduct elections. They furthermore shed light on the implementation of e-voting as it will lessen the cost of elections.

Philippines and Belgium have likewise joined the list of nations that have taken up the responsibility to conduct elections electronically. While several countries are accepting the e- voting systems there are many other countries are moving back to the paper based system such as Netherland in counting their national elections (Clift, S. 2009). In 2008 e-voting was suspended after several years of use when activists showed that the systems in use can, under any circumstances, endanger the secrecy of the vote. In spite of the problems, many

stakeholders, especially mayors and voters, still trust e-voting. This is based on positive experiences from the past they are asking for a reintroduction of voting computers. Germany too just recently stopped the use of e-voting in conducting their polls. Republic of Ireland too abandoned using their e-voting systems after spending millions of euros investing in it. However, the United States of America (USA) continues to deliberate the use of e-voting in their elections as it has caused lots of debate. The issue of e-voting is a controversial issue in most part of the world where some people are in support while others are against it (Lai, R., & Haleem 2002).

Goldsmith and Ben (2011) Estonia introduced e-voting as an additional voting channel in 2005 and enjoyed widespread trust from the very beginning. Estonia is a country that enjoys a high level of trust in its institutions especially e-voting. Not even massive hacking attacks against Estonia’s e-government infrastructure ahead of the 2007 elections undermined this confidence. In 2011 almost 24% of votes were cast online.

Loeber, L. (2014) argues case study of a country in which e-voting used to be the general norm until 2006; the Netherlands. Since the abandonment of e-voting, several attempts have been made to reintroduces some form of e-voting. This paper describes these attempts and tries to give an insight in the possible future developments of e-voting in the Netherlands. It also analyses which issues play a major role in debates on the use of e-voting.

### E-voting in developing countries

Osho and Abubakar (2016) mention the challenge of accessibility is especially peculiar to developing countries where IT adoption is still relatively low. The paper proposes a framework for an e-voting system that would most benefit developing economies. It ensures availability of the system to only eligible voters and integrity of the voting process through its capacity to identify and prevent ineligible voters and multiple voting. To guarantee accessibility to all eligible voters, it supports both online and offline voting capabilities. Adopting electronic form of voting would provide a more robust, easier to use, and reliable system of voting, which, consequently, would contribute towards enhancing the delivery of democratic dividends.

Ruhode. E and Achieng. M (2013) argue that their study explores how South African can leverage the opportunities that e-voting presents. Manual voting is often tedious, non-secure, and time-consuming, which leads us to think about using electronic facilities to make the

process more efficient. The study proposes that the adoption of electronic voting technologies could perhaps mitigate some of these issues and challenges in the process improving the electoral process. The findings reveal that relative advantage, compatibility and complexity would determine the intentions of South African voters and the Electoral Management Bodies (IEC) to adopt e-voting technologies. Moreover, the findings also reveal several other factors that could influence the adoption process.

Abu-Shauad. E, Kinght. M, & Refai. H, (2010) discuss electronic voting systems as divisive as some countries used such systems and others did not. Electronic voting (e-voting) is relatively a new concept based on its application that aims at reducing errors and improving the convenience and integrity of election process. The paper tried to explore the factors that influence the adoption of such systems in a university environment. The study utilized a sample of 302 bachelor degree students in a public Jordanian university and in relation to students’ council election process. Results indicated that students were keen on the concepts of trust and usefulness of e-voting when adopting such systems. The study supported the findings of TAM in the area of technology acceptance.

### Types of E-voting

Internally, electronic voting systems have many functions, including encryption, randomization, communication and security systems. A specific analysis of these functionalities goes beyond the immediate scope of this paper. For a basic understanding of what e-voting systems can do, however, it is useful to consider the following list of some of the end-user functionalities that the system can provide to both voters and election officials. Most e-voting systems fall into one of the following types:

### Physically Supervised

This type of e-voting requires human supervision. Such direct recording electronic voting machines, precinct count optical scanning (PCOS), Electronic ballot printers (EBP). This is the type of e-voting adopted in most developing countries. Such as Nigeria with the use of the card reader technology in the 2015 general elections.

### Remote E-voting via the Internet

This type of e-voting does not require human supervision as a voter can cast his vote from anywhere using an Internet connection. Such as eBallot site.

### Advantages OF E-voting

Below are the advantages of e-voting:

### Accessibility

E-voting allows the voters the opportunity to vote for their mandate from anywhere. This method of voting allows the voters to cast their vote via the Internet. This makes the electoral process more convenient and fast (Goldsmith and Ben, 2011).

### Empowerment

E voting aids users to feel confident about their votes, because online voting gives the voter the authority to own their votes (Clift, S. 2009).

### Cost effectiveness

With online voting the high cost of elections is reduced. The cost of conducting paper based elections is reduced as there will be no need to print ballot papers and provide voting ink (Goldsmith and Ben, 2011).

### Security and Confidentiality

When an e-voting website is hosted on a secure server, only authorized voters are allowed to visit the site and cast their votes. Green (2000) says, the votes are cast on the device of by the voter and travels to a ballot system via SSL (Secure Socket Layer). Due to the encrypted nature of these layers the votes are protected from any unauthorized access and limits the chances of electoral fraud.

### Accurate and Fast results

According to Manjoo (2000), online voting does not give room for invalid ballots or mismarked votes. The results of the election are calculated automatically. The election fraud that comes

with the paper based manipulation of elections are quickly eradicated. There are no delays experienced in the correlation and announcement of results

### Challenges of E-voting

With every innovation comes some hindrances and challenges that will be experienced to ensure improvement in the technology. E-voting is one of them, despite all the benefits provided by e-voting, most people are concerned with the potential fraud during the counting of casted votes as malwares and cyber criminals can affect the outcome of the results. Svensson and Leenes (2003) argue that e-voting will be reduce the cost and also increase voter’s turnout during elections. But in some cases people are more reluctant to participate in the electoral proceedings. Xenakis and Macintosh (2005) also states that e-voting will increase youth participation and increase the low turnout of a paper based election. Barker and Moon (2013) states that e-voting will improve the participation of disable persons. E-voting will also solve the issue of mother tongue by allowing voters to vote in different languages (G, Garson 2006). As any technology e-voting system is used to lure the youth to be more active in selecting a leader to govern them. It can also be used as a tool to involve the physically challenged in performing their rights.

Despite the advantages posed by the acceptance of technology in election processes, there are many issues and challenges facing the system (L, Carter & F Balenger., 2005). This challenge includes security, social, technical, political, legal and economic implications. This issues need to be addressed in other to gain the voters confidence.

Many verifiable systems have been proposed within the academic area but only few have been accepted in the real or mock elections (B. Adida, 2008). A voter needs to take into account the verifiable measures to ensure that their votes count. Therefore the designers need to take many factors into account when designing an e-voting system. The verification stage of voting is very important because most of the voting systems especially the one used by students in AUN only show the voting interface without any verifiable measure to ensure the vote is counted. This study will show the user perception on these e-voting system in the university.

E-voting is the process that allows voters to cast their vote in a discrete and secure way electronically (via the Internet). The most important element of e-voting is the remote voting where the casting of vote can be done anywhere (L. Mitrou, 2004). Voters use their mobile

devices and personal computers to vote. When using these devices the concept of accessibility, usability, security, authenticity, trust and privacy most be fully understood (Little. L, Storer. T, Briggs. P, & Duncan. I, 2008).

### Characteristics of E-voting

Below are the characteristics of e-voting:

### Security in E-voting

E-voting has great prospective in making such elections are conducted cheaper, more efficiently and most importantly accountability is observed. But, security is a major debate topic affecting the e-voting system. There are numerous security dangers and security terrorizations associated with the technology systems (Wu, Chou, Weng & Yen-Han, 2011). E- voting system is also vulnerable to computer attacks. The hack a vote project which was carried out in a class at Rice University demonstrated how students can easily hack a voting system. They students incorporated different forms of attacks on the system which can affect the final result of the election. This projects shows how the e-voting system can be easily hacked and how malicious codes are inserted into the systems to increase or reduce votes.

### Usability of E-voting

It is obvious that accuracy and security are very important in e-voting systems; another important aspect is the usability. The usability ensures the integrity of elections. Usability ensures that the intended vote was the one casted. Usability checks the under vote and over votes which affect the outcome of the elections (Everett .S, 2007). There is confusion when voters find themselves in the situation above. The usability of a voting system can have effect on future turn out. If users have bad experience, they are likely not to participate in the next elections.

The perception of users on e-voting is capable of influencing the student’s intention to use the e-voting system. There are various studies that investigated the acceptance of e-voting in Nigeria (Ishaq S.R, W. R. S. Osman W.R.S, Shittu A.J.K & Jimoh. R.G, 2013). They investigated the perspective of managerial and operational staff of the electoral bodies such as independent national electoral commission (INEC) and election management board (EMB).

Both the primitive and e-voting systems have failed in providing trustworthy election. The goal of elections is to deliver the will of the people and also provide assurance to all stakeholders involved (Barrat, J. & Goldmith, B, 2017). For election to be a successful one, the processes in carrying out such election must be trusted by all stakeholders (Barrat, J. & Goldmith, B, 2012). The trust in e-voting can be associated to the trust on other public foundations, therefore trust of one party can lead to distrust of another (Christensen, T. & Laegreid, P. 2005). Christensen T and Laegreid P (2005) define trust in e-voting as the hope to regard the behavior of the system or stakeholders in a condition that is tagged to be risky. However, the overall running of elections influences the trust people have on the e-voting system. Students that think the system is not free and fair tend to express their mistrust in the system and consequently reject it. Therefore, the trust students have on the host site in charge of conducting the election will serve as prerequisite for a successful e-voting system. There are technical and nontechnical factors that can enhance the trust people have on e-voting. It is believed that it is almost impossible for an electronic voting to be error free (Moynihan, D. 2004) and the present security systems cannot provide the desired security for the system.

### Theoretical Framework

A lot of models have been developed to explain user behavior in regards to acceptance of a new technology. Some of this acceptance models were used to investigate new technology such mobile banking, e-commerce, e-learning but only few studies investigated the acceptance of an e-voting system. Some of these models include theory of planned behavior (TPB), Technology acceptance model (TAM), Diffusion on innovation theory (DOI) and Unified theory of acceptance (UTAUT). TAM stands out of other theories because it has the best qualities of eight technology acceptance models. The following are theories that can be used to analyze e-voting:

### Theory of Planned Behavior

The theory was developed by Ajzen (1991). The theory of planned behavior (TPB) projects or foresees the parties’ intention or behavior on a technology. It defines a person’s behavior which can employ their self-control. It forms a supplementary construct to test a different dimension to acceptance of different kind of technologies (Cowen, 2009). The TPB is an adjustment to the theory of reasoned action (TRA) in which perceived behavioral control is added to the model as seen in the Figure 2.1 below.



*Figure 2.1 Theory of Planned Behavior (Ajzen, 1995; Yolanda, 2015)*

### Theory of Reasoned Action

The theory of reasoned action (TRA) was developed by (Fishbein & Ajzen, 1975). It is one of the most essential theories used to explain user behavior towards the implementation of a technology. According to the TRA below a states a fellow humans routine on the specific behavior as shown by the individual’s behavioral intention (BI) to execute a behavior. The behavioral intention is set with the person’s attitude leaning towards the behavioral intentions and subjective norm (SN) (Davis et al 1989). Attitude is seen as an individual’s style of response to an action (Fishbein & Ajzen 1975). Subjective norm is defined as the perception of an individual when the people who matter to them think they should behave in a particular way (Fishbein & Ajzen 1975; Yolanda 2015). Both attitude and subjective norm may influence the behavior of an individual. However, a person’s behavior can affect how the person acts and vice versa as seen in the Figure 2.2.



*Figure 2.2 Theory of Reasoned Action (Fishbein & Ajzen, 1975; Lai and Zainal, 2015)*

### Diffusion Innovation Theory

The founding father of diffusion Innovation theory Everett Rogers, defined diffusion as the process in which a new technology is communicated through a specific channel over time to the users in a social system (Rogers 2003, p. 5). Diffusion Innovation theory can be a unique way of communication or messages that is concerned with new ideas. An innovation can a technology that is perceived to be new not necessarily a new technology. The newness of technology shows that there will be high level of uncertainty by users (Rogers 2003, p. 5). Uncertainty in this context is the difficulty to predict structured information. In the case of e- voting which is relatively new and the uncertainty of the result is high. E voting is a social system in which it acceptance or rejection leads to a social change. Rogers, (2003) grouped factors affecting the acceptance of a new technology into three which are technological, environmental and organizational factors.

DOI is a theoretical structure used to measure of social change and diffusion. It is used in other sectors such as anthropology, industry, education and medical sociology (Rogers, 2003). Rogers makes mention of 5 stages of the DOI, he called the stages evaluation, awareness, trial, interest and earlier adopted. He later renamed the stages as knowledge, persuasion, decision, implementation and confirmation (Rogers, 2003). As seen in Figure 2.3.



*Figure 2.3 Diffusion Innovation Theory (Rogers 2003, p. 5)*

### Technology Acceptance Model

Technology Acceptance Model (TAM) is a commonly used theory, introduced by Davis (1989). It is an extension to the Theory of Reasoned Action (TRA). TAM classifies models that enhance the implementation of information systems. The core goal of the model is to recognize solutions on how an individual or a group of people agree to use a technology. TAM identifies factors that influence people’s decision to implement a new or improved technology. The framework provides a better dimension for predicting and understanding the use of an innovation. Principle factors such as perceived usefulness and perceived ease of use influence a person’s decision. As illustrated in Figure 2.4 below.



*Figure 2.4 Technology Acceptance Model (Davis 1989; Lai, 2016)*

Technology acceptance model is a commonly used theory used by information systems researchers. The framework has been deployed in various IS research. Franco and Rodan (2005) stated that for a person to accept to use of a technology there has to be a correlation between behavioral intention and the perceived usefulness.

Hun-Pin Shih (2004) combines the behavioral model of Choo (1991) with the TAM. Lee (2009) merged the TPB, perceived risk and perceived advantages in implementing online banking.

In conclusion, the TAM is a generally accepted model to aid in understanding and clarifying user behavior in an information system. There have been numerous studies which have been used to test the framework and outcome have been reliable. This paper tries to analysis the model and different related researches using the TAM theory.

### Chapter Summary

This chapter syntheses the literature on the pneumonia and also the theories used to conceptualize the model used in the research. The chapter also identifies characteristics of e- voting, theories such as TRA, TPB as well as DOI and the situation of e-voting. The chapter goes further to discuss advantages of e-voting. The theories discussed were used to come up with a framework for this study in chapter 3.TAM was discussed in this chapter as the suitable theory to be used for this study. The theoretical framework was crafted using three theories TRA, TPB and TAM.

# CHAPTER THREE METHODOLOGY

### Introduction

Chapter three highlights the appropriate approach and methodology that will be used to achieve the objectives of this study. Based on a conceptual model and construct hypothesis drawn in this chapter, data will be gathered for analyzing. In order to achieve this objective users will be asked to answer survey questions.

### Research Model and Hypothesis Development

Below is the research model adopted for the study

### Research Model

As mentioned in the previous chapter the TPB, TRA and TAM frameworks have been accepted in this research after carefully studying them. King & He (2006) mentions that TAM model is a flexible but yet powerful framework in understanding the implementation of a technology. Constructs where adopted from the theories discussed in the previous chapter to come up with a conceptual model (TAM 2) to conduct this research.

The Figure 3.1 below shows the contrast used to model a framework to identify the factors that allows AUN students to accept the use of the eBallot system.



*Figure 3.1 TAM 2 Framework for study (Venkatesh & Davis, 2003; Lai 2017).*

### Hypothesis Development

Below is the hypothesis generated for the research

### Subjective Norm (SN)

Subjective norm is a construct coined from the Theory of reasoned action (TRA) which allows an individual to allow others influence is intention to use a technology. A person will always consider the affirmation of others to his/her intention or behavior towards accepting a technology (Mugo, Njagi, Chemuei & Montanya, 2017). This study of e-voting in the American University of Nigeria subjective norm is as important as peer pressure which is common among students. Therefore, it is assumed that:

H1: Subjective Norm will have a significant influence towards the intention of the students to use the eBallot system.

### Perceived Usefulness (PU)

Studies from the past have identified perceived usefulness as a construct in technology acceptance (Davis et al, 1989; Venkatesh, 1999, 2000; Venkatesh & Davis, 2000). People consider the significance of a technology to them before going ahead to accept it (Wu, Chou, Weng, Yen-Han, 2011.). In this study it is believed that if users perceived the e-voting system to be useful, they will develop intention to use it. Therefore, it is hypothesized that:

H2: Perceived Usefulness to have a significant influence on the intent of the students to use the eBallot system.

### Perceived Ease of Use (PEU)

This is also a construct accepted from technology acceptance model (TAM) which was develop by Davis, (1989). It is a concept which explains the complexity of a technology. It explains the simplicity of the technology and how users identify it to be free from effort (Wu, Chou, Weng, Yen-Han, 2011.). This also refer to the effort expectancy as explained by Venketesh et al., (2003). It refers to the complexity as explained by Rogers in diffusion innovation as degree of the difficulty of an innovation.

In this thesis, it is expected that the eBallot system is free from effort. Hence, makes it easier for the students to cast their votes. Therefore, it is hypothesized that:

H3: Perceived Ease of Use is a driving factor in the students’ intent to use the eBallot site.

### Perceived Trust (PT)

Trust is an important concept in any system especially when it comes to electronic voting. Perceived trust was found to be an important factor in user’s intention to accept a new technology (Lai, 2016). This is because users have to trust the electoral process for them to participate. In online voting the system has to be transparent for users to believe in it. The issues of security such as hacking and malware is a great threat to the user’s intention to use an e-voting system.

Therefore, it is hypothesized that:

H4: Perceived Trust drives the intention of the students to use the eBallot system in a significant manner.

### Perceived Security

The security of e-voting system is a major concern for active and potential users of the e- voting system. The issue of security is mostly because of the technology and software used in developing the system (Lai, 2016). This has an effect on the intention to use the technology. If the system is vulnerable to attacks which can have effect on the result of the election.

Therefore, it is hypothesized that:

H5: Perceived Security will have a significant effect on the intention of the students to use the eBallot system.

Table 3.1 below highlights the hypothesis drawn in this study.

*Table 3.1 Research Hypothesis*

|  |
| --- |
| Hypothesis |
| H1: Subjective norm will have a significant influence towards the intention of the studentsto use the eBallot system. |
| H2: Perceived usefulness will drive the students’ intent to use the eBallot site significantly. |
| H3: Perceived ease of use will influence the intent of the students to use eBallot system ina significant way. |
| H4: Perceived trust drives the intention of the students to use the eBallot system in asignificant manner. |
| H5: Perceived security will determine the students’ intention to use eBallot site in asignificant manner. |

### Strength and Weakness of the Model

This study analysis the evolution of TAM 2 from literature, some of its major characteristics and criticisms. Results from a selective list of literature published on TAM theory arranged as follows Theory of Reasoned Action (Fishbein & Ajzen, 1975), measures of Perceived Usefulness and Perceived Ease of Use were tested and validated. However, the model was used define the casual relationships between the different constructs of TAM 2 that will be described.

Begozzi (2007) highlights that a person’s intention can be subjected to assessment and consideration, this will direct the user to reconsider his/her intention. He concluded that the framework will not be suitable for clarifying and forecasting system use.

### Compatibility with Study

Technology acceptance model (TAM 2) is one of the most commonly used model for acceptance of system use. The Venkatesh and Davis (2000) provides more elaborate explanation for the reasons participants find the eBallot system useful. The model performs well in both voluntary and mandatory situations with the exception of the subjective norm that has no voluntary result but has an effect in the mandatory situation (Lai, 2017).

Begozzi, Davis and Wershaw (1989) suggest that beliefs vary in both TRA and TAM which provides significant results in predicting the intent of the users of a system (Yolanda 2015). They also found that there is very little connection between subjective norm (SN) and behavioral intention variables.

### Research Approach

The research approach used in this research is discussed below

### Research Paradigm

The paradigm of a research work offers a framework for the research. It serves as the basic believe system in which the study is built upon. It guides the researcher by providing a boundary in which the researcher is expected to carry out the study. There are many factors that influence the selection of a paradigm, some of the factors are the research questions, the researchers’ philosophical stance and the nature of the phenomenon the researcher is trying to investigate. The basics of a research paradigm relies on the ontological, epistemology and methodological stance of the study (Yin, 1994; Hussey & Hussey, 1997).

There two common research paradigms which are positivist and interpretivist (Hussey & Hussey, 1997). Positivist approach is mostly used in scientific approach and it is quantitative in nature while interpretivist is qualitative in nature.

### Positivist Research Paradigm

Positivist paradigm is associated with the causes and facts of a social phenomenon. In this study on electronic voting, the researcher applies the theory and hypothesis to explain the phenomenon. Which involves the use of quantitative data and statistical tool for the analysis. In this type of approach social observations are treated like the observation of physical phenomena. It also involves the researcher detaching himself from the research participants which will show reliability and validity of the study. According to the positivist school of thought, researcher’s need to detach their emotion and bias from the participants of the study (Lin, 1998).

### Quantitative Approach

Quantitative and qualitative methods are two approaches to research which are mostly used in social science studies. Quantitative study focuses on the representation of statistical and numerical data. It involves the manipulation of observations in order to describe or explain a phenomenon. The qualitative in the order hand involves the interpretation of non-numerical data in order to find meaning that cannot be measured in terms of quantity (Zikmund, 2000).

Quantitative research is accepted because it is very important and useful in providing detailed planning before data collection and this study will use numerical data to explain the phenomenon. Quantitative study also uses deductive model to test the relationship between concepts. In this study the relationships between construct and the intention to use e-voting system will be observed.

Research is mostly categorized into descriptive (aware of the problem), explanatory (the problem is clearly defined) and exploratory (the problem is not clear) (Yin, 1994). Yin, (1994) argues that more than one purpose can be used in a study. Which means a study can have both descriptive and explanatory.

This research employed exploratory in which the background information about the research problem and the hypothesis is generated. As a result the researcher will use the construct to formulate and construct hypothesis from the research model. According to Zikmund (2000) exploratory studies have better clarity and understanding of the research problem. Exploratory studies help in understanding new insight of a problem in order to ask questions on the phenomena. Saunders and Thornhill (2003) explains that the advantage of using exploratory study is because it is flexible and can adapt to change.

Deductive approach is suitable here because enough literature was found to review. In contrast Inductive is used when there is little or no study on the area of research. The deductive is more appropriate in this study because conclusions will be drawn from the research model and time is also limited with lower risks involved.

### Data Collection Techniques and Procedures

Below are the techniques and procedures used in this study

### Sampling

The aim of using a sample of a population for every study is to reduce cost and maintain the participants of the study. It also helps to maintain time and effort. A poor selection of sampling can have disastrous effect on the study.

### Random Sampling

There are two types of sampling firstly probabilistic which is when a researcher is confident that the selected sample can represent the whole population. The non-probabilistic on the order hand means that the researcher is not sure whether the selected sample will represent the whole population. In this study the probabilistic sampling will be used because the total population of AUN students is known and a sample size calculator will be used to determine the sample size to be used.

Random sampling method was therefore used in this study. The sample will be chosen not considering the gender, age or the tribe of the participant. There are two methods of random sampling, there is systematic and there is the true random sampling. In systematic random sampling, the researcher selects the participants considering the age, gender and ethnic group of the participants. While in the truly random sampling a researcher selects participants without considering the age and gender. The type of sampling was chosen because it will represent the target population.

### Sample Size

The sample size of this thesis was calculated using equation (1) as demonstrated below:

Sample size = (𝑍𝑛−1)2×P(1−P)

E2

(𝑐𝑜𝑐ℎ𝑟𝑎𝑛, 1963) (1.0)

"Where (𝑍) = Z value (2.34 = 99%; 1.96 = 95%; 1.645 = 90% confidence level)"

In this case 1.645 (95%) was used.

“*P = percentage proportion of choice (30% used for sample size needed)*”

“*E is margin of error (5%) Going as per the stated assumptions the sample size will therefore be*”:

Sample size =

(1.645)2 × 0.3(1 − 0.3)

0.052

Sample size =

2.706 × 0.21

0.0025

Sample Size = 227

According to Cochran’s equation two hundred and twenty seven questionnaires were distributed to participants within AUN. An effectively taken sample size ranging from 100 to 200 is generally regarded as it represents a whole population (Struwig & Stead, 2001).

Sample size is very important in any statistical analysis. The anticipating participants of the study is based on the type of statistical tool or statistical technique deployed. The structural equation modeling requires a certain number of respondents to attain reliable results (Hair et al., 2006). Hair also states that a sample size of a 100 is acceptable for a structural equation model (SEM).

### Survey Method

A survey was deployed in this study to achieve the aim and objectives of this study of e-voting in the American University of Nigeria. The data collection will be done using self-administered questionnaires to students.

The questionnaires were characterized into two categories. The first category is known as the demography of respondents and the latter category includes questions from each of the constructs of the research model. See **Appendix B**.

### Structural Equation Modeling (SEM)

Quantitative and questionnaire survey method was used to collect the data is this research. 227 responses was collected from students in AUN. The structural equation modeling (SEM) and Smart PLS was used to analyze the data, test the hypothesis model, give descriptive statistics correlations and model fit results. PLS-SEM is a casual modeling approach aimed at maximizing the explained variance of dependent latent construct. PLS-SEM is similar to multiple regression analysis. The primary objective is to maximize explained variance in the dependent constructs and to evaluate the data quality on the basis of the measurement model characteristics (Hair et al., 2010).

### 3.8.6 Measures

In this study a set of questionnaires will be distributed to the users of the eBallot system. The questionnaire was categorized into two section which are the demographic and the questions from the construct of the research model. The questionnaire consist of four questions each from subjective norm (SN), perceived trust (PT), perceived usefulness (PU), perceived security (PS) and perceived ease of use (PEU), intention to use e-voting site (USE). Questions will be measured with a 5-point Likert scale which ranges from "Strongly Disagree = 1", "Disagree = 2", "Neutral = 3", "Agree = 4" and "Strongly Agree = 5". Table 3.2 below shows the scale of measure in the questionnaire.

*Table 3.2 Summary of Scale measurement*

|  |  |  |
| --- | --- | --- |
| **Item** | **Description** | **Source** |
|  | **SN** |  |
| SN1 | People of importance to me think I should use the eBallot system. | (Venketesh et at.,2003) |
| SN2 | The school encourages students to use the eBallot system. |
| SN3 | People close to me push me to use the eBallot system. |
| SN4 | My friends uses the E-voting system |
|  | **PEU** |  |

|  |  |  |
| --- | --- | --- |
| PEU1 | I will find it easy to use E-voting system | (Venketesh et al., 2003) |
| PEU2 | I understand the system and it is convenient for me touse. |
| PEU3 | I am skillful in using the eBallot system. |
| PEU4 | I believe using E-voting system does not require mental effort. |
|  | **PU** |  |
| PU1 | I find the eBallot system more useful than thetraditional way of voting. | (Davis, 1989) |
| PU2 | Using the eBallot system will increase the quality oroutput of the elections. |
| PU3 | Using the eBallot system will produce a crediblecandidate |
| PU4 | Using the eBallot system enables me to elect mypreferred candidate. |
|  | **PT** |  |
| PT1 | I perceive the eBallot system as secure. | (Lin, 2015) |
| TR2 | The eBallot system meets my expectations |
| TR3 | I trust the eBallot system to be reliable. |
| TR4 | Overall I trust eBallot system. |
|  | **PS** |  |
| PS1 | I feel secure using the eBallot system. | (Lin, 2015) |
| PS2 | Do you feel safe when you use the eBallot system? |
| PS3 | Overall is the eBallot system is a convenient place totransmit sensitive information |
|  | **USE** |  |
| USE 1 | I am capable of operating the eBallot system. | (Venketesh et al., 2003) |
| USE 2 | I am capable enough to use the eBallot site. |

|  |  |  |
| --- | --- | --- |
| USE 3 | I am knowledgeable enough to use the eBallot site. |  |
| USE 4 | I intend to use the eBallot site. |

### Validity and Reliability

Stated below is the threshold value used to identify the validity and reliability used it the study

### Reliability

Reliability is the measure of the stability and consistency of the measurement instrument (Sekaran, 2000). It measures the quality of the measurement instrument and also checks inconsistencies and its impact on the result. Reliability is important especially if there is more than one measurable item of the research model construct. In this study the reliability will be measured using the composite reliability from the structural equation modeling. In this research each of the constructs is measure with four questionnaire item. The reliability in this study is measured with the consistency in answering the measurable items. The acceptable range for composite reliability is 0.7.

### Validity

Validity in research is the measure of accuracy (Sekaran, 2000). It is the ability of the scale used to measure what the researcher wants to measure. In other worlds, validity is when the scale measures the exact construct it is supposed to measure (Hair et al., 2006). The value of average variance extracted will be used to measure the convergent validity and the square of the average variance extracted will be used to measure discriminant validity. The acceptable value of validity is 0.7.

### Ethical Consideration

In research, it is important to address ethical issues despite being difficult. Researchers are humans and can make mistake. Therefore, it is important to identify and follow the identified ethical issues. In American University of Nigeria every researcher is mandated to do an ethical training and acquire the certificate. And also before any research is carried out, the researcher will have to fill an ethical form provided by the institutional review board (IRB). In his study

the information provided by participants will remain confidential. A consent form is also given to participant before answering any question. See **Appendix A**.

### Chapter Summary

This chapter discusses the method and methodology used to obtain the framework of the study. The chapter goes further to identify the sample size and method of calculating the intended sample target. SEM-PLS was identified as the statistical analysis tool used to test the hypothesis generated. The chapter also identifies the research approach used to draw the hypothesis of the study as questionnaires were given to participants in anticipation for their response.

# CHAPTER FOUR RESULTS AND ANALYSIS

### Introduction

This chapter analysis the data collected and discusses the findings of the study. The hypothesis was tested using a path model that was developed from the findings. This chapter uses the Smart PLS to analyze the data gathered and provide the results.

### Demography

All 227 respondents are undergraduate students of AUN which is within the research area. Table 4.1 shows the demographic features and the descriptive statistics.

*Table 4.1 Demographic demonstration*

|  |  |  |  |
| --- | --- | --- | --- |
|  | Classification ofVariable | Frequency | Percentage % |
| Gender | Male | 101 | 44% |
| Female | 126 | 56% |
| Level of your education qualification | Fresher | 37 | 16% |
| Sophomore | 67 | 30% |
| Junior | 80 | 35% |
| Senior | 43 | 19% |
| Age | 16-25 | 197 | 87% |
| 26-35 | 30 | 13% |
| 36-45 | 0 | 0% |
| Above 46 | 0 | 0% |
| ICT use | Mandatory | 227 | 100% |
| Voluntary | 0 | 0% |

Male Female

Fresher Sophomore Junior Senior

*Figure 4.1 Gender Figure 4.2 Level of Education*

16-25 26-35 36-45 above 46

Mandatory Voluntary

*Figure 4.3 Age Figure 4.4 ICT use*

Undergraduate students in AUN filled the questionnaire. Both male and female participated in the study as represented in Table 4.1. 56% percent of the respondents were female while the percentage of male respondents was 44% as shown in Figure 4.1. The level of education shows that 16% percent of the respondents were freshmen, sophomore was represented by 30% percent of the respondents as shown in Figure 4.2, 35% percent were juniors and 19% percent of the respondents were seniors as shown in Figure 4.3 . The age distribution of the respondents shows that 87% were between 16-25 years, 26-35 years had a response percentage of 13% while 36-45 and 46 above had 0 respondents as shown in Figure 4.4.

### Validity and Reliability Test

To measure the validity of the construct, construct validity will be measured using convergent and discriminant validities. Results from the analysis identify the composite reliability (CR), average variance extracted (AVE) and the correlation coefficients between the constructs that are summarized in Table 4.3.

*Table 4.2 Composite reliability (CR), the square root of the average variance extracted (AVE) and Correlations between constructs.*

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | **CR** | **AVE** | **USE** | **PEU** | **PS** | **PT** | **PU** | **SN** |
| **USE** | **0.908** | **0.715** | **0.845** |  |  |  |  |  |
| **PEU** | **0.862** | **0.609** | 0.722 | **0.781** |  |  |  |  |
| **PS** | **0.936** | **0.830** | 0.512 | 0.504 | **0.911** |  |  |  |
| **PT** | **0.865** | **0.681** | 0.426 | 0.657 | 0.334 | **0.825** |  |  |
| **PU** | **0.856** | **0.598** | 0.544 | 0.622 | 0.405 | 0.522 | **0.773** |  |
| **SN** | **0.905** | **0.704** | 0.493 | 0.493 | 0.277 | 0.593 | 0.610 | **0.839** |

The Fornell & Larcker’s criterion also known as the correlations between constructs shows the square root of the average variance extracted which compares the AVE with the correlations of other constructs. The values are the diagonal values in the Table 4.3 above and shows all the values are above 0.7 which is within the acceptable range (Ringle, C. M., Sarstedt, M., Schlittgen, R., & Taylor, C. R. 2013). . The Table 4.3 above shows the Fornell & Larcker’s criterion.

In order to have internal consistency that is acceptable reliability will be measured. The best way of measuring internal consistency is the use of composite reliability or Cronbach’s alpha (Straub and Gefen 2004). In this study composite reliability will be used to measure the internal consistency. This is because Cronbach’s alpha assumes all loadings are equal. Cronbach’s alpha is also sensitive and it tends to overestimate internal consistency (Ringle, C. M., & Sarstedt, M. 2016). The Table 4.2 above shows the values of the composite reliability of each construct. The acceptable value of composite reliability is 0.7. The values of the composite reliability of perceived trust (0.865), perceived ease of use (0.862), perceived security (0.936),

perceived usefulness (0.856) and subjective norm (0.905) are all above 0.7. This shows the high level of internal consistency of the research model see Figure 4.6.



*Figure 4.5 Composite Reliability*



*Figure 4.6 Average Variance Extracted (AVE)*

The software allows or consider two indicators. It checks if the loadings are higher than the cross loading (Ringle, C. M., Sarstedt, M., & Straub, D. W., 2012). It also consider the square root of the average variance extracted (AVE) which is greater than it correlations with the order constructs (Chin 1998) see Figure 4.7 above. However, the discriminant validity is accepted for this model as it supports the discriminant validity between the constructs with a threshold value of 0.7.

### Hypothesis Testing

Both the path coefficient and T statistics values will be used to help test the hypothesis of this research. The values shows the effect on the constructs on the intention to use the technology. In this research the path coefficient and the T statistics value show the effect of the constructs perceived ease of use, perceived security, perceived trust, perceived usefulness and subjective norm have on the intention to use the eBallot system in AUN. The T-value has a threshold value of (1.645) in this study because of the confidence level used in the study, this means all t-values above the threshold value are supported. T statistics value is after bootstrapping of 5000 samples (Sarstedt et al., 2014).

*Table 4.3 Hypothesis Testing*

|  |  |  |  |
| --- | --- | --- | --- |
| **Hypothesis** | **Path Coefficient** | **T Statistics value** | **Remark** |
| **Perceived Ease of Use -> Intention to use E-voting****System** | 0.613 | 7.057 | Supported |
| **Perceived Security****-> Intention to use E-voting System** | 0.181 | 3.053 | Supported |
| **Perceived Trust -> Intention to use E-****voting System** | 0.160 | 2.540 | Supported |
| **Perceived Usefulness -> Intention to use E-****voting System** | 0.156 | 2.196 | Supported |

|  |  |  |  |
| --- | --- | --- | --- |
| **Subjective Norm ->****Intention to use E- voting System** | -0.014 | 0.184 | Not Supported |



*Figure 4.7 Path Coefficient*

H1: Subjective Norm will have a significant influence towards the intention of the students to use the eBallot system.

The path coefficient of the subjective norm to behavioral intention to use an electronic voting system is negative (-0.014) and a t-value of (0.184) as illustrated in Table 4.2. This indicates that there is a negative relationship between the influence of people that are important to the user and the intention to use the system. This result is also consistent with other studies which shows there is significant relationship subjective norm and behavioral intention to use.

H2: Perceived Usefulness will have a significant influence on the intention of the students to use the eBallot system.

It was hypothesized that perceived usefulness will be a significant determining factor in students’ intent to use the eBallot site. The result from the study shows their significant relationship (0.156) and a t-value of (2.196) as shown in Figure 4.5. The result is consistent

with other studies which shows there is a significant relationship between the usefulness of the system and the intention to use the E-voting system.

H3: Perceived Ease of Use drives the students’ intent to use the eBallot site in a significant manner.

It was hypothesized that perceived ease of use will have a significant influence on the use the E-voting system. The result also shows that most users think that despite the system being free from effort a significant value of (0.613) and a t-value of (7.057) was recorded see Table 4.2. The result is consistent with other studies that show there is a significant influence between ease of use and actual usage of the system.

H4: Perceived Trust will have a significant effect on the intention of the students to use the eBallot system

The path coefficient between perceived trust and intention to use was found to be significant (0.160) and a t-value of (2.540) as seen in Table 4.2. Therefore supporting hypothesis H4 which suggest the relationship between PT and the students’ intention to use eBallot system is positive. This shows that if most users trust the system they will have behavioral intention to use the system.

H5: Perceived Security will have a significant effect on the intention of the students to use the eBallot system.

Hypothesis five states that relation between PS and the students’ intent to use eBallot system is positive. The result from this study shows that there is a significant relationship on the intention to use and perceived security (0.181) and a t-value of (3.053) as seen in Figure 4.5. The result from this study is in line with others studies which show that there is significant relationship between security and acceptance of a technology.

### Path Model

Figure 4.8 below shows the structural model which indicates the path coefficient that indicates if the relationship between the constructs is significant or insignificant. A significant relationship means that there is a confident relationship between the construct of the behavioral intention to the use of a technology. The path coefficient between subjective norm and intention

is (-0.014) which indicates negative relationship. The path coefficient between perceived ease of use and behavioral intention to use an E-voting system is (0.613) which is a significant relationship. Perceived security and perceived trust have (0.181) and (0.160) respectively which are both positive.



*Figure 4.8 Path Model*

### 4. 6 R square (R2)

The R2 also known as coefficient of determination is a measure of the proportion of variance (%) in the dependent variable which is explained by the independent variable (Moore, D. S., Nots, W.I & Flinger, M.A., 2013). The value of R square on the eBallot system acceptance is

0.568 which is acceptable as illustrated in Table 4.4. The findings show that there is a degree of variance and the model is well interpreted by the relationships between subjective norms, perceived ease of use, perceived usefulness, perceived trust and perceived security with the intention to use the eBallot system. R square adjusted, however, offers to show the percentage of variance described by each of the independent variables in relation to the USE. Figure 4.9 shows the comparison between the R2 and R2 adjusted.

*Table 4.4 R Square and R Square adjusted*

|  |  |  |
| --- | --- | --- |
|  | R square | R square adjusted |
| Intention to use e-voting system | 0.568 | 0.558 |



*Figure 4.9 R Square and R Square Adjusted*

### 4.7 Chapter Summary

This chapter shows the research findings and presents the results in a statistical format. Smart PLS statistical tool was used to analyze the data gathered for the study. Structural equation modelling was used to test the hypothesis of the study. The results are grouped into two sections: demography and hypothesis testing. This chapter shows values of CR, AVE, R2 and path coefficient. Fornell & Larcker’s Criterion was used to compare the relationships between the constructs.

# CHAPTER FIVE

**SUMMARY, CONCLUSION AND FUTURE WORK**

### Introduction

The discussion of the research model, hypothesis, observation and conclusion will be presented in this chapter. Subjective norm which was shown to be negative in the analysis will be discussed and how the influence of others will affect the acceptance of e-voting system. Perceived ease of use, perceived usefulness, perceived trust and perceived security will be discussed in relation to the result in chapter five.

### Discussion

* + 1. **Subjective Norm and AUN students’ intention to use the eBallot system.**

It was hypothesized that subjective norm which is the influence of others will have a significant influence on the intention to use an e-voting system. The result in this study shows that there is an insignificant influence between the SN and the intention to use the eBallot system. This shows that the students in AUN do not depend on the approval of other before they go ahead to make use of the eBallot system. It will not really have any persuasive power on them to use the system (Yolanda, 2015).

### Perceived Usefulness and AUN students’ intention to use the eBallot system.

The worthiness in a technology is very important feature before accepting or using an information. In this study PN was hypothesized to have an affirmative relationship with the students’ intention to use the eBallot site. The result in chapter four confirms this hypothesis. The users’ believe that the e-voting system is very useful in the election as it helps in voting their preferred candidate. Students find the e-voting system more convenient than the paper base election which lacks accountability in most cases (Lai and Zainal, 2015).

### Perceived Ease of Use and students intention to use the eBallot site.

The PEU was hypothesized to have a significant relationship with the intention of the students to use the eBallot system. From the analysis in this study it shows that the students in AUN find the site user friendly as it has the highest impact of all the constructs investigated. The result of this study is also in line with other studies that finds that perceived ease of use has a significant influence on the intention to use an information system (Yolanda, 2015).

### Perceived Trust and AUN students’ intention to use the eBallot system.

The trust of the eBallot system is hypothesized to have a significant impact on the students’ intention to use the eBallot site. The path coefficient in Figure 4.1 shows the students trust in the system. The result from this study is in line with that of several other related studies. Voters believe that their votes will count at the end of the process (Lai and Zainal, 2015).

### Perceived Security and AUN students’ intention to use the eBallot system.

Perceived security is hypothesized to have an affect its relationship with the students’ intention to use the system in a significant manner. Results from this thesis indicates that the eBallot system is secure because there is a significant relationship between PS and the students’ intention to use the eBallot system (Lai, 2016).

### Research Contribution

The findings of this study contributes immensely to the academics by the understanding of the factors that allow users to accept the use of electronic voting systems. This study will assist the independent electoral commission (INEC) with crucial factors that will motivate users to accept an electronic voting system in Nigeria and beyond.

### Research Limitation

There are few limitations in this study. One of the limitation is that the study was conducted in American University of Nigeria where E-voting system was fully implemented. The sample

size used cannot be generalized to the entire republic of Nigeria. Another limitation is that study only considers users that have access to the Internet.

### Conclusion

This study focuses on the constructs that influence the acceptance of e-voting in AUN. The study identifies the problem and challenges mostly faced by users of e-voting systems. The user perspective was identified through the review of literatures. The findings in this study was consistent with other studies that investigated the factors that influence the implementation of a new technology. The study starts off with an introductory chapter that discusses the background of the phenomenon. The problem and challenges faced by users and the research aim and objectives of the study were discussed in the study. Chapter two discuses literature review which involve the review of other technology acceptance model. The study uses a deductive approach with the aid of a conceptual framework (TAM 2). The factors identified are subjective norm, perceived usefulness, perceived trust, perceived ease of use and perceived security. The relationship between the factors and the acceptance of the eBallot system partially supported the hypothesized effects based on the technology acceptance model. Perceived ease of use showed the most impact, on the other hand subjective norm had a significant influence on the acceptance, and the effect was negative.

### Future Work

This study has provided sufficient evidence for future researchers to use in their research even in a larger context. The thesis only considered factors such as Perceived Ease of Use, Perceived Security, Perceived Trust, Subjective Norm and Perceived Usefulness. In the future, other factors such as availability, awareness and availability of infrastructure can be added and tested. Future studies can e-voting works on older and younger voters. Qualitative method can be used to conduct the research in order to yield broader results. This research opens the door for the Independent National Electoral Commission (INEC) to look into providing Nigerians in Diaspora the option to vote in the upcoming general elections.

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#### Appendix A

**AMERICAN UNIVERSITY OF NIGERIA CONSENT FORM**

#### Factors Affecting the Acceptance of Electronic Voting Systems: A Case Study of the E- Ballot System at the American University of Nigeria (AUN)

**Invitation**

You are invited to participate in this research study for a (Masters in Information Systems) at the American University of Nigeria titled “students’ perception on electronic voting acceptance in Nigeria case of AUN” because you are a user of electronic voting systems in Nigeria.

**Who to contact with questions:**

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If you feel like speaking to someone else about the research and the findings, you may contact the AUN Institutional Review Board at irb@aun.edu.ng.

Statement of Consent I give my voluntary consent to take part in this study. I will be given a copy of this consent document for my records.

#### Appendix B

**SURVEY QUESTIONNAIRE**

#### Factors Affecting the Acceptance of Electronic Voting Systems: A Case Study of the E- Ballot System at the American University of Nigeria (AUN)

My Name is Abushaasin Abubakar, I’m a master’s student of American University of Nigeria studying information system, and I embarked on my master’s thesis on the above stated topic. Please complete the questionnaire below

Directions: Please rate each of the following on 1-5

#### Demographic

1. Gender

Male [ ] female [ ]

1. What is the level of your educational qualification?

Fresher [ ] Sophomore [ ] Junior [ ] Senior [ ]

1. What is Your Age bracket

[16- 25] [26 - 35] [36 - 45] [Above 46]

1. Is ICT use mandatory or voluntary at your school? 1= Mandatory 2=Voluntary Scale: 1) Strongly Disagree, 2) is Disagree, 3) Neutral, 4) Agree, 5) Strongly Agree.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Subjective Norm (SN)** | 1 | 2 | 3 | 4 | 5 |
| SN1 | People who influence my behavior think I should use the E-voting system. |  |  |  |  |  |
| SN2 | The school encourages me to use the E-voting system. |  |  |  |  |  |
| SN3 | People who are important to me think I should use the E-votingsystem |  |  |  |  |  |
| SN4 | My friends use the E-voting system |  |  |  |  |  |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Perceived Ease of Use (PEU)** | 1 | 2 | 3 | 4 | 5 |
| PEU1. | My interaction with the E-voting system available is clear andunderstandable. |  |  |  |  |  |
| PEU2. | It would be easy for me to become skillful at using the currentE-voting System. |  |  |  |  |  |
| PEU3. | I would find whatever E-voting system available easy to use. |  |  |  |  |  |
| PEU4. | Learning to operate a site is easy for me |  |  |  |  |  |
| **Perceived Usefulness (PU)** | 1 | 2 | 3 | 4 | 5 |
| PU1 | Using E-voting system would increase the quality or output ofelections |  |  |  |  |  |
| PU2 | People who are important to me think I should use the site. |  |  |  |  |  |
| PU3 | Using the E-voting system will produce a credible candidate. |  |  |  |  |  |
| PU4 | Using E-voting systems enables me to elect my preparedcandidate of choice. |  |  |  |  |  |
| **Perceived Trust (PT)** | 1 | 2 | 3 | 4 | 5 |
| PT1 | I perceive E-voting system as secure. |  |  |  |  |  |
| PT2 | I have the knowledge necessary to use the site. |  |  |  |  |  |
| PT3 | A specific person (or group) is available for assistance withdifficulties on the site. |  |  |  |  |  |
| PT4 | The site is not compatible with other ICT systems I use. |  |  |  |  |  |
| **PERCEIVED SECURITY (PS)** | 1 | 2 | 3 | 4 | 5 |
| PS1 | The site address contains ‘https’ |  |  |  |  |  |
| PS2 | I am not informed if information in transit is deleted. |  |  |  |  |  |
| PS3 | I am warned if messages have been tampered with. |  |  |  |  |  |
| PS4 | The website verifies my identity before I cast my vote. |  |  |  |  |  |
| **Intention to Use E-voting System** |

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **(USE)** | 1 | 2 | 3 | 4 | 5 |
| USE1 | I would be able to operate the E-voting System |  |  |  |  |  |
| USE2 | I have the ability to use the E-voting system |  |  |  |  |  |
| USE3 | I have the knowledge to use E-voting System |  |  |  |  |  |
| USE4 | I will use E-voting System |  |  |  |  |  |