A Model for Analyzing Usage Factors in Designing User Acceptance of Biometric Voter Registration Technology

Richard Kayanga Nyakundi, Prof. Samuel Mbuguah, Dr. Ratemo Makiya

***Abstract*-Models leading to acceptance of the technology remain largely unrealized in economically transitioning countries due to low adoption of appropriate and acceptable electronic technology models. This is because electoral bodies focus on the technical supply-side factors with little emphasis on acceptable biometric technology systems. While a number of adoption models have been applied to the developed countries, they require domestication in order to address the specific client-based needs of developing nations. This study therefore was meant to provide A Model for User Acceptance of BVR Technology. This model sought to explain the low acceptance level of biometric technology acceptance that led to development of a model which best support free, fair and credible election process. A Model for Adoption and Acceptance of Successful BVR Technology is developed and validated. The findings affirm that the model can be adopted and applied in both developing and developed countries to fast track the voting process.**

Key Words: Biometric Voter Registration Technology, User Acceptance, usage factors

I. INTRODUCTION

Biometric voter registration provides a fully automated and comprehensive electronic voting system. It enables voter registration and authentication, ballot entry, local or local aggregation, server encryption and voting data validation, counting and election planning and management (Zissis D and Likas, 2011Val). Transparent, free, fair and credible elections are essential to electoral democracy and provide citizens with an important tool to empower leaders (Mcheny & Murumba, 2018). Multi-party democracy requires elected and appointed senior officials at all levels of the political system to thesis to the population watch on a regular basis. However, the accountability of Kenyan government officials is jeopardized by the fact that elections are always irregular. According to Matti (2019), political democratization failed in the face of election fraud by various parties and mad parties. This paper focuses on a model for user acceptance of BVR technology.

II. Background to the Study

The use of technology has recently become an integral part of the functioning and activities of organizations and communities (Golub and Diofasci (2019). The role of technology in election risk detection and prevention on the other hand, information technology is seen as a solution to many election hurdles, including accurate registration, easy voting and counting, and rapid distribution of results. By using biometric technology for voter registration, election administration has been able to improve the accuracy of voter registration by providing an efficient mechanism to identify duplicate voter registrations. The use of biometric technology to identify voters on Election Day has also helped increase the credibility of the election process (Efa and Debra, 2018). Likewise, this technology provides a way to quickly distribute ballots and election results through methods such as electronic voting and election data transmission through election management tools via mobile technology. This allows for early announcement of election results, relieves tension in hot elections and increases the credibility of the process. Studies have shown that, despite the cost, biometric technologies can be a lucrative economic investment for countries, even if they reduce the likelihood of serious post-election violence (Gelb & Diofasci, 2019).

Technology is evolving rapidly and EMBs are mimicking the need to incorporate technology into operations, either by purchasing new systems or by upgrading existing systems, depending on the expected results of the system. James, Garnett, Laber and Van Hamm (2019) argue that technology should improve the efficiency of EMB management, reduce costs, make the electoral process more transparent, and validate election results for all parties involved. The BVR records faces, fingerprints, social security numbers (PII) of voters (name, gender, ID / passport number, telephone number, etc.). Registration takes place in the registration center, where the person has to vote. In Kenya, the BVR registration method was the only system used by the IEBC to register voters before the 2013 general election.

Another technology used in voting systems around the world today is EVID. Electronic Voter Recognition System (EVID) is an electronic voting book. There are two types of EVID technology: laptops with fingerprint readers and computers with fingerprint readers (Tran, 2019). EVID Evidence verifies and confirms electronic voters registered in the BVR. It is used to register voters in polling stations on election day and to simplify the voting process. EVID also prevents duplication of work and ensures that only registered people to vote. Abdullah (2015) regards legitimate elections as complete, transparent, accountable and competitive. Global elections give all eligible citizens an equal opportunity to vote for their representatives as voters and candidates in government elections. According to Onabajo (2015), the legitimacy of a democratic government depends on fairer elections than on election day. A real electoral process requires an open pre-election environment in which citizens can participate without fear or interference. Political parties, candidates and the media can act independently. It is an independent judiciary that acts honestly and quickly. Election officers act fairly (Rubinstein & Rosney, 2018). From the beginning, NDI has

worked with partners around the world to ensure that the choice reflects the will of the people. Its main purpose is to ensure the integrity of elections and to promote long-term government accountability and broad political participation. Debate has become part of accepted and anticipated elections in many parts of the world, but face-to-face comparisons with candidates have become the traditional, emerging and changing standard of democracy. It is an independent regulatory body established in 2011 by the Kenyan Constitution. Article 88 of the Kenyan Constitution establishes the Free Election Vigilance Commission (IEBC) as the body to conduct and monitor elections and referendums in Kenya (Cheeseman et al., 2019). The Commission is responsible for conducting referendums and elections, or public and other elections, of institutions elected in accordance with the Constitution, as required by law. This Act was drafted in accordance with the 2010 Constitution and the provisions of the Independent Election Commission and Border Rights. IEBC commands include: Election monitoring, monitoring and facilitating evaluation, regulating the amount a candidate or political party spends in elections, establishing a code of conduct for candidates and political parties, and complying with the rules of nomination of candidates (Nespka, Mister, Amad Boersma, Tomaszewski second, 2018).

Section 44 rules of the Freedom of Use of Technology and Election Boundary Commission (IEBC) of the 2011 Election Act have been awarded an "integrated electronic voting system" under section 44(1) of this Act. such as the Kenya Unified Election Management System (KIEMS). KIEMS is designed to integrate biometric voter registration (BVR), biometric voter identification (certification), electronic transmission of results (RTS), and candidate registration systems (CRM). Three submarines (CRM, PROOF, RTS) were part of the 2017 tender offer, but the IEBC held the BVR during the 2013 election process. Biometric data of all registered voters is uploaded to the integrated system, and some voters' biometric data is restricted to registered polling places.

Objective of the study

To Develop a Model for Analyzing Usage Factors in Designing User Acceptance of BVR Technology

III. RELATED STUDIES

A. Existing Information Technology Acceptance Models

This section focused on models related to the level of acceptance of technological innovations. It highlights the degree of acceptance or rejection of a biometric system. Various models were examined and their weaknesses unearthed prompting the need to develop a model for consumer acceptance of BVR technology. The table below summarizes the existing technology acceptance model.

Table 3.1 Summary of Various Technology Acceptance Models

Study	Contributions	Gaps
The Technology Acceptance Model By Davis (1989)	Developed a robust framework for demonstrating user acceptance patterns	Developed in light of concerns that workers were not using ITs made available to them but ignored usage factors that would lead to acceptance
Unified Theory of Acceptance and Use of Technology (UTAUT) Venkatesh et al. 2003	Demonstrates the four main intentions and use; performance expectation, effort expectation, social impact and cresting conditions	Is a complex model whose design is not desirable for sustainability to clients
The Information Systems Success Model Delone and McLean	Comprehensive understanding on the success of information systems.	The model only addresses information quality and avoid other factors to enhance acceptance and acceptance
Analysis of a Biometric Voter Registration System Tadayoshi Kohno, Adam Stubblefield and Aviel D. Rubin	Improves on UTAUT model in enhancing design of information technology.	It adds only quality of service and personal innovativeness on the UTAUT model ignoring other important client-based factors
Secure Biometric Voter Registration Dimitris Gritzalis	Outlines most of the user based factors vital for success of BVR technology	The model focuses only on the electoral process and avoids the factors for acceptance and sustainability
A Model of technology Acceptance Kumar *et al.*, 2007	Explains more precisely on both technology education as well as the security of the systems in enhancing acceptance.	The model focuses on practical voting practices and avoids the acceptance option
Innovation Diffusion Theory(IDT)	Explain the advantages of innovation especially with	Is a meta-theory but lacks acceptance factors hence easily rejected even after innovation

Roggers, 1962	information technology.	
Theory of Reasoned Action Fishbein & Ajzen(1975)	Explains behavioral intention as a dependant of subjective norm and assertiveness.	The model avoids acceptance drivers and instead it features on social influence
Theory of Planned Behavior (TPB) Ajzen in 1991	Identifies inspiration and ability as influencers of behavioral performance.	Avoids environmental factors that influence acceptance and acceptance of the technology
Adopted Biometric Encryption Operational Model	Mathematically formulates biometric operational models	So complex for acceptance
An information-theoretic model of voting systems B. Hosp and P. L. Vora	Theoretically models and evaluates voting systems and the respective flow of information.	Avoids most of the factors that influence acceptance
A model for Successful Technology Sarkar, (2007)	Focuses on the supply sector to address the factors of IT.	Addresses the supply side of technology and avoids the demand side of technology
A Survey of Voters' Perception of Security and Other Reliance Factors Oluwafemi O. et al, 2015	Explores the factors affecting BVT acceptance.	Some factors are featured here but avoids most of the User-based factors that determines continuous use of the technology

B. Critique of Related Models of BVR Technology

The Innovation Certification Model (TAM) is a TRA extension developed by Davis that is only used on PCs. According to Tam, the customer's beliefs influence accuracy, shape social goals, and ultimately lead to the use of realistic structures. Visual Fit (PU) is a customer's perception of a framework application that improves performance. Visual usability (EOU) reflects how accepting customers are of the intuitive use of the framework. In fact, he saw the relevance and usefulness of TAM as two ideas in the diffusion theory of innovation: “relative usefulness” and “complexity”. Information technology, on the other hand, is a tool to better manage the business and does not help to measure link movement of other executives who ignore customer behavior. The term "vulnerable" means that it is clearly related to the customer's mission but clearly reflects the customer's obligations.

Subsequently, Gudo and Thompson developed a business technology adaptation model to overcome these limitations. As this model shows, factors such as customer motivation, contextual knowledge specified in the data frame, and mapping capabilities determine customer behaviors related to frame changes. The current direction of innovation capabilities such as programming, tools, organizational and customer capabilities makes a lot of sense. This change supports resampling of customer activity and helps customers understand their behavior. Despite the fundamental differences between these models, each emphasizes the important role of the client's beliefs and assumptions regarding behavioral use. Carvalho (2006) states that when the layman wrote in computer science, experimentation shifted to the field of enforcement, and computer science changed its approach by focusing on "the right use of frame and quality". Customers understand why it has become more difficult to visualize data using a PC (Davis; Bagozzi; Warshaw, 1989). Silva (2006) does not just emphasize the importance of having a professional perspective. By focusing on the need for innovation, we try to understand not only the uses of data innovation, but also the behavior of the people who use it. As I write, I can distinguish several hypotheses that attempt to predict the impact of innovation on human behavior, but in this article we will discuss three hypotheses that differentiate innovation. They are: Rational Theory (TRA). Theory of Planned Behavior (TPB), finally the Technology Adoption Model (TAM), and the point-by-point model.

Rational Behavior Theory (TRA) has its roots in the social sciences of the brain and studies the identification of specific variables in goal-directed behavior (Fischbein; Ajgen, 1979). Describe the relationship between beliefs, rigidity, norms, goals, and behaviors that survive atmospheric behavior. For example, innovation and rejection are driven by expectations of behavioral adoption, and these goals are collectively influenced by adaptive individuals. This accuracy is determined by synthetic rules based on beliefs and declared actions (Quintella; Pellicione, 2006). According to Fishbein and Eigen (1979), the framing elements are merely the emotional indicators that presuppose an external evaluation of work continuity and the beliefs associated with statements that are not the subject of the article. The behavior of air exhibited by TRA determines the behavior of the target transducer with respect to a particular representation (Fishbein, Ajgen, 1979). The operation of TRA Mobile can be described as follows. Customers are more likely to stick to their goals in terms of flight data, their ability to control their positive or negative use, and subsequent sentiment indicators. Treat customer insights from someone else's point of view. According to Oliveira Jr. (2006), individuals choose to act without their consent, resulting in inconsistent personal

patterns of when and how this person should act. I paid to please this man. These models are often used to accurately predict human decisions, including voting in competitions and cocktails. This is because this hypothesis is well suited for predicting decisions among judges (Dillon; Morris, 1996).

Validation of the TAM model is described in Product Content Manager Diagnostics (DAVIS, 1989; Sá, 2006). Silva (2006) states that Davis (1989) found in this example that physical activity had a greater effect on behavior than in a formal office. TAM has the advantage of not only unraveling data innovation and providing extensive empirical support, as in the case of Davis (1989), but also has a solid virtual foundation. The TAM model was developed to understand the causal relationship between external factors of customer identity and actual computer use, and sought to investigate customer behavior through the Office of Application Information and User Usage (Davis, 1989). In the case of Davis (1989), people are generally unsure whether this innovation will be used in real-world presentations. The person who invented the stone is useless or the work is too full to use, i.e. the circular saw can injure you. TAM is basically based on two structures. Publishing services and editorial offices. The influence of external factors such as managers is completely underestimated when measuring progress and adjusting the use of forecasts (Davis, 1989).). This pattern should be identified as the responsiveness and influence of external factors used in his personal database (Davis; Bagozzi; Warshaw, 1989; Davis 1989; Dillon, Morris, 1996; Lee et al., 2003; Venkatesh et al., 2003).

IV. METHODOLOGY

A. Research Strategy

Both inductive and deductive research strategies were used. Inductive strategy is a theory building strategy and from the literature presented user factors are important for user acceptance model for BVR technology. Deductive research strategy was used to criticize the existing models and confirm the user acceptance model for BVR technology factors with the aim of developing a model that best suits BVR technology acceptance.

B. Research Philosophy

Pragmatic philosophy that confirms the real-world development was used. The philosophy utilized a method or a combination of methods. In other words, regardless of philosophical principles, common assumptions, or other types of assumptions, what works is helpful and should be employed.

C. Target Population

The study targeted Nine (9) Sub-Counties of Kisii County that comprises of 32 wards. Included in the study were IEBC County Elections Manager, Constituency Elections Coordinators, ICT staff working with IEBC, Other staff members working with IEBC, at least one-time electoral candidate and registered voters of Kisii County. As per the field data, 10% of total population of Kenyan cannot read and write (KNBS, 2019). This study gave an approximate target population of 652,638 respondents.

D. Sampling Techniques

Sampling techniques constituted of purposive, stratified and simple random sampling. The target population was 652,638 respondents categorized into voters, electoral candidates, ICT staff working in IEBC, Constituent elections coordinators and the County elections manager. A sample of 291 was derived from the target population.

E. Data Analysis

Data was analyzed by use of standard deviation which determined the accountability and validity of the data. Exploratory factor analysis was done to identify the specific factor loadings and multi-linear regression analysis was also applied to determine the effect the factors on technology acceptance and use.

V. RESULTS

A. Model Description

A Model for Analyzing Usage Factors in Designing User Acceptance of BVR Technology factors requirements were identified in a field study. The factors are; Reliance, Government Policy, Paybacks, Edification, Preparation, Cognizance, User-friendliness, Compatibility, Indigenous language and Exactitude. The factors requirements were used together with the Technology Acceptance Model (TAM) developed by Davis (1989) to develop a model for User Acceptance of Biometric Voter Registration Technology.

The thesis also examined the need for the Model for User Acceptance of BVR Technology to determine some of the factors identified as significantly influenced perceived usefulness and the perceived ease of use. Regression analysis was used to determine the factors that had a significant effect hence development of the model. This answered the third research question that stated, how well can a model for User acceptance of a BVR technology be developed? Multi-linear regression analysis was carried out to determine individual and combined factor effects on the BVR Technology adoption and acceptance.

A Model for Analyzing Usage Factors in Designing User Acceptance of BVR Technology is described with the independent variables that include the usage factors that are; Reliance, Government Policy, Paybacks, Edification, Preparation, Cognizance, User-Friendliness, Compatibility, Indigenous Language and Exactitude. The moderating variable which is the Technology Acceptance Model (TAM) with two variables that include Perceived Usefulness and Perceived Ease of Use. User Acceptance of BVR Technology is the dependent variable. Table 5.1 shows the outer Loading for the ten factors.

Table 5.1 The outer Loading for the ten factors.

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
Cognizance1 -> Cognizance	0.816	0.807	0.081	10.021	0
Cognizance2 -> Cognizance	0.874	0.867	0.061	14.428	0
Compatibility1 <- Compatib	1	1	0		
DepIndic1 <- UserAcceptance	0.482	0.488	0.089	5.412	0
DepIndic2 <- UserAcceptance	0.623	0.616	0.075	8.29	0
DepIndic3 <- UserAcceptance	0.359	0.358	0.111	3.238	0.001
DepIndic4 <- UserAcceptance	0.654	0.65	0.056	11.641	0
DepIndic5 <- UserAcceptance	0.567	0.561	0.094	6.01	0
DepIndic6 <- UserAcceptance	0.662	0.66	0.075	8.865	0
DepIndic7 <- UserAcceptance	0.458	0.451	0.111	4.128	0
Edification1 -> Edification	0.791	0.768	0.145	5.456	0
Edification2 -> Edification	0.708	0.693	0.163	4.336	0
Exactitudes1 -> Exactitude	-0.153	-0.144	0.148	1.035	0.301
Exactitudes2 -> Exactitude	-0.127	-0.102	0.171	0.743	0.458
Exactitudes3 -> Exactitude	0.727	0.667	0.13	5.606	0
Exactitudes4 -> Exactitude	0.514	0.484	0.145	3.536	0
Exactitudes5 -> Exactitude	-0.016	-0.01	0.167	0.094	0.925
Exactitudes6 -> Exactitude	0.368	0.345	0.156	2.354	0.019
Exactitudes7 -> Exactitude	0.451	0.41	0.16	2.816	0.005
GovernPolicy1 -> GovPolicy	0.798	0.767	0.127	6.292	0
GovernPolicy2 -> GovPolicy	0.348	0.336	0.175	1.99	0.047
GovernPolicy3 -> GovPolicy	0.655	0.639	0.149	4.4	0
Ilanguage1 <- ILanguage	0.908	0.903	0.063	14.499	0
Ilanguage2 <- ILanguage	0.672	0.64	0.163	4.109	0
Paybacks1 -> PayBack	0.631	0.506	0.239	2.638	0.008
Paybacks2 -> PayBack	0.307	0.252	0.226	1.36	0.174
Paybacks3 -> PayBack	-0.256	-0.172	0.262	0.975	0.33
Paybacks4 -> PayBack	-0.381	-0.3	0.234	1.63	0.103
Paybacks5 -> PayBack	0.091	0.086	0.24	0.377	0.706
Paybacks6 -> PayBack	0.193	0.154	0.21	0.917	0.359
Paybacks7 -> PayBack	0.506	0.399	0.248	2.039	0.042
Reliance1 -> Reliance	0.657	0.633	0.157	4.195	0
Reliance2 -> Reliance	0.391	0.376	0.178	2.202	0.028
Reliance3 -> Reliance	0.909	0.879	0.085	10.715	0
Userfriendl1 <- UFriendliness	0.853	0.803	0.219	3.889	0
Userfriendl2 <- UFriendliness	0.581	0.532	0.287	2.024	0.043
preparation1 -> Preparation	0.373	0.342	0.237	1.577	0.115
preparation2 -> Preparation	0.553	0.514	0.237	2.327	0.02
preparation3 -> Preparation	0.948	0.883	0.103	9.196	0

From Table 5.1, all exogenous variables for Cognizance, Compatibility, Edification, Government Policy, Indigenous language, Preparation, Reliance and User-friendliness were significant because their p- value was below .05. Other than included exactitute1, exactitute2 and exactitute5 as well as PayBack2, PayBack3, PayBack4, PayBack5 and PayBack6 were statistically non-significant

Convergent validity and discriminant validity of the measurement model were tested and it was revealed that

there were no construct validity issues nor did we have multicollinearity issues as none of the measured variables whose Variance Inflation Factor (VIF) was below 3.3 which is the threshold value for testing multicollinearity anomalies in the data. This means that constructs are in line with the intended objectives of the study hence contributing to the researcher's conclusions and recommendations. Table 5.2 shows the results of multicollinearity statistics.

Table 5.2 ***shows the results of multicollinearity statistics.***

	VIF
Cognizance1	1.229
Cognizance2	1.229
Compatibility1	1
DepIndic1	1.139
DepIndic2	1.182
DepIndic3	1.057
DepIndic4	1.223
DepIndic5	1.191
DepIndic6	1.221
DepIndic7	1.105
Edification1	1.016
Edification2	1.016
Exactitudes1	1.056
Exactitudes2	1.074
Exactitudes3	1.142
Exactitudes4	1.06
Exactitudes5	1.041
Exactitudes6	1.041
Exactitudes7	1.117
GovernmentPolicy1	1.021
GovernmentPolicy2	1.017
GovernmentPolicy3	1.03
Indigenouslanguage1	1.098
Indigenouslanguage2	1.098
Paybacks1	1.011
Paybacks2	1.05
Paybacks3	1.033
Paybacks4	1.053
Paybacks5	1.05
Paybacks6	1.058
Paybacks7	1.014
Reliance1	1.138
Reliance2	1.164
Reliance3	1.165
Userfriendliness1	1.005
Userfriendliness2	1.005
preparation1	1.045
preparation2	1.118
preparation3	1.141

Further, the effect of User factors on BVR technology acceptance was determined by use of a multi-linear regression model of the form:

$Y_1=\beta_0+ \beta_1X_1+ \beta_2X_2+ \beta_3X_3+ \beta_4X_4+ \beta_5X_5+ \beta_6X_6+ \beta_7X_7+ \beta_8X_8+ \beta_9X_9+ \beta_{10}X_{10}+\varepsilon i$ was used

Where X_{1-n} represents the factors and β_{0-n} the coefficients

This was intended to establish the extent and nature of the effect of various user factors on the BVR technology acceptance.

The model summary in table 5.3 described the effect of the factors taken as a whole on the BVR Technology.

Table 5.3 Path Coefficients on the User Factors and BVR Acceptance

	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
Cognizance -> UserAcceptance	0.351	0.318	0.079	4.216	0
Compatibility -> UserAcceptanc	-0.047	-0.049	0.055	0.953	0.341
Edification -> UserAcceptance	0.132	0.141	0.068	2.101	0.036
Exactitude -> UserAcceptance	0.131	0.213	0.07	2.811	0.005
GovPolicy -> UserAcceptance	0.220	0.221	0.065	3.381	0.001
ILanguage -> UserAcceptance	0.049	0.051	0.058	0.914	0.361
PayBack -> UserAcceptance	0.105	0.126	0.071	1.48	0.139
Preparation -> UserAcceptance	0.158	0.127	0.059	2.082	0.038
Reliance -> UserAcceptance	-0.008	-0.015	0.075	0.444	0.657
UFriendlines -> UserAcceptance	0.072	0.075	0.059	1.168	0.243

The results show that Reliance factor accounted for 7.5% of the variation in technology acceptance when the other factors are held constant. Compatibility and Edification factors explained 5.5% and 6.8% of the changes in the BVR acceptance levels respectively when the other factors are held constant. Further Exactitude factor accounted for 7.0% of the variation while Government Policy explained 6.5% of the changes in BVR acceptance levels. Indigenous Language accounted for 5.8% which was a significant proportion while Payback explained 7.1% of the changes. On the other hand, Preparation explained 5.9% of the changes in BVR technology acceptance levels while User Friendliness accounted for 5.9% of the variation when the other contributing factors are held constant. Cognizance had a major effect of BVR technology acceptance level of 7.9% of the changes in technology acceptance levels. Overall, the effect of individual factors can be small but the ultimate joint effect of all user factors on BVR technology acceptance levels was proved to be very significant.
From the above descriptive therefore, the coefficient model to be validated is

$Y=.351 X_1-.047X_2+.132X_3+.131X_4+.220X_5+.049X_6+.105X_7+.158X_8-.008X_9+.072X_{10}$

Where X_1-X_{10} are the user factors of Cognizance, Compatibility, Edification, Exactitudes, Government Policy, Indigenous language, Paybacks, Preparation, Reliance and User-friendliness respectively.

This structural equation was derived using the path coefficient values in the table of coefficients as presented in table 5.1. It indicates the effect of changes in the dependent variable (User Acceptance) as a result of a unit change in the respective factors. For instance, if Cognizance (X_1) increases by 1 unit then BVR Technology acceptance will increase by .351 units holding another factors constant. Equally if compatibility increases by 1 unit, then BVR Technology acceptance will decrease by .047 units. Changes in reliance and user friendliness by one unit will alter BVR Technology Acceptance by .008 to the negative and 0.072 to the positive respectively.

The significant value (p-value) shows the effect caused by each independent variable on the dependent variable. A smaller *p*-value indicates that the independent variable has a statistically significant influence on the dependent variable. For independent variables to have a significant impact on dependent variable, their value ought to be 0.05 or less.

The figure 5.2 illustrates the relationship between the independent variables and that of the dependent variable (User Acceptance) excluding the effect of the moderating variable.

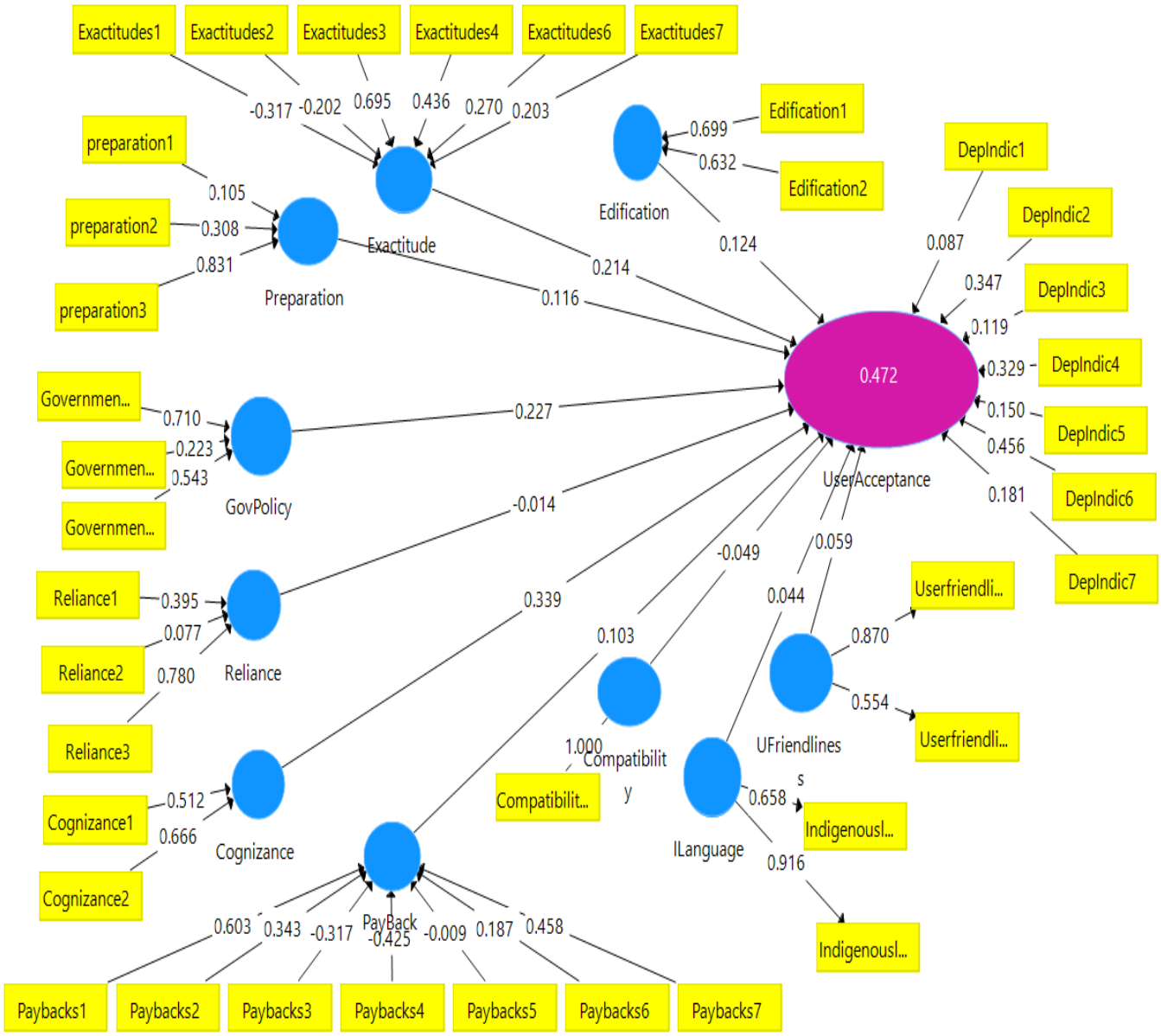

Figure 5. 1. *The relationship of the independent variables with that of the dependent variable excluding the effects of the moderating variable.*

Where X_1-X_{10} are the user factors of Cognizance, Compatibility, Edification, Exactitudes, Government Policy, Indigenous language, Paybacks, Preparation, Reliance and User-friendliness respectively.

Figure 5.1 shows a user acceptance model when all the exogenous variables were loaded to specific constructs of the study. The model uses both reflective indicators and formative indicators which determine the model before it is moderated by TAM. It also uses both first order and second order constructs in its development. The model also has an endogenous variable which is measured by all the constructs of the study and these latent variables account up to 47.2% in the variance of the user acceptance.

It is worth noting that some exogenous variables had loadings below the threshold and were eliminated from the model. They include exactitute1, exactitute2 and exactitute5 as well as PayBack2, PayBack3, PayBack4, PayBack5 and PayBack6 which were statistically non-significant. This is because their *p*-value was greater than .05. Such variables were eliminated and hence the development of a Model for Analyzing Usage Factors in Designing User Acceptance of Biometric Voter Registration Technology as depicted in figure 5.2.

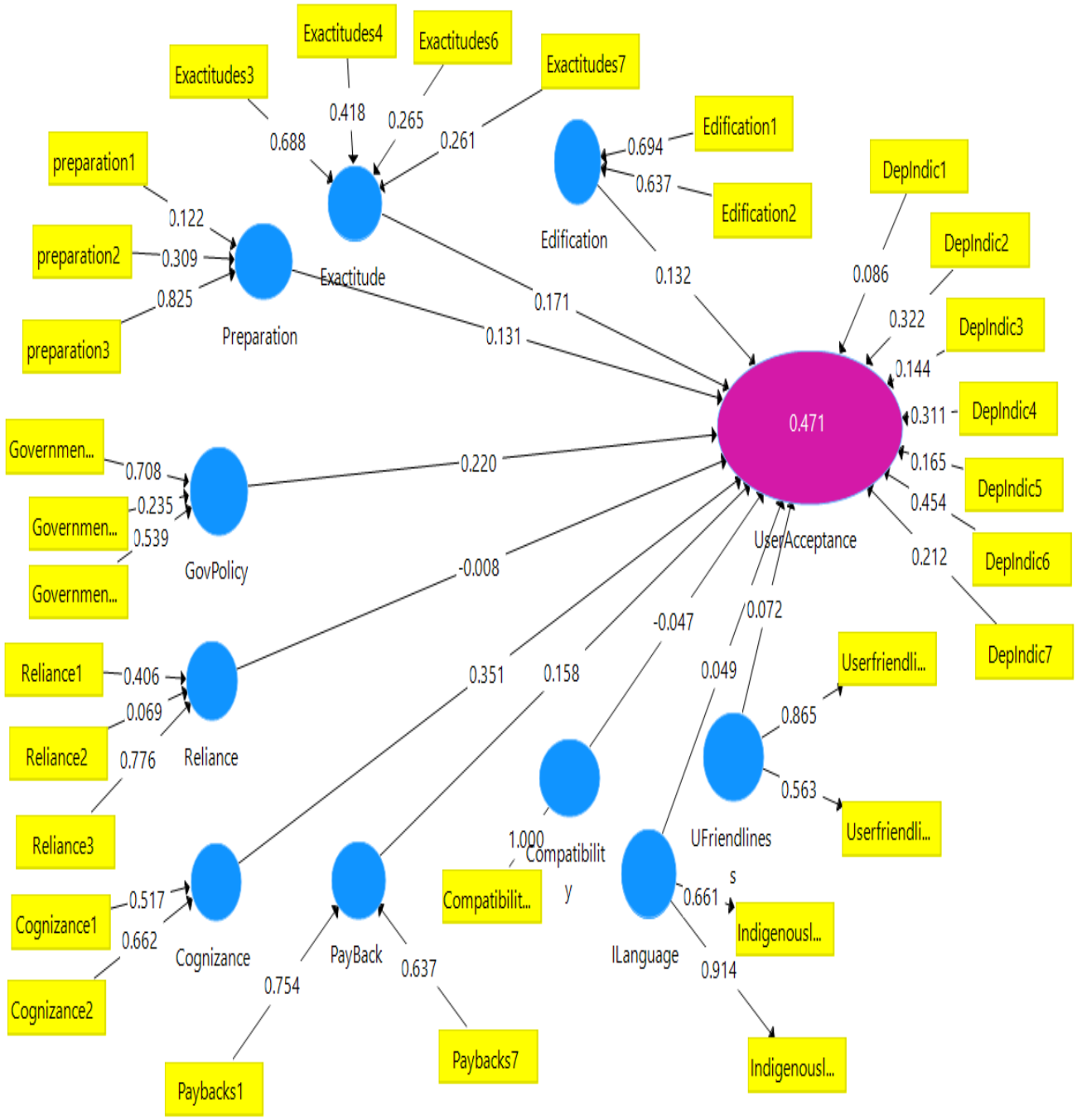

Figure 5.2 *A Model for Analyzing Usage Factors in Designing User Acceptance of Biometric Voter Registration Technology*

From the above diagram it evident that a Model for Analyzing Usage Factors in Designing User Acceptance of Biometric Voter Registration Technology factors explain 47.1% in the variance of user acceptance hence the development of the model.

VI. Model Validation

The model was achieved after validating twelve measurement models based on the loadings on every construct. Construct validity was established in the model. Convergent validity and discriminant validity of the model was ensured by the use of average variance extracted as shown in table 6.1

Discriminant validity was established using table 6.1 which shows that the diagonal correlation values exceed both vertical and horizontal correlational values.

Table 6. 2 Convergence Statistics for Exogenous Variables Using Average Variance Extracted (AVE)

Variables	AVE
Cognizance	0.716
Compatibility	1.000
Edification	0.563
Exactitude	0.688
GovPolicy	0.399
Language	0.639
PEofUse	0.598
PUsefulness	0.493
PayBack	0.646
Preparation	0.871
Reliance	0.515
UFriendliness	0.508
UserAcceptance	0.708

From table 6.2 the AVEs were greater than .50, meaning that construct validity was established.

	Cog	Comp	Edif	Exactd	Policy	IL	PBack	Prep	Rel	Ufrnd
Cognizance	0.846									
Compatibility	0.015	1.000								
Edification	0.260	0.187	0.751							
Exactitude	0.218	0.292	0.325	0.433						
GovPolicy	0.231	0.086	0.111	0.208	0.632					
ILanguage	0.283	0.215	0.217	0.345	0.122	0.799				
PayBack	0.162	0.071	0.134	0.223	0.090	0.138	0.381			
Preparation	0.211	0.014	0.006	0.123	0.160	0.082	0.148	0.686		
Reliance	0.465	0.017	0.074	0.285	0.351	0.179	0.155	0.258	0.718	
UFriendliness	0.357	0.158	0.200	0.199	0.076	0.287	0.096	0.024	0.190	0.638

Table 6.3 shows the model fit measures. It is evident that Chi-Square was found to be statistically significant, $p<.05$, Root Mean Square Error and Approximation (RMSEA) was
way below the minimum threshold which is .08 and Turkey Lewis Index (TLI) was above the minimum which is .90

Table 6.3 *Model Fit Measures*

	RMSEA 90% CI				**Model Test**		
RMSEA	**Lower**	**Upper**	**TLI**	**BIC**	**χ^2**	**df**	**p**
0.0235	0.0129	0.0323	0.933	-3756	1004	901	0.009

From figure 5.2, it is evident that R^2 was 47.1%. This means that usage factors were able to explain up to 47.1% of the user acceptance of the BVR Technology while 52.9% were explained by other factors which were not considered in the study.

VII. CONCLUSION

A number of models reviewed in chapter two have indicated a number of shortcomings. Some have heavily

relied on initial modelling factors as opposed to the user factors while others had ignored other important user factors which have been included in a model for user acceptance of BVR technology.

The model approach can bridge the identified gaps between voter registrations provided and used, thus increase the use of BVR Technology. This will lead to increasing the impact of voter registration services and user interaction with voter registration institutions. Electoral institutions focus mostly on supply-side factors; therefore, this model addresses the demand-side perspective of BVR Technology and BVR Technology adoption.

It is hoped that once this model is adopted and applied in Kenya, the adoption rates of BVR Technology will increase. The model is also generic and can be applied to other developing countries that have similar contexts as Kenya. Therefore, a model for analyzing usage factors in designing user acceptance of BVR Technology adoption requires great investment by voter registration institutions and the ICT if these services are to be adopted in the short and long run.

VIII. RECOMMENDATIONS

The study of definitive user agents to approve successful BRV technology in Kenya was established and developing research was assigned a model for approval and accepting successful BRV technology. For this reason, the researcher advised the preparation of native users of BVR technology dramatically during the implementation of BVR technology if these services are to be approved and should be done, during and after the implementation of any BRV. The research showed that preparation had a significant impact on acceptance. Therefore, the Ministry of Information and Communication Technology, in consequence, intends to provide the BVR technology services for the technology users (in the specific institution in BVR / program / service programs) and providing static government policies if these services are successful.

BRV technology should be changing negative accuracy for users to BRV technology. The results showed that the negative accuracy for respondents in the direction of BRV technology to use de protected services; Validation results also showed that preparation had a major impact on the benefits. That is why the research recommends that this research is permanently prepared before the BRV technology and other BRV technology, because this is one of the most important barriers to approval of BRV technology.

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Richard Kayanga Nyakundi, School of Computing and Informatics, Kibabii University, Bungoma- Kenya**.**

Prof. Samuel Mbuguah (PhD, CEng), Director Planning &Organization Performance/ Associate Professor (IT), Kibabii University – Kenya, P.0 Box 1699-50200 Bungoma.

Dr. Ratemo Makiya (PhD), School of Computing and Informatics, Kisii University, Kisii – Kenya.