E-Banking as a Financial Supply Chain System: Can e-TAM improve Trust and the Rate of Adoption?

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Abstract— Electronic banking as a financial supply chain system has gone a long way to revolutionize banking services as contemporary customers of banking organizations have largely moved from brick and mortal banking to digital platform. However, trust remains an important underlying factor that makes users from developing countries to be wary of the way they adopt this novel technology banking system. The significant objective of this study therefore centres on how to improve trust using extended technology acceptance model (e-TAM) by incorporating perceived security and e-trust with perceived usefulness and perceived ease of use to predict adoption of e-banking. Previous studies have paid meagre attention to this area, especially in a developing context. The data of the study were collected from 266 customers while the responses obtained were analysed using Partial Least Square Structural Equation Modelling. The findings show that perceived usefulness and perceived ease use predicted e-trust and e-banking adoption. Perceived security also predicted e-banking adoption but failed to predict e-trust. E-trust mediates the relationship between perceived usefulness, perceived ease of use and e-banking adoption. However similar mediating effect was not found between perceived security and e-banking adoption. The implications of the study were presented.

Keywords— *E-banking, E-TAM, Perceived Usefulness, Perceived Ease of Use, Perceived Security, E-trust*

1. Introduction

In the recent time, high penetration of internet technology is assisting many customers around the globe to have a multiple access to electronic banking (e-banking) [1]. E-banking gives opportunity to an individual customer to perform a series of banking activities without any form of limitation at a very low cost [2-3]. Likewise, the banking institutions have taken opportunity of e-banking as a financial supply chain system to add value, reduce costs of operations [4-5] and relate effectively with their customers [6-7]. In view of these benefits, recent evidences have shown that adoption of e-banking has been on the increase among individuals, particularly, in Europe, North America and some Asia countries [8-9]

However, in developing countries of Africa, particularly Nigeria, evidence indicates that the rate of adoption of e-banking is still very low despite huge investments made by retail banking institutions to institute e-banking platforms. [10-12]. This quantum refusal of Nigerians to fully adopt e-banking has some negative effects on the economy of the country as cash based transactions continue to increase [10], [13-14]. Recently, the Central Bank of Nigeria (CBN) has instituted different cashless policies with a view to encourage e-banking adoption [15]. But evidence shows that most Nigerians still prefer branch banking to e-banking services [13].

As noted by a number of scholars, the low rate of e-banking adoption generally, especially, in developing nations like Nigeria, is due to the absence of trust in the e-banking platforms, among other factors [16-17]. For instance, the result of research conducted by Customer Respect Group (an international research and consulting firm) indicates that one out of six Americans gave up e-banking, either due to its vulnerability or its routines ambiguities, and lack of perceived usefulness [18]. Other recent studies indicate a huge number of other customers who still patronize e-banking platforms are equally nervous as a result of lack of security [19]. This is line with the previous finding of [12] that asserts that ‘’security is the overwhelming challenge for e-banking vendors and a great inhibitor for adoption of electronic banking in Nigeria’’.

In spite the low rate of adoption of e-banking in developing countries, like Nigeria, fewer detailed and empirical studies have been conducted to assist banking institutions towards improving the rate of adoption [20-21], [13] as most technology adoption studies either emanate from developed or emerging nations [22-23]. In this regard, this study answers the clarion calls of [23] [24] as re-echoed by [25], and [12] that more relevant studies are required,

especially, in Nigeria. The call was based on the premise that the result of technology/Information System (IS) based studies obtained in one nation may not be applied directly to another country due to contextual difference and level of technology usage [26]. And as observed by [25] and [27], technology-enabled transactions have created opportunities for deviant behaviors within financial service ecosystem but little efforts have been made to explore factors that can make trust to be increased especially with the advent of recent Information Technology (IT) environment. In this sense, a further research is required to urgently shed light on how to reduce the rate of e-banking crime that has become pandemic in Nigeria [28], [27]. This would therefore assist to increase the level of trust while improving the rate of adoption among the target audience of the banking institutions.

The researcher structured the final section of this paper as follows: The literature review presents e-banking and technological adoption by arguing for TAM; its constructs and extension. This part also presents hypotheses and conceptual framework of the study. The part that follows discusses methodology and followed by discussions of findings, implication, and conclusion. The last part presents limitations and research recommendation.

2.1 Literature Review

2.1.1 Technology adoption Model and adoption of Information System

Adoption is generally regarded as the signing of contract to use technology such as e-banking [28] [29]. The most universal definition of adoption is the "acceptance and continued use of an innovation." [30, p.56]. Technology Acceptance Model (TAM) in this instance is one of the parsimonious theories that has been widely used to predict the adoption by previous researchers in the domain of consumer behavior and Information System (IS) studies. Its core constructs: Perceived of usefulness (PU) and Perceived ease of use (PEU) have been used by studies to elucidate adoption of different technologies such as mobile banking [31], mobile commerce [32], and online learning [33] among others. Based on empirical evidence however, it is regarded as the most appropriate theory that can be applied across fields without any form of barrier [31]. Based on google scholar index, original TAM has been cited 50084 times as at date, while its veracity is seen in explaining more than 40% variance in behavior of most models [22]. Despite this, studies have positioned that the practical effectiveness and theoretical propositions of TAM are subject to arguments as the model lacks sufficient and rigorous research [e.g., 31]. In this regard, a number of other scholars have called for the extension of TAM indicating that incorporation of other constructs along TAM would enhance the veracity of the model to suit the context where the theory is used [34-35]. Consequently, this study extends TAM by integrating perceived security and e-trust along PU and PEU to explain adoption of electronic banking [36], [16].

2.1.2 Perceived Usefulness (PU)

PU is defined as "the degree to which a person believes that using a particular system would enhance his or her job performance" [37]. PU, from Davis' point of view specifically refers to being effective and productive at work by virtue of time saved and relative importance of the system usage that is attached to the individual's work [38-39]. This definition of PU was context specific as computer usage within an organization was the focus. However, results from [37] showed that PU predicted both present and future usage of system significantly. Other authors within customers' domain with respect to technology usage have equally found that PU influences both e-banking adoption and trust [16], [40], [22]. Users would develop trust in e-banking platforms when the platforms provide them with necessary benefits as anticipated [41]. Based on this, the following hypotheses are presented.

H1: PU has a positive and significant effect on e-banking adoption
H2: PU has a positive and significant effect on e-trust

2.1.3. Perceived ease of Use (PEU)

Perceived ease of use refers to "the degree to which a person believes that using a particular system would be free of effort'' [37]. It is often regarded as the subjective feeling of the effortlessness of a system which affects the adoption of technology. It remains an important factor that determines development, delivery and acceptance of e-banking services. A system is perceived to be easily used overtime since the longer the usage of a system, the more the proximity of acceptance [42]. The definition of PEU was given in the context of organization where usage of computer was the focus [37]. Findings from Davis' research consequently revealed that PEU significantly predicted current and future usage of a system at a lesser degree than PU. Other recent authors have equally established substantial evidence and found a significant relationship between e-banking system adoption and PEU [43-44]. Similarly, a number of researchers assert that e-banking platform would be trusted if it gives the users less challenges in the course of usage [45-46]. Based on this, the following hypotheses are presented.

H3: PEU has a positive and significant effect on e-banking adoption
H4: PEU has a positive and significant effect on e-trust

2.1.4. Perceived Security (PS)

The importance of security in banking transaction cannot be overemphasized. In fact, its significance in an online service like e-banking is more paramount than in traditional or mortal and brick transactions [47]. PS is essentially defined as the degree to which customers believe that transactions being carried out using a particular channel will be free from risk, fraud and intruders [22]. In e-commerce, perceived security indicates how secured the customers feel while carrying out their transactions online. Importantly, PS in e-commerce has been approached from a broader view to include confidentiality and authentication of information as well as customers' detailed sense of well-being that may be liken to actual protection while carrying out transaction in offline environment [48]. Most importantly, since online banking has been engendered with insecurity, technological solutions as well the feelings of online security are essential towards adoption of technology [49]. Therefore, a site that is secured may not indicate the degree of security precautions being proffered while a site that is highly insecure can mislead the customers that it is secured [48]. Accordingly, several studies have established relationship between PS, trust and e-service adoption [50-51]. Based on this argument, the following hypotheses are hereby presented.

H5: PS has a negative and significant effect on e-banking adoption
H6: PS has a positive and significant effect on e-trust

2.1.5. E-trust

Trust in electronic banking and other related IS studies has been largely neglected [52]. The need to research this construct is necessitated especially that the features and characteristics of online service delivery has given rise to a lack of trust among some e-banking customers [53]. This arises due to lack of personal and direct interaction between service provider and customer [16]. The lack of physical interaction which consequentially creates a vacuum between the customers and service provider importantly implies that the customers cannot directly observe front line officers or the physical office space with the purpose of judging how trustworthy the service provider is [54-55]. The activities being carried out in the online environment do not permit instant and simultaneous exchange of goods/service and money since there is a spatial and temporal separation of buyers and sellers. Further, the fear of hackers who often intrude privacy has importantly created uncertainties in the online services and couple with the news of frauds and other associated activities that have dominated the headline of news in the recent time [51], [55]. Due to lack of trust, scepticism and uncertainty, a gap has been created and it is the duty of bank managers to quickly to bridge this gap so as to grow e-banking as an important medium through which banks can perform good and excellent service delivery [55].

Trust has therefore been conceptualized as a situation when one party or a customer has confidence and believes that the service provider has integrity and can be relied on [56]. Trust can importantly be defined as ''a willingness to rely on an exchange partner in whom one has confidence.'' [56, p.23]. Existing studies have positioned that confidence forms the bedrock of trust since one party believes strongly that e-banker is helpful, consistent, fair, competent and benevolent and would not handle service agreement for a personal gain [56]. In this instance, a number of studies have established relationships between PU, PEU, PS and e-trust [16], [51]. However, the mediating role of e-trust which suggests that when users experienced trust, they feel confident about using the e-banking has been neglected [52]without considering the fact trust is the heart of of other determinants and the greater the trust, the longer the relationship [60]. And as noted recently by [61] very limited studies have combined TAM and trust to predict adoption. In view of this, the following hypotheses are presented.

H7: E-trust has a positive and significant effect on e-banking adoption
H8: E-trust mediates the relationship between PU and e-banking adoption
H9: E-trust mediates relationship between PEU and e-banking adoption
H10: E-trust mediates the relationship between PS and e-banking adoption

Based on the above discussions and hypotheses development, conceptual framework of this study is hereby presented.

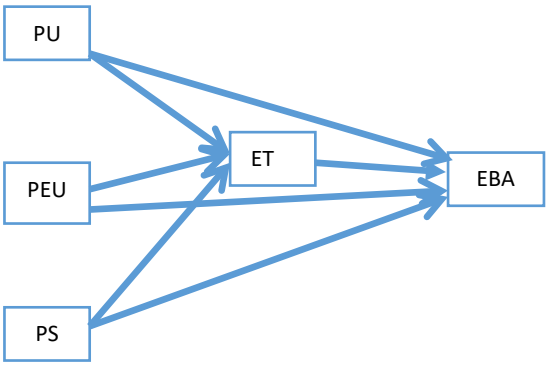

Figure 1: conceptual Framework

3.1 Methodology

This study adopts survey questionnaire in order to empirically measure and test the relationship among the variables of this study. The survey instruments consist of 31 items as identified through a detail review of TAM literature, as well as PS, e-trust and adoption of e-banking.

PU, PEU and PS measurement items were extracted from [61], and [37] while E-Trust and e-banking adoption measurement items were captured from [40]

3.1.1 Research Design

The sample of this study comprised e-banking customers in Lagos State, Nigeria. The questionnaires of the study were distributed systematically through head of operations of selected banks. This method was used as experience has shown that banks don't normally release the list of their customers to researchers due to confidentiality regulation. In all 382 questionnaires distributed, 291 copies were returned. However, 266 questionnaires which represents approximately 70% response rate were finally analysed using PLS-SEM. Out of the 266 respondents, 191 (71.8%) are female while 75 (28.2%) are male. The age of the respondents spread across as 24 (57.45%) respondents are within the age of rage of 18 and 25. 104 (39.09%) of the respondents are within the age range of 26 and 35. 90 (33.83%) of the respondents are within the age range of 36 and 45, while the rest of the respondents are above age of 45. The educational qualification of the respondents includes: 8.9% (Primary and secondary school qualification), 19.9% (1st Degree), 42.1% (Master qualifications). 3.4% (Doctorate degree) while others have other qualifications. Concerning type of accounts operated, 45% operate savings account, 52.3% operated current account, while others operated other types of accounts. In addition, 1.9% of the respondents got less than 1 year banking experience, 30.5% of the respondents got 1-5 years experience, 46.6% got 6-10 years-experience, 19.5% got 11-20 years banking experience while others have 20 years and above experience.

3.1.2 Measurement Model

For the purpose of analyzing generated hypotheses, Partial least squares structural equation modelling (PLS-SEM) was employed based on the arguments of previous scholars that the PLS is a technique that is best used in prediction [63]. PLS has two basic steps of measurement model and structural model [63].

In order to analyse the measurement model, factor analysis was carried out so as to determine the veracity of the proposed model. Based on the arguments of [63] reliability and validity are the two important criteria which are used in evaluating the theoretical soundness of a framework. Hair et al [63] recommended that researcher must first establish reliability of the constructs through the evaluation of composite reliability (CR) of each variable. The second criterion is the establishment of the construct validity which encompasses convergent validity (CV) and discriminant validity [62]. CV refers is the extent to which a given measure correlates positively with another measure of the similar construct [62]. This seems to be pointing to the fact measurement items of similar construct should converge or share certain level of variance. It has been suggested that for convergent validity to be ascertained, it is mandatory that the outer loadings of the items, composite reliability (CR), Rh_A, and as well as average variance extracted (AVE) must be considered [23]. Hair et al. [62] argued that item loadings and AVE should not below 0.70 and 0.50 respectively. However, other recent scholars argued that items of lesser loadings which fall below 0.70 can be retained if the items contribute significantly to AVE, path significance and other parameters in the model [22]. Figure 2 and Table 1 show the result of the measurement model of the study.

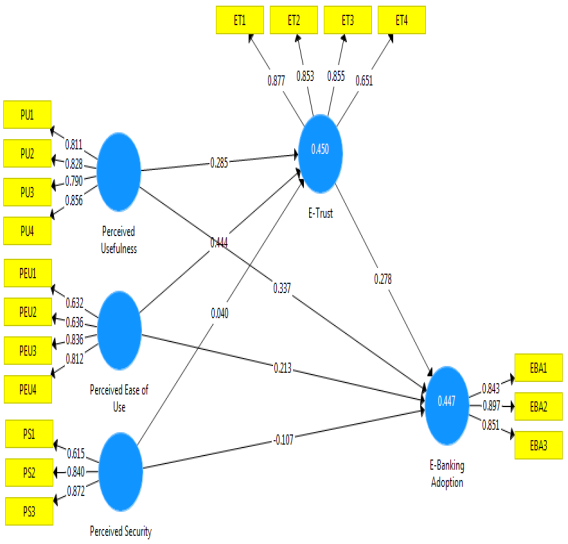

Figure 2: Measurement Model

Table 1
Factor Loading Significance

Constructs and Items	Loadings
Perceived Usefulness	AVE: 0.675; CR;0.892; Rho_A:0893
PU1	0.811
PU2	0.828

PU3	0.79
PU4	0.856
Perceived Ease of Use	AVE: 0.540; CR;0.822; Rho_A:0,724
PEU1	0.632
PEU2	0.636
PEU3	0.836
PEU4	0.812
Perceived Security	AVE: 0.615; CR;0.824; Rho_A:0,752
PS1	0.615
PS2	0.84
PS3	0.872
E-Trust	AVE: 0.747; CR;0.898; Rho_A:0,832
ET1	0.877
ET2	0.853
ET3	0.855
ET4	0.651
E-banking Adoption	AVE: 0.663; CR;0.886; Rho_A:0,850
EBA1	0.843
EBA2	0.897
EBA3	0.851

Table 3
Discriminant Validity (Fornell and Larcker)

	EBA	E-Trust	PEU	PS	PU
EBA	0.864				
E-Trust	0.563	0.814			
PEU	0.533	0.627	0.735		
PS	0.182	0.329	0.459	0.784	
PU	0.582	0.554	0.578	0.296	0.821

As shown in Table 3 above, the discriminant validity of this study has been established as it shows the extent to which each selected construct in this study distinct from another construct considering statistical yardsticks [62]. In this regard, all the items of each selected construct are distinct when compared with variances of other constructs using as the researchers compare the diagonal values (square roots of AVE) with that of the correlation values as off-diagonal elements. Since all the diagonal values are higher than the off diagonal values located in the same rows and columns, the researcher concluded the discriminant validity of this study has been met.

3.1.3. Assessment of Structural Model

The researchers are required to establish structural model with a view ascertain the significance of hypothesized relationship. For the structural model to be established a bootsrapping subsample of 5000 is required as this will enable to ascertain the degree of significance loadings, and path coefficients [63].

Having performed the bootsrapping, Table 4 shows the outputs of the structural model obtained from the PLS as figure 2 equally reveals the values of coefficients path, and determination coefficient (R^2) of each variable. As shown in Table 4, PU was significantly and positively related to e-banking adoption (β = 0.337; t.=5.749) thereby supporting. PU was significant and a positive predictor of e-trust (β = 0.285; *t=5.117*). PEU was also significantly and positively related to e-banking adoption (β = 0.213, *t*=2675). PEU was positively and significantly related to e-trust (β = 0.444; *t*=7.163). PS significantly and negatively predicted e-banking adoption (β = 0.107, *t*=1.762). E-trust also significantly and positively related to e-banking adoption (β = 0.278, *t.=3.736*). Thereby making H1, H2, H3, H4 making H4, H5, and H7 to be supported accordingly. However, H6 which states a positive relationship between PS and E-trust (β = 0.040, *t.=0.520)* is not supported. With respect to mediating effect, the results show that e-trust mediates between PU and e-banking adoption (β = 0.079, *t.=3.659*), and between PEU and e-banking adoption (β = 0.123, *t.=3.033*). This indicates that H8 and H9 hypotheses are accepted. However, H10 which states that e-trust mediates the relationship between PS and EBA (β = 0.011, *t.=0.0591)* is not supported. The result of structural model is shown in Table 3 and Figure 3

Table 4
Structural Model Result

Hypothesis	**Path**	**b**	**SE**	**T.Value**
H1	PU-EBA	0.337	0.059	5.749
H2	PU-ET	0.285	0.056	5.117
H3	PEU-EBA	0.213	0.080	2.675
H4	PEU-ET	0.444	0.062	7.163

H5	PS-EBA	-0.107	0.061	1.762
H6	PS-ET	0.040	0.063	0.644
H7	ET-EBA	0.278	0.074	3.736
H8	PU-ET-EBA	0.079	0.0.22	3.659
H9	PEU-ET-EBA	0.123	0.041	3.033
H10	PS-ET-EBA	0.011	0.019	0.591

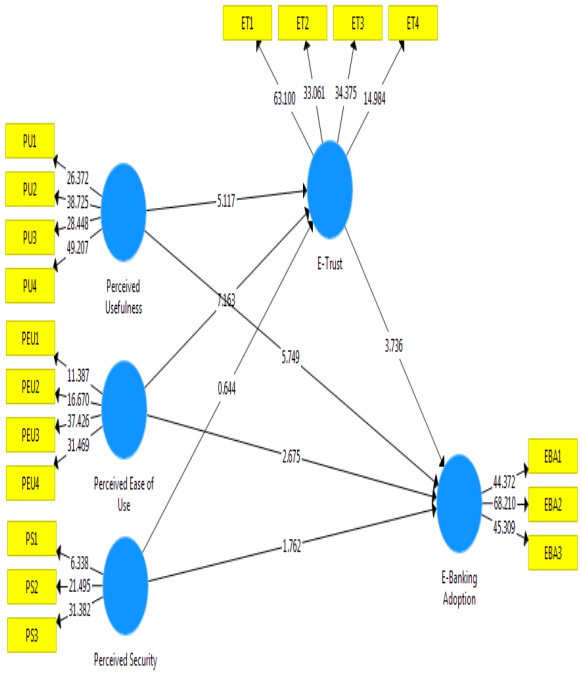

Figure 3: Structural Model

4.1 Discussion of findings

This study extends TAM by incorporating perceived security and e-trust to explain adoption of e-banking in Nigeria. By doing this, seven direct and three mediating hypotheses were formulated out of which six direct hypotheses were supported while two mediators mediated the proposed relationships.

The first hypothesized relationship (H1) between PU and e-banking adoption was significantly positive and supported. This result is in consonance with the results [28] and [31]. This therefore indicates when customers have the feeling that e-banking platform is useful to achieve their financial transaction objectives, the rate of usage will increase [64].

The second hypothesis H2 states that perceived usefulness is positively related to e-trust and was also accepted. This finding tallies with the results of previous studies [65-66] and therefore implies that perceived usefulness in this context determines trust in the e-banking channel. This seems to indicate that users of e-banking tend to trust e-banking service provider as they believe that the banks are committing more resources to ensure that the plant is useful in meeting their needs and in line with the agreement they had while signing e-banking contract [21].

The third hypothesis H3 which states that perceived ease of use is positively related to e-banking adoption was also accepted. Extant scholars have reported similar findings [22] thereby explaining that the easier e-banking platforms are in terms of configuration that eases usage, the more users will be willing to use e-banking.

The fourth hypothesis H4 states that perceived ease of use is positively related to e-trust was accepted. Previous studies have found similar results [67-68]. This suggests that when e-banking platforms are easily used by virtue of easy configuration, task executions and other attributes that ease the lives of users, the customers will trust the bankers that they are committed to the relationship.

The fifth hypothesis H5 which states that perceived security has a negative relationship with adoption of e-banking was equally supported. Previous studies confirmed this relationship indicating that perception of lack of security can negatively inhibit adoption of IS/IT such as e-banking [69]. The finding indicates that perceived security/risk is a major factor that is deterring the customers from adopting online banking. This fact is coming to light as most customers do associate perception of risk with system failure and lack of reliable of the channels. In fact, the major concern of customers that adopt e-banking is transaction risk and inability of their service providers to remedy the situation through rapid and swift responses [70].

The sixth hypothesis (H6) that states a positive relationship between perceived security and e-trust was not supported. This result is line with the findings of other studies [71] and which seems to indicate that users consider other factors other than perceived security to develop trust in e-banking platforms or the service provider. This has been initially positioned as some studies do suggest that trust could be enhanced when e-banking provides prompting services, respond to customers' query and while the platform provides other similar features.

The seventh hypothesis H7 that states e-trust positively influences e-banking adoption was

supported. This finding tallies with the outcomes of several other studies [72-73]. In essence, it does indicate that trust in an online environment is a prerequisite to adoption since rate of adoption tends to increase in circumstances where customers trust the banks or channels through which the services are rendered and which therefore indicates that banks should intensify their efforts to put necessary facilities that will help to boost the level of confidence.

The eight hypothesis H8 that states that e-trust mediates the relationship between perceived usefulness and adoption of e-banking was supported. Previous scholars such as [74] found similar relationship, thereby, signifying that perceived usefulness is a key prerequisite that influences adoption through trust in online transaction.

The ninth hypothesis H9 that states e-trust mediates the relationship between perceived ease of use and adoption of e-banking was supported. Previous scholars [75] found similar relationship indicating that perceived ease of use is a key prerequisite that determines adoption via trust in electronic banking.

The tenth hypothesis H10 which states that e-trust mediates the relationship between perceived security and adoption of e-banking was not supported. In essence, the finding signifies that presence of security does not stimulate trust towards adoption of e-banking. This result is in line with the findings of previous studies [76].

4.1.2 Implications and conclusion

E-banking is a contemporary banking financial service chain and one of the recent technology inventions that is being embraced, especially, in developing countries such as Nigeria. However, in order to cope with the high rate of velocity of changes currently going on in world of competitive information system market, it is highly imperative that banking institutions ensure that e-banking platforms are redesigned and strengthened with features that would ensure that the current users of the platforms are served effectively while a large number of intending users are largely attracted. For instance, to effectively increase the adoption rate, our findings indicate that bankers and designers of e-banking platforms should pay attention to certain attributes such as PU, PEU and perceived security of the e-banking platform. In essence, while configuring these platforms, required features that will make the users to obtain maximum benefits, and feel that the platforms are easily used should be embedded. Likewise, efforts should be put in place to enhance the perception of security of e-banking platforms. This cab achieved by embedding certain features such as Padlock symbol, VeriSign, Virtual Keyboard, SMS alert, Automatic lockout on multiple entry of password, Sign on password expiry, Automatic timeout for inactiveness over certain period, address bar turning green, mandatory use of special characters in password and a host others into e-banking platforms [22], [36]. Such configurations will help to improve e-banking platforms while adding value as a financial service chain system.

This study is anchored on the extension of TAM as it added PS and e-trust within the context of a developing country as most extant researchers have not largely tested these relationships. Therefore, by this extension, TAM simplicity and its parsimony have been retained and improved thereby contributing to the body of knowledge.

4.1.3 Limitation of the study

This study has some limitations that should be taken into consideration while interpreting its results. First, the cross sectional and quantitative nature of the study requires that future researchers should consider a longitudinal study using qualitative approach. If such is done, it would enable a thorough and deep exploration of the issue at hand to be achieved. Second, this study only captures four factors in predicting adoption of e-banking in Nigeria. It is recommended that coming studies to incorporate factors such as hedonic motivation, price value, information quality and innovative performance [22], [77-78] for the purpose of understanding and predicting adoption of e-banking effectively.

References

[1] Wang, M., Cho, S., & Denton, T.. The impact of personalization and compatibility with past experience on e-banking usage. *International Journal of Bank Marketing*, *35*(1), 45-55, 2017

[2] Amin, M. Internet banking service quality and its implication on e-customer satisfaction and e-customer loyalty. *International Journal of Bank Marketing*, *34*(3), 280-306, 2016

[3] Yoon, H. S., & Steege, L. M. B. Development of a quantitative model of the impact of customers' personality and perceptions on Internet banking use. *Computers in Human Behavior*, *29*(3), 1133-1141, 2013

[4] Fonseca, J. R. e-banking culture: A comparison of EU 27 countries and Portuguese case in the EU 27 retail banking context. *Journal of Retailing and Consumer Services*, *21*(5), 708-716, 2014

[5] Komulainen, H., Saraniemi, S., Ulkuniemi, P., & Ylilehto, M. End-customer value

restructuring the financial service supply chain. *Marketing Intelligence & Planning*, 36 960, 709-720,2018

[6] DeYoung, R., Lang, W.W. and Nolle, D.L. How the internet affects output and performance at community banks, Journal of Banking and Finance, 31 (4), 1033-60, 2007.

[7] Rod M, Ashill NJ, Shao J, Carruthers J. An examination of the relationship between service quality dimensions, overall internet banking service quality and customer satisfaction: A New Zealand study. Marketing Intelligence & Planning. 27(1):103–126. 2009

[8] Laukkanen, T., & Cruz, P. (2012. Cultural, individual and device-specific antecedents on mobile banking adoption: a cross-national study. In *System Science (HICSS), 2012 45th Hawaii International Conference on* Systems Sciences 3170-3179, 2012. IEEE.

[9] Tran, H. T. T., & Corner, J. The impact of communication channels on mobile banking adoption. *International Journal of Bank Marketing*, *34*(1), 78-109, 2016.

[10] Ayo, C. K., & Adewoye, J. O. (2010). The state of e-banking implementation in Nigeria: A post-consolidation review. *Journal of emerging trends in economics and management sciences*, *1*(1), 37-45.

[11] Central Bank of Nigeria. (2003). Guidelines On Electronic Banking in Nigeria. Retrieved from www.cenbank.org/documents

[12] KPMG. Banking Industry Customer Satisfaction Survey, Nigeria, Lagos: KPMG Professional Services, retrieved from http://www.Kpmg.com 2014

[13] Inegbedion, H. E. Factors that influence customers' attitude toward electronic banking in Nigeria. *Journal of Internet Commerce*, *17*(4), 325-338, 2018.

[14] Odumeru, J. A. The Acceptance of E-banking by Customers in Nigeria Odumeru. *World Review of Business Research*, *2*(2), 62–74, 2012.

[15] Central Bank of Nigeria: Re-implementation of Cashless Policy. Retrieved from www.cbn.gov.ng, 2019

[16] Akhlaq, A., & Ahmed, E. The effect of motivation on trust in the acceptance of internet banking in a low income country. *International Journal of Bank Marketing*, *31*(2), 115–125, 2013

[17] Chiu, C. L., Chiu, J. L., & Mansumitrchai, S. Stages in the development of consumers' online trust as mediating variable in online banking system: a proposed model. *International Journal of Electronic Finance*, *9*(3), 170-201, 2019

[18] Chiou, J. S., & Shen, C. C. The antecedents of online financial service adoption: the impact of physical banking services on Internet banking acceptance. *Behaviour & Information Technology*, *31*(9), 859-871, 2012

[19] Ataya, M. A. M., & Ali, M. A. (2019, August). Acceptance of Website Security on E-banking. A-Review. In *2019 IEEE 10th Control and System Graduate Research Colloquium (ICSGRC)* (pp. 201-206). IEEE.

[20] AbuShanab, E., Pearson, J. M., & Setterstrom, A. J. (2010),''Internet banking and customers' acceptance in Jordan: the unified model's perspective'', *Communications of the Association for Information Systems*, *26(*1), 494-524, 2010

[21] Adesina, A. A., & Ayo, C. K. An empirical Investigation of the Level of Users' acceptance of E-Banking in Nigeria. *Journal of Internet Banking and Commerce*, *159 (*1), 1–13, 2010

[22] Salimon, M. G., Yusoff, R. Z. B., & Mokhtar, S. S. M. (2017). The mediating role of hedonic motivation on the relationship between adoption of e-banking and its determinants. *International Journal of Bank Marketing*.

[23] Salimon, M., Mokthar, S., Yusr, M., Yusoff, R., Kareem, O., & Bamgbade, J. Do risk and fun matter in the adoption of mobile commerce in Nigeria? A PLS-SEM approach. *Management Science Letters*, *8*(6), 507-518, 2018.

[24] Jaishankar, K. The Future of Cyber Criminology: Challenges and Opportunities. International Journal of Cyber Criminology 4(1/2):26-31, 2010.

[25] Tade, O (2013). A Spiritual Dimension to Cybercrime in Nigeria: The Yahoo-plus Phenomenon. Human Affairs, Vol 23:689-705.

[26] Poong, Y. S., Yamaguchi, S., & Takada, J. I. Investigating the drivers of mobile learning acceptance among young adults in the World Heritage town of Luang Prabang, Laos'' *Information Development*, *1*, 1-15, 2016.

[27] Davinson, N., & Sillence, E. Using the health belief model to explore users' perceptions of 'being safe and secure'in the world of technology mediated financial transactions. *International Journal of Human-Computer Studies*, *72*(2), 154-168, 2014.

[28] Anouze, A. L. M., & Alamro, A. S. (2019). Factors affecting intention to use e-banking in Jordan. *International Journal of Bank Marketing*.

[29] Eriksson, K., Kerem, K. and Nilsson, D. Customer acceptance of internet banking in Estonia", *International Journal of Bank Marketing*, 23 (2), 200-216, 2005

[30] Robertson, T.S. (1971). *Innovation behavior and communication*. New York: Holt, Rhineart & Winston.

[31] Alalwan, A. A., Dwivedi, Y., Rana, N. P., & Williams, M. D., Consumer adoption of mobile banking in Jordan: examining the role of usefulness, ease of use, perceived risk and self-efficacy'', *Journal of Enterprise Information Management*, Vol. *29 No.* 1, pp. 118-139, 2016

[32] Yadav, R., Sharma, S. K., & Tarhini, A. (2016). A multi-analytical approach to understand and predict the mobile commerce adoption. *Journal of enterprise information management*, *29*(2), 222-237, 2016

[33] Joo, S., & Choi, N. Factors affecting undergraduates' selection of online library resources in academic tasks: Usefulness, ease-of-use, resource quality, and individual differences. *Library Hi Tech*, *33*(2), 272-29, 2015.

[34] Abdullah, F., Ward, R., & Ahmed, E. Investigating the influence of the most commonly used external variables of TAM on students' Perceived Ease of Use (PEOU) and Perceived Usefulness (PU) of e-portfolios. *Computers in Human Behavior*, *63*, 75-90, 2016

[35] Ramkumar, M., Schoenherr, T., Wagner, S. M., & Jenamani, M. Q-TAM: A quality technology acceptance model for predicting organizational buyers' continuance intentions for e-procurement services. *International Journal of Production Economics*, *216*, 333-348, 2019.

[36] George, A., & Kumar, G. G. (2013), Antecedents of Customer Satisfaction In Internet Banking: Technology Acceptance Model (TAM) Redefined, *Global Business Review*, *14(*4) 627-638, 2013.

[37] Davis, F. D., Perceived Usefulness , Perceived Ease of Use , and User Acceptance of lnformation Technology. *MIS Quarterly*, *13(*3), 319–340, 1989.

[38] Aldás-Manzano, J., Lassala-Navarré, C., Ruiz-Mafé, C., & Sanz-Blas, S.. Key drivers of internet banking services use. *Online Information Review*, *33*(4), 672–695, 2009

[39] Jerene, W., & Sharma, D. The adoption of banking technology and electronic financial services: evidence from selected bank customers in Ethiopia. *International Journal of Electronic Finance*, *9*(4), 310-328, 2019.

[40] Juwaheer, T. D., Pudaruth, S., & Ramdin, P. *Factors influencing the adoption of internet banking: a case study of commercial banks in Mauritius*. *World Journal of Science, Technology and Sustainable Development*Vol. 9, 204–234, 2012.

[41] Kaushik, A. K., Mohan, G., & Kumar, V. Examining the Antecedents and Consequences of Customers' Trust Toward Mobile Retail Apps in India. *Journal of Internet Commerce*, *19*(1), 1-31. 2020

[42] Safeena, R., Hundewale, N., & Kamani, A. Customer ' s Adoption of Mobile-Commerce A Study on Emerging Economy. *International Journal of E-Education, E-Business, E-Management and E-Learning*, *1*(3), 228–233, 2011.

[43] Dimitriadis, S., & Kyrezis, N. The effect of trust, channel technology, and transaction type on the adoption of self-service bank channels. *The Service Industries Journal*, *31*(8), 1293–1310, 2011.

[44] Teoh, W. M.-Y., Chong, S. C., Lin, B., & Chua, J. W. Factors affecting consumers' perception of electronic payment: an empirical analysis. *Internet Research*, *23*(4), 465–485, 2013

[45] Kim, J. A. E. Y., & Lee, H. S. (2013). Key factors influencing customer satisfaction in Korea's Mobile service Sector. *Journal of Internet Banking and Commerce*, *18*(3), 1–13, 2013.

[46] Van Deventer, M. (2019). Antecedents of Trust in Mobile Banking Amongst Generation Y Students in South Africa. *Acta Universitatis Danubius. Œconomica*, *15*(3).

[47] Yousafzai, S., Pallister, J., & Foxall, G. Multi-dimensional role of trust in Internet banking adoption. *The Service Industries Journal*, *29*(5), 591–605, 2009

[48] Shin, D.-H., & Shin, Y.-J. Consumers' Trust in Virtual Mall Shopping: The Role of Social Presence and Perceived Security. *International Journal of Human-Computer Interaction*, *27*(5), 450–475, 2011

[49] Chellappa, R. K., & Pavlou, P. A. (2002). Perceived information security, financial liability and consumer trust in electronic commerce transactions. *Logistics Information Management*.

[50] Mann, B. J. S., & Sahni, S. K. Profiling Adopter Categories of Internet Banking in

India: An Empirical Study. *Vision: The Journal of Business Perspective*, *16*(4), 283–295, 2013.

[51] Sánchez-Torres, J. A., Sandoval, A. V., & Alzate, J. A. S. (2018). E-banking in Colombia: factors favouring its acceptance, online trust and government support. *International Journal of Bank Marketing*.

[52] Thakur, R. What keeps mobile banking customers loyal?.*International Journal of Bank Marketing*, *32*(7), 628-646, 2014.

[53] Alalwan, A. A., Dwivedi, Y. K., & Rana, N. P. Factors influencing adoption of mobile banking by Jordanian bank customers: Extending UTAUT2 with trust. *International Journal of Information Management*, *37*(3), 99-110, 2017.

[54] Susanto, A., Lee, H., Zo, H., & Ciganek, A. P. User acceptance of internet banking in Indonesia: initial trust formation. *Information Development*, *29*(4), 309–322, 2013.

[55] Yap, K., Wong, D. H., Loh, C., & Bak, R. Offline and online banking – where to draw the line when building trust in e-banking? *International Journal of Bank Marketing*, *28*(1), 27–46, 2010.

[56] Morgan, R. M., & Hunt, S. D. (1994). The Commitment-Trust Theory of Relationship Marketing. *Journal of Marketing*, *58*, 20–38. 1994

[57] Ulaga, W., & Eggert, A. (2006). Relationship value and relationship quality Broadening the nomological network of business-to-business relationships. *European Journal of Marketing*, *40*(3), 311–327.

[58] Thakur, R. (2014), "What keeps mobile banking customers loyal?", *International Journal of Bank Marketing*, Vol. 32 No. 7, pp. 628-646

[59] Sharifi, S. S., & Esfidani, M. R. (2014). The impacts of relationship marketing on cognitive dissonance, satisfaction, and loyalty. *International Journal of Retail & Distribution Management*.

[60] Amin, M. (2016). Internet banking service quality and its implication on e-customer satisfaction and e-customer loyalty. *International Journal of Bank Marketing*, *34*(3), 280-306, 2016.

[61] Deb, M., & Lomo-David, E. An empirical examination of customers' adoption of m-banking in India. *Marketing Intelligence & Planning*, *32*(4), 475–494, 2014.

[62] Hair, Jr., J.F, Hult, G.T.M, Ringle, C.M., Sarstedt , M. (2014). A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM) Los Angeles. Sage

[63] Hair, Jr., J.F, Hult, G.T.M, Ringle, C.M., Sarstedt , M. (2017). A Primer on Partial Least Squares Structural Equation Modeling (PLS-SEM).Los Angeles. Sage

[64] Wei, T. T., & Chong, A. Y. What drives Malaysian m-commerce adoption ? An empirical analysis. *Industrial Management & Data Systems*, *109*(3), 370–388, 2009.

[65] Colesca, S.E. Increasing E-Trust: A soultion to minimize risk in E-Government adoption. Journal of Applied Quantitative Method, 4(1), 31-43, 2009.

[66] Yu, P. L., Balaji, M. S., & Khong, K. W. (2015). Building trust in internet banking: a trustworthiness perspective. *Industrial Management & Data Systems*, *115*(2), 235–252, 2015.

[67] Carter, L., Weerakkody, V., Phillips, B., & Dwivedi, Y. K. (2016). Citizen adoption of egovernment Services: Exploring citizen perceptions of online services in the United States and United Kingdom. Information Systems Management, 33(2), 124-140

[68] Wamba, S. F., Bhattacharya, M., Trinchera, L., & Ngai, E. W. Role of intrinsic and extrinsic factors in user social media acceptance within workspace: Assessing unobserved heterogeneity. *International Journal of Information Management*, *37*(2), 1-13, 2017

[69] Munusamy, J., De Run, E., Chelliah, S., & Annamalah, S. (2012). Adoption of retail internet banking: A study of demographic factors. *Journal of Internet Banking and Commerce*, *17*(3).

[70] Yousafzai, S. Y., Pallister, J. G., & Foxall, G. R. Strategies for building and communicating trust in electronic banking: A field experiment. *Psychology & Marketing*, *22*(2), 181-201, 2005.

[71] Yousafzai, S., Pallister, J., & Foxall, G. Multi-dimensional role of trust in Internet banking adoption. *The Service Industries Journal*, *29*(5), 591-605, 2009.

[72] Al-Majali, M., & Mat, N. K. N. (2011). Modeling the antecedents of internet banking service adoption (IBSA) in Jordan : A Structural Equation Modeling (SEM) approach. *Journal of Internet Banking and Commerce*, *16*(1), 1–15, 2011.

[73] Chandra, S., Srivastava, S., & Theng, Y.-L. (2010). Evaluating the Role of Trust in Consumer Adoption of Mobile Payment Systems : *Communications of the Association for Information Systems*, *27*(29), 561–588

[74] Kim, J. A. E. Y., & Lee, H. S. Key factors influencing customer satisfaction in Korea's Mobile service Sector. *Journal of Internet Banking and Commerce*, *18*(3), 1–13, 2013

[75] Zalloum, L., Alghadeer, H., & Nusairat, N. The Effect of Using Mobile Banking Services Applications on Electronic Word of Mouth:

The Mediating Role of Perceived Trust. *International Business Research*, *12*(9), 62-80, 2019.

[76] Singh, S., & Srivastava, R. K. (2018). Predicting the intention to use mobile banking in India. *International Journal of Bank Marketing*.

[77] Baabdullah, A. M., Alalwan, A. A., Rana, N. P., Kizgin, H., & Patil, P. Consumer use of mobile banking (M-Banking) in Saudi Arabia: Towards an integrated model. *International Journal of Information Management*, *44*, 38-52. 2019

[78] Yusr. Innovation capability and its role in enhancing the relationship between TQM practices and innovation performance. *Journal of Open Innovation: Technology, Market, and Complexity*, *2*(1), 6, 2016