E-Services Technology Based Influence on Banking Users

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Abstract: **The purpose of the study is to investigate the electronic based e-service channel on banking users. Focus is given to some selected banking service channels, in this context, the service channel are speed of delivery, convenience, efficiency, reliability & security are considered as service based technology channels. The methodology approach employed was the survey questionnaire administered to the respective users of the banking channels. Five hypotheses were formulated and tested using the Structural Equation Modeling-Partial Least Square (SEM-PLS). A survey of 248 valid questionnaire instruments, were collected from the customers of e-service banking users within Yola metropolis. Data obtained from the customers were analyzed using the SEM-PLS to determine the reliability and validity of the model. Besides, path coefficient and the degree of Influence on banks users were investigated. The findings indicate significant influence on banking users which can be categories as Small, Medium and Large Influence. The paper contributed to both theory & practice, the research developed a model, tested with a data obtained from e-banking users which enable the financial sector know the services they deliver to their customers**

Keywords: **E-Services, Technology & Banking**

I. INTRODUCTION

Today almost all the Nigerian electronic based services are automated; technology has contributed in transforming the Financial Institution. Consequently Technology has led to new innovative services, creating market opportunities and introducing new business information systems (Chang, Cheung, & Cheng, 2002). E-based services are electronic automated banking services which could be conducted without the help of the banking employees. The emergence of e-Services (Technology Based) has led to the innovation of new strategies for improving and facilitating customer satisfaction (Adewoye, 2013). E-based services are relatively novel way of transacting business serivices which is information system based, that enable users to transact services in vitual space (Shih & Fang, 2004, pp. 213-223). The automated e-services have much benefit to customers and users of the platform, which includes: convenience, lower turn-out of banks users etc.

There are various benefit of using e-services channel (Technology Based) which include; speed in service delivery, ease of use, reliability and efficiency which are also called service attributes of quality in evaluating business continuity (Lehtinen, 2010). A study of the relationship existed between Information Systems, as well as overall technological internet service quality (Rod, Ashill, Shao, & Carruthers, 2009). E-services channel have not well been investigated in the literature, although there is a relationship between electronic technology banking and Telecommunications Systems (White & Nteli, 2004). Self Service Technology Banking has over the years focus on providing more e-services than tangible services; furthermore, there has been a demand, provision of more services than the product in the global economy today.

The purpose of the paper is to investigate the e-services channels (Technology based) influence on banking users in a financial institution in Nigeria. Emphasis is given on what factors of e-Services channel that is associated with the service quality on banking users in the financial institution.

E-service channel in the banking sector has recorded a tremendous transformation with the use of self- service technology. There has been an in depth need for understanding the use of technological channels (Meuter, Bitner, Ostrom, & Brown, 2005). The proliferation of e-service channel across the service industry is apparent. Technology has also discovered an exceptional way of delivering a quality service to the users of the banking sectors (Financial Institution) (Muiruri & Ngari, 2014). Others scholars in the same field of study have investigated the Impact of Technology on mobile banking in Nigeria (Oluwatolani, Joshua, & Philip, 2011). Although their studies are streamline to a limited platforms of e-services such as internet banking, and other Information Systems infrastructures. The scholars were able to investigated the relationship between quality service measurement and the banking (Rod et al., 2009). This work will be guided by two theoretical models which are known as Attribute based model and the discrepancy Theory of Satisfaction in Information System (IS). This theories are relevance in this studies, this is because they were widely used in e-service channel service quality, customer satisfaction and Information System research. The purpose of the paper is to investigate the e-services channels (Technology based) influence on banking users in a financial institution in Yola Metropolis area of Adamawa State. Emphasis is given on what factors of e-services channel that is associated with the service quality in financial institution.

II. LITERATURE REVIEW

Meuter, Ostrom, Roundtree, and Bitner (2000) reported an increase in the number of financial institutions that were using

self-service technology such as Automated Teller Machines (ATM), phone/mobile banking and internet banking. All of these could be utilized on various independent channels to meet the customer needs without support from the bank staff. Similarly, user satisfaction in a business world, can be defined as a method by which services and products are supplied and delivered by industry in order to meet the customer's expectation. User satisfaction, could also be viewed as the feelings and judgment of quality service as experienced by the customers (Jamal & Naser, 2003). Service quality has been broadly studied within the field of Business Management and Management Information Systems (MIS) (Wang, 2011).

Service quality is defined as how customers evaluate a product or services, especially when customers show a positive motivation in consuming the product (Jun et al., 2004). Service quality is significant in service and information management, especially for financial institutions which are seen as encompassing different characteristics of skilled service transaction. On the other hand, in the traditional service encounter, service quality has now been replaced by technology use, because now most customers encounter new technology (Meuter, Bitner, Ostrom, & Brown, 2005). Another scholars says service quality has to do with lowering of cost, and improving of efficiency and security (Yang & Fang, 2004). In addition to that, In a similar study by Wang and Harris (2003) service quality and customer satisfaction are considered to be the central point of assessing how service is rendered by an organization to its customers, and which can be measured on a typical measuring scale. Service dimensions in the context of service quality can refers to the associated factors of Technology banking which influences customer satisfactions. The Attribute Based Model according to Dabholkar (1996) is an appliance for dimension of the service quality of e-services channels. This model is relevant because it has studied how the need of customer collaboration in using technological service impacts the customer's intention to use it (Yen, 2005). Discrepancy theory of research in Information Systems, provides a structure into the investigation of user satisfaction and expectation. It has been used broadly, most especially in information system research (Jiang & Klein, 2000). Customer satisfaction can be refers to as a "post choice evaluation which varies whether the user experience of using purchasing a specific good as it supposed to be, is a vital indicator of service quality" (Ardabili, Daryani, Molaie, Rasooli, & Kheiravar, 2012, pp. 8637-8643). Satisfaction can also result from successfully evaluating a stakeholder's skill concerning Information Systems and services (Wynne & Chin, 2000). The following section will discuss each of the hypotheses posited in this study.

Efficiency of Technology Self Service

Efficiency of self-service technology positively influences customer satisfaction. It has been proven by many studies Meuter, Ostrom, Roundtree, and Bitner (2000) who believe that service quality in TBSS improves productivity. Secondly Ombati, Magutu, Nyamwange, & Nyaoga (2010) explain that SST helps the customer to save time while others have found similar results in studies of retails banking and achievement of customer satisfaction. Efficient and fast self-service technology has been found to positively impact the user's choice of using self-service technology because it solves the user's problem Zeithaml et al. (2002). In support of this point Davis (1989) has found that customers are not unhappy about perceive waiting time if TBSS is found to be efficient. This explains our first hypothesis which is shown below.

H1: Efficiency of TBSSB has the ability to influence customer satisfaction in banking industry in Nigeria

Convenience of Technology Self Service

Convenience of self-service technology influences customer satisfaction. Ease of use of the technology will significantly influence users. According to (Davis, 1989; Meuter et al., 2000) the power of ease of use of technology adoption is closely related to the effort that the user makes in dealing with the complexity of the technology. Convenience is therefore an attribute of Technology based self-service banking (TBSSB). It relates to ease of use and to the effort the customer needs to make in order to succeed using the technology (Fernandes & Pedroso, 2016). Ease of use is also identified by customers as an important factor in ensuring customer satisfaction. Ease of use also relates to the amount of effort a customer puts to effectively use the system and perform the process service (Timmor & Rymon, 2008).

H2: Convenience of TBBS has the ability to influence customer satisfaction in banking industry in Nigeria

Speed of Delivery of Technology Self Service

Customers are very interested in using technology based self-service (TBSS). This is because it offers the best, fastest and reliable banking. When the technology self-service has fast and reliable delivery of service the transaction. The customers will spent a limited time to reliably use the system (Buell et al., 2009).Customers usually takes, and puts time into consideration. (Reinders et al., 2008) says speed of delivery provided by the technology service will make customers more willing to relate with the technology banking. Speed of delivery is therefore an essential factor in customer choice of a technology channels. This is because customers are particular concerned about saving time most of them will choose a self-service check-out that reduces the amount of time spent (Marzocchi & Zammit, 2007). Users will also prefer to take the shortest path to accomplish and deliver their services (Demirci & Kara, 2014).

H3: Speed of delivery of TBSS has the ability to influence customer satisfaction in banking industry in Nigeria

Reliability of Technology Self Service

Reliability is a substantial element in influential the quality of service. If the technology is reliable and convenience it would

influence customer satisfaction (Davis, 1989; Prabtibha A. Dabholkar, 2002; Zeithaml et al., 2002). Customers are advised precisely on how to handle system failure because of the risk related with the use of TBSS (Parasuraman et al., 2005). Reliability of SST is one of the most significant characteristics for customer evaluation of service quality (Kumar & Bose, 2013). Reliability is the measure by which the customer accurately assesses technology service delivery. Reliability is an important component of quality service which influences customer satisfaction (Parasuraman et al., 2005). This explains the hypothesis below.

H4: Reliability of TBSSB has the ability to influence customer satisfaction in banking industry in Nigeria

Security of Technology Self Service

Security and control influences customer satisfaction. when customers perceive technology based self-service is secure they will be confident (Dabholkar et al., 2003). Control is another essential measure of TBSS quality, and acceptability in relation to customer satisfaction. Security is also an essential determinant of TBSS quality. Security is of great concern for customer satisfaction. Customers are always satisfied with the technology that gives them full control (Fernandes & Pedroso, 2016). Security is essential in evaluating the impact of self-service technology on customer satisfaction (Yen, 2005). This explains the hypothesis below

H5: Security of TBSSB has the ability to influence customer satisfaction in banking industry in Nigeria

III. MATERIALS AND METHODS

A quantitative method was used for the current study to obtain data which was used for analysis of validity and trustworthiness. Data was collected through survey questionnaires of the selected five retail commercial banks in Jimeta metropolitan area of Adamawa State. Data was collected from the sampling population of the study; we used a few selected financial institutions which are Fist Bank, Zenith Bank, Fidelity Bank, Guaranty Trust Bank and Union Bank. Purposive sampling techniques were used. The data was empirically collected through survey questionnaire. The collected data was analyzed using the Statistical Package for Social Science (SPSS) for descriptive analysis. Also we used Partial Least Square Structural Equation Modeling (PLS-SEM). Using purposive sampling techniques to understand users experience was systematic purposeful and answerable. The purpose of this empirical investigation is therefore to obtain reliable and valid data in accordance with the purpose of the study. For the purpose of this research, the investigator uses an empirical study involving a questionnaire survey. This is to gain an understanding into the typical experiences of the participant in order to arrive at sound conclusion. In the current study the researcher was able to conduct the study using related literature and empirical research. The researcher studied the complexity and the nature of the research problem, and the research question. This enable the researcher have understanding into the purpose of the research and the design, and to meet the requirement of the research objectives. For this reason a quantitative research was used. We used the formula below, which is borrowed from Krejcie and Morgan (1970) to determine the required sample size needed for our study. We used a confidence level of 95% with a confidence level (margin error) of .5% from a total population of 700 to get 248 participants for our analysis. We used a five-point Likert scale ranging from strongly disagrees (1) to strongly agree (5). The collected data was analyzed using SPSS for descriptive analysis and the Partial Least Squares Structural Equation Modeling (PLS-SEM). To determine the reliability and validity of the model. Besides, path coefficient and the degree of Influence on banks users were investigated. We can also manually compute using the below mathematical formula.

Using the formula to calculate the sample size

$s = X^2NP(1 - P) \div d^2(N - 1) + X^2P(1 - P)=(3.841)\times(700)\times0.50(1-0.50)\div(0.05)^2 \times(700-1)+(3.841)\times0.50(1-0.50)=248$ (Krejcie & Morgan, 1970)

s=denote required sample size=248 participants

X^2=denote the table value of chi-square for 1 degree of freedom at desired confidence level of (3.841)

N=denote population size=700

P=denote population proportion (assumed to be .50 since this would provide the maximum sample size).

d=denote the degree of accuracy expressed as a proportion (.05).

IV. STRUCTURAL EQUATION RESULT AND INTERPRETATION

Structural Equation Modelling (SEM) is a "multivariate data analysis "second generation analysis software" Sarstedt et al. (2014, pp. 105-115). It measures the relationship between the variables, and determines the relevance of path the coefficients. Scholars in the field of information systems, industry and marketing, mostly use this software. Majorly the software is used for analysis. "It is a multivariate data analysis method that can be used to test theoretical supported linear and additive causal models"(Chin, 1998, pp. 295-336). There are two applications in structural equation modeling, the inner model interpretation and the outer model representation. "The inner model specifies the association between the dependent, and the independent latent variable; the outer models on the other hand, specify the association between the latent variables and their observed indicator. In SEM; variables are also called exogenous and endogenous" (Hair, Ringle, & Sarstedt, 2013, pp. 1-12). Distinct approaches can be applied to SEM the first and most importantly used is the "co-variance-based SEM (CB-SEM), which can be achieved with AMOS, EQS LISREL & M-plus. The second approach is

called Partial Least Squares (PLS); this focuses on the application and is used for variance such as SMART-PLS, WARP-PLS, and GRAPH-PLS. It can also be achieved with the use of the "r" statistical software package" (Hair, Ringle, & Sarstedt, 2013, pp. 1-12)

For the purpose of the study, we have chosen to use the second generation approach known as Partial Least Squares (PLS). Are Multiple analysis of the variables was conducted in order to report the result using SEM. The relationship between the constructs was analyzed using the software SEM-PLS for regression determination and analysis of R^2 of the path modeling coefficient algorithm in the model. The SMARTPLS is the latent variable technique used for modeling which comprises both construct and also recognizes measurement error (Sarstedt et al., 2014). We then analyzed the result in two forms, using the SMARTPLS. We inferred the measurement model and the structural model, which was interpreted in the final stage. We then determined the relationship between the variables factor, we assessed the validity and reliability of each of the constructs in the model. This was done in order to make sure only the valid variables were estimated. The below Figure 1 & 2 depicted the outer loadings of the analysis.

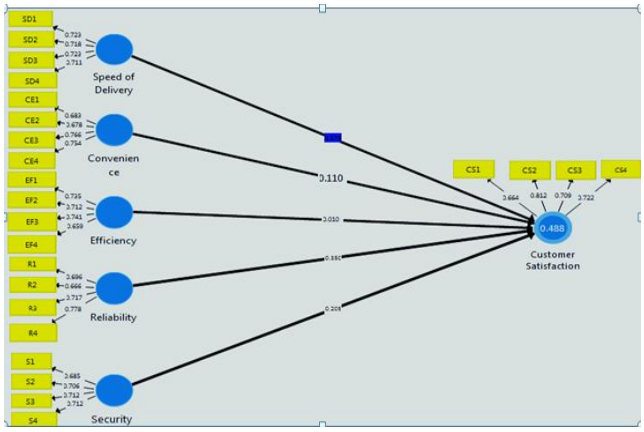

Figure 1, Initial Path Model

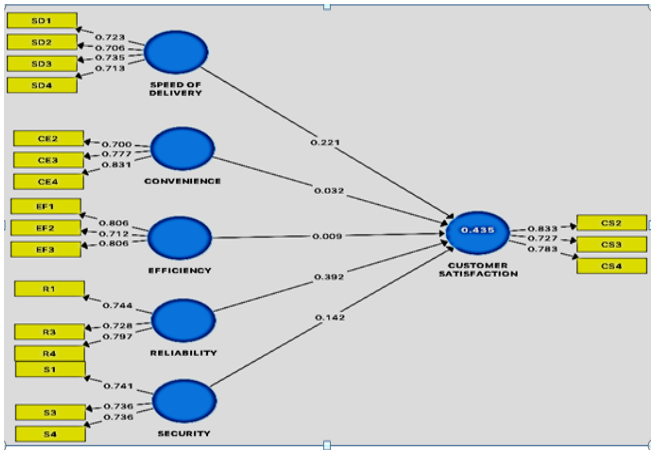

Figure 2, Final Path Model

V. DETERMINATION OF THE PATH COEFFICIENT AND STRUCTURAL RELEVANCE RELATIONSHIP

Table 1: Shows T-Statistics of Path Coefficient of Inner Model

Variables Indicators	Original Sample (O)	Sample Mean (M)	Standard Deviation (STDEV)	T Statistics (|O/STDEV|)	P Values
CONVENIENCE -> CUSTOMER SATISFACTION	0.032	0.030	0.110	0.290	0.772
EFFICIENCY -> CUSTOMER SATISFACTION	0.009	0.020	0.091	0.095	0.925
RELIABILITY -> CUSTOMER SATISFACTION	0.392	0.385	0.077	5.119	0.000
SECURITY -> CUSTOMER SATISFACTION	0.142	0.146	0.079	1.805	0.071
SPEED OF DELIVERY -> CUSTOMER SATISFACTION	0.221	0.221	0.082	2.675	0.008

***: $p < 0.001$; **: $p < 0.01$; *: $p \leq 0.05$; *t-statistic acceptable vale >1.96 significance level*

In SEM-PLS we analyzed and tested the hypothesis, and the model structure which enabled us to calculate for path coefficient. Smart PLS software does not require a normal distributed data. It is calculated and evaluated with R^2 for the dependent latent variables. That helps to compute how well the model fits the relationship hypothesized and the average variance extracted (Fornell & Larcker, 1981). We then conducted a bootstrapping of five thousand samples (5000) to generate the t-statistic (Sarstedt et al., 2014). The table: 7 below show the significance of the path coefficient. The estimated t-values are shown with their path coefficient. The t-statistics of the inner model was tested using two-tailed test, with the significance level of >1.96. We used the results above to statistically determine the significance of the path model. We also determined the significant relationship, and assessed the relevance of that significance (Hair et al., 2013).

Looking at the relative importance of the exogenous construct in predicting the dependent construct, efficiency of service has the most significance at (0.925), followed by convenience at (0.772). Reliability has no relevance; it shows (0.000) but security generated (0.071), followed by speed of delivery which had (0.008). Also we can examine the significance of total effect from the bootstrapping output. From the table above, the t-statistics for the total effect indicates that reliability and speed of delivery are statistically significant.

VI. DETERMINATION OF RESULT/HYPOTHESIS TESTING (REGRESSION ANALYSIS $R^{2)}$

The regression analysis is used to determine the R^2 of the endogenous variable. We run bootstrapping to determine the path coefficients significance. Bootstrapping helped us to select mean replacement form for missing data (Sarstedt et al., 2014). A sample size of 5000 was chosen. The result however indicated that there is 44% variance of R^2 in customer satisfaction, which is explained by the TBSSB attributes.

To test the hypothesis relationship between the construct of the structural path coefficient, we used a two-tailed test. This was done at >1.96 significance level, to determine the significance and relevance of the structural relationship. For each of the constructs, the t-statistics values must be larger than 1.96 Gye-Soo (2016), for it to be significant. The

relationship between speed of delivery and customer satisfaction was significant with β= 0.772, and t=2.675 (table value is 1.96 at >1.96 significance level). This indicates that the speed of delivery has significance on customer satisfaction, with a coefficient of 0.772. The relationship between convenience and customer satisfaction was insignificant at β=-0.925 and t=0.290 (table value is 1.96 at >1.96 significance level). This indicates that convenience was insignificant on customer satisfaction, with a coefficient of 0.925. The relationship between efficiency and customer satisfaction was insignificant with β= 0.000 and t=0.095 (table value is at 1.96 at >1.96 significance level), this indicates that efficiency was insignificant on customer satisfaction with a coefficient of 0.000. The relationship between reliability and customer satisfaction was significant with β=0.071 and t=5.119 (table value is 1.96 at >1.96 significance level), this indicates that reliability has significance on customer satisfaction. The relationship between the security and customer satisfaction was significant at the level of β= 0.008 and t=1.805 (table value is 1.96 significance level).

This indicates that security has a positive significance on customer satisfaction with a coefficient of 0.198. Out of the five path coefficients for the structural model, two paths were successfully supporting the hypothesis, which are speed of delivery and reliability. The two variables have significant influence on customer satisfaction, thus H1 and H4 were accepted. However, security, convenience and reliability have no significant influence on customer satisfaction, thus H2, H3 and H5 were not supported.

Table 2, Summary of Hypothesis Testing

NO	Relationship Between Variable		Path Coefficient	T-statistics	Description
1	Speed of delivery	Customer Satisfaction	0.772	2.675	**significant**
2	Convenience	Customer Satisfaction	0.025	0.290	**Insignificant**
3	Efficiency	Customer Satisfaction	0.000	0.095	**Insignificant**
4	Reliability	Customer Satisfaction	0.071	5.119	**Significant**
5	Security	Customer Satisfaction	0.008	1.805	**Insignificant**

VII. DISCUSSION OF RESULT

From our result of the path coefficient we examine their significance from the bootstrapping option. Our result shows the hypothesized relationship of the five constructs. Recall that speed of delivery which is H1= t-statistics (2.675) was found to be significance and therefore acceptable. Reliability of self-service technology with H4= t-statistic (5.119) was found to be of structural significance with the test, thus the hypothesis was accepted. Looking at the relative importance of the exogenous drivers construct in predicting the endogenous construct, Convenience (CE= 0.925), was found to be the most important, followed by speed of delivery (SPD=0.772). We also see that reliability and security of service have very little influence on the endogenous variable customer satisfaction while efficiency has no influence at all (EFF= 0.000).

Assessing the level of R^2 of the endogenous variable which is (0.435), indicates 44% of customer satisfaction variance is explained by the associated service quality of TBSSB which are the predictor exogenous variables. We also report the relevant impact of each of the predictor constructs on endogenous variables. Our result shows that; H1 which is Speed of delivery had a small relative impact on customer satisfaction, H2 which is convenience had a relatively small impact on customer satisfaction, while H3 which is efficiency had a small impact on customer satisfaction, and H4 reliability had medium relative impact on customer satisfaction. Finally H5 which is security had a large relative impact on customer satisfaction.

VIII. SUMMARY RECOMMENDATION AND CONCLUSION

Structural Equation Modeling Partial Square (SEM-PLS) was used to test the hypothesized theory we in investigated e-services technology Influence on banking users and the associated factor with the service quality channel their influence on users of the banking system in retail banking environment

H1= t-statistics (2.675) was found to be significance and therefore acceptable. Reliability of self-service technology with H4= t-statistic (5.119) was found to be of structural significance with the test, thus the hypothesis was accepted. Looking at the relative importance of the exogenous drivers construct in predicting the endogenous construct, Convenience (CE= 0.925), was found to be the most important, followed by speed of delivery (SPD=0.772). We also see that reliability and security of service have very little influence on the endogenous variable customer satisfaction while efficiency has no influence at all (EFF= 0.000). Our result shows that; H1 which is Speed of delivery had a small relative impact on customer satisfaction, H2 which is convenience had a relatively small impact on customer satisfaction, while H3 which is efficiency had a small impact on customer satisfaction, and H4 reliability had medium relative impact on customer satisfaction. Finally H5 which is security had a large relative impact on customer satisfaction.

Structural Equation Modeling Partial Least Square (SEM-PLS) was used to test the theory as well as the hypothetical variables. We investigated the association and the impact on the TBSSB service quality on customer satisfaction. The result of the hypotheses association testing shows that speed of delivery and reliability of TBSSB service quality, have significant impact on customer satisfaction. Also, in the determination of relevance impact of exogenous variable (predictor) on endogenous variable, the result of the F^2 test of relevance impact shows that “speed of delivery, convenience and efficiency” have a small impact on customer satisfaction

while reliability has medium impact and security has a large impact on that endogenous variable.

These research findings are important contributions to financial institutions, in decisions concerning aspects of e-service technology, retention, which will ultimately influence customers' uptake of the technology service option. The Reliability and Security aspect of the technology would ensure further gains and profitability in financial sector. The findings of this research are consistent with the findings by Bebli (2010), that speed of delivery, ease of use, reliability all positively correlated and significant. Fernandes and Pedroso (2016) also shows service attributes positively impact user perception of service quality, the work conclude that speed of delivery using the service and ease of user as the important attributes.

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