Empirical Validation of Online Features in the User Acceptance of Internet Banking Websites

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Abstract: - Internet banking was introduced in the developed countries around the 1980s whereas in developing countries like Nigeria, it only started around the year 2000. This study focuses on investigating the online features of Internet banking websites of Nigerian banks and the impact of their relationships with the acceptance behaviors of users from an information systems (IS) view. The empirical results obtained from a sample survey of 55 Internet banking users indicate that technology acceptance model (TAM) is an appropriate model for use in forecasting the acceptance behaviors of Internet banking customers. It also indicates that online features have positive effect on customer's perceived usefulness, attitude and behavioral intension to adopt Internet banking websites.

Key-Words: - Online features; Internet banking websites; Technology acceptance model; Internet banking, E-banking

1 Introduction

The rapid development and growth of mobile communication networks and the Internet has triggered the adoption of both mobile commerce [1], [2] and electronic commerce in general, giving rise to various means of carrying out commercial transactions through the use of the Internet especially in developing countries. In developing regions like Africa, the amount of mobile phone users outnumber the amount of PC users and bank account holders [3], this implies that the number of mobile banking users will tend to grow [4] thereby enhancing the adoption of e-banking in developing countries. The increasing demand on the use of the Internet in carrying out commercial transactions in Nigeria has encouraged the banking sector to invest heavily in technological infrastructure [5] thereby improving e-banking systems in order to meet up with increasing customer populations and corresponding financial demands. All the existing commercial banks in Nigeria now provide Internet banking websites and other forms of e-banking platforms.

As there are many commercial banks in Nigeria providing e-banking services, we envisage a competition between e-banking providers. Banks in Nigeria are also faced with the challenge of dealing with customer requirements in the case of Internet banking in order to provide optimum services. The acceptance of e-banking in developing regions is still uncertain with [4] pointing out that there are no known actual figures or statistics of mobile banking users in Africa. However, the opportunities of the system growing in under-developed regions are enormous. Several works in the literature of electronic commerce investigated and reported factors that are capable of influencing the satisfaction of users and their usage of Web-based shopping centers. In [6], Web quality factors were generally discussed and also in [7], [8], [9], the success model based on the success factors of Web-based shopping centers was equally presented. We borrow some of the outcomes of these studies into the e-banking domain because it is very similar to the Web-based shopping centers. We specifically base our work on Information Systems (IS) opinions [10], [11], [12], [13], [14] which includes the fact that customer acceptance behaviors can be predicted

by exploring the technical specifications of a system via constructs like service quality, system quality and information quality.

To this end, in our study, we first carry out an empirical exploration of the online features of Internet banking websites from the point of view of IS. Secondly, we explore the relationships between the online features and behavioral acceptance of customers via path coefficient analysis using technology acceptance model (TAM) as the theoretical basis for the exploration. We focus on how each online quality factor relates with TAM's individual constructs.

2 Technology Acceptance Model

In order to understand the user acceptance behaviors of different forms of technologies, several acceptance models have been developed with the technology acceptance model (TAM) [15] being widely and commonly used to investigate user acceptance of various forms of Internet technology driven applications. TAM opines that the use of a system is influenced by user's behavioral intention to use the system and this behavioral intension is in-turn influenced by user's attitude to use the system. As we mentioned earlier, Internet banking websites constitute a Web system which enables customers to complete certain financial transactions as they will normally do in a traditional banking setting. Since there is no face-to-face interaction between the bank's service desk and the customer, the only medium of communication is the user interface provided by the website. It is therefore not out of context to seek to understand customer's requirements and expectations from their use of the Internet banking platform in order to serve them better. A customer's positive attitude towards using the Internet banking website significantly and positively influences his behavioral intention to continue using the website.

Previous studies have adopted the TAM in understanding technology acceptance among users especially in the domain of Internet technology-driven applications in recent times [11], [12], [14], [16], [17], [18]. However, this has seen TAM being extended to include other external constructs. Wu and Wang [2] integrated the extended technology acceptance model (TAM2) [19] with the innovation diffusion theory (IDT), risk and cost in order to

study the acceptance of mobile commerce. Wu and Chen [20] extended TAM by integrating it with the Theory of Planned Behaviour (TPB) in order to study the acceptance of online tax in Taiwan.

As aforementioned, TAM has been subjected to several modifications that gave birth to different models. Some of these modifications revolve around the inclusion of external constructs or variables that IS researchers argue can further develop TAM and make it more sustainable. For instance we mentioned that online quality features such as information quality, system quality and service quality have been used as external constructs to successfully explore user acceptance behavior via TAM. Therefore, adopting TAM as a model and as a theoretical foundation towards exploring the acceptance of Internet banking websites in Nigeria is a justified approach since TAM allows the introduction of external variables in determining user acceptance of technology.

3 Conceptual model development

Figure 1 presents our extended research model. The model was originally proposed by Ahn et al. [14] to include offline features. Based on our contextual study, we removed the offline features. The research model is a combination of the well-known technology acceptance model (TAM) as established by Davis [15] and online features as developed and validated in [1], [13], [14], [20]. For the purpose of this study, we have relied on the original constructs of TAM such as perceived ease of use (PEOU), perceived usefulness (PU), attitude and behavioral intension to Use (BIU) in investigating the relationships between external variables and customer's acceptability of Internet banking websites. Unlike in [14], where the TAM model was used to validate the online and offline features of Internet shopping malls, we set out to validate only the online features which are based on information systems research views in the domain of E-banking and in a Nigerian context. The offline features which are based on marketing research views are not applicable in this context and therefore excluded. The basis of the research analysis is the Nigerian user of E-banking and our sample population includes all categories of people who transact with various E-banking website providers.
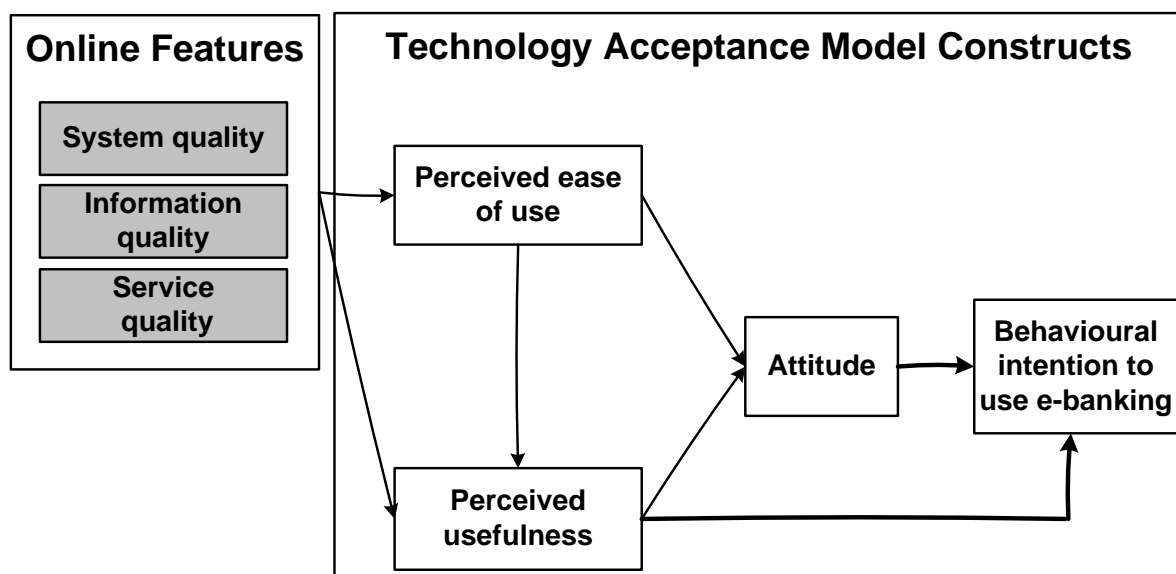
Fig.1. Proposed conceptual model (Adapted from [14])

3.1 The Measurement Development

In the collection of data for the constructs of the underlying research model, we used a questionnaire. The measurement items in the questionnaire were based on the seven-point Likert scale. In [1], [13], [21] the measurement items for the Web quality constructs were developed and validated as the key instruments for measuring the online features.

In order not to reinvent the wheel in the assessment of the measurement items, we adopted almost all the sample measurement items presented by Ahn et al. [14] which had already gone through vigorous and thorough evaluation process undertaken by IS professors and passed. We however rephrased the statements in the questionnaire to reflect our domain and also removed few sub-measurement items that had a lower reliability score based on our small sample data. The original TAM constructs and other related measurements were equally adopted from related studies such as [11], [12], [14], [15]. The final questionnaire was made up of 40 measurement items which are measuring the variables under consideration. Table 1 shows the final questionnaire for online quality factors.

3.2 Online Survey

Since we intend to undertake a wider study which would enable us make a more meaningful generalization of the case of Nigeria as we would be targeting Nigerian online users after this current pilot study is concluded, we employed a Web-based survey for this study using Lime Survey tool. The online survey enabled to recruited respondents

across the country who have actually engaged in Internet banking. We targeted all commercial banks in Nigeria that provide e-banking services. The questionnaire opens with a set of instructions to guide the respondents. Respondents were specifically asked to respond to all the statements based on their individual e-banking experiences. They were also instructed to respond to the statements using the Likert scale of 1-7; where 1 corresponds to "strongly disagree" and 7 corresponds to "strongly agree".

A total of fifty five (55) respondents were recruited, resulting in 55 recorded cases and with no missing values. The cases were first harvested from Lime Survey into a CSV file. The CSV file was then imported into SPSS for initial data pre-processing. The resulting data was then saved as an SPSS file for onward importation into LISREL 9.2 for actual data analysis. Due to the small sample involved, analysis with LISREL software was deemed inappropriate [22], [23]. We however relied on SPSS and AMOS for data analysis. About 61 percent of the respondents were male. Majority of the participants were between the ages of 20-29. The data collected is a reflection of the opinions of actual users of e-banking.

We found that majority of the participants are civil servants and students who mainly use the Internet to do e-banking at home and in the office. The difference between participants who do e-banking at home or the office is negligible. Most of the respondents have a considerable degree of Internet experience of over 4 years and the two most preferred e-banking channels of choice are the ATM and Internet banking followed by mobile banking. The most preferred e-banking provider of choice is

Table 1 Principal constructs and measurement items (Adapted from [14])

Constructs	Measurement item(s)	Statement(s)
System quality	Design	The E-banking Website has an appropriate style of design for business type
	Navigation	The E-banking Website has an easy navigation to information
	Response time	The E-banking Website has fast response and transaction processing
	System security	The E-banking Website keeps transactions secure from exposure
	System availability	I can use the E-banking Website when I want to use it
	Functionality	The E-banking Website has a good functionality relevant to site type
	Error free transaction	The E-banking Website keeps error-free transactions
	Multimedia	The E-banking Website provides an appropriate video-audio presentation
Information quality	Contents variety	The E-banking Website has sufficient contents which I expect to find
	Complete information	The E-banking Website provides complete information
	Detail information	The E-banking Website provides detailed information
	Accurate information	The E-banking Website provides accurate information
	Timely information	The E-banking Website provides timely information
:	Reliable information	The E-banking Website provides reliable information
	Appropriate format	The E-banking Website communicates information in an appropriate format
Service quality	Responsiveness	The E-banking Website anticipates and responds promptly to user request
	Reliability	The E-banking Website can be depended on to provide whatever is promised
	Confidence	The E-banking Website instils confidence in users and reduces uncertainty
	Empathy	The E-banking Website understands and adapts to the user's specific needs
	Follow-up service	The E-banking Website provides follow-up service to users
	Competence:	The E-banking Website gives a professional and competence image

Guaranty Trust Bank followed by First Bank and Diamond Bank, both of which share equal percentage.

4 Results

The conceptual model was analysed using IBM's SPSS Statistics 20 and IBM's SPSS AMOS 23 software. Maximum likelihood approach was used in estimating the research model. We performed data analysis in two phases. In the first phase, the measurement model was subjected to a critical examination and validation. In the second phase, we performed a structural equation model analysis which is supported in SPSS Amos via path coefficient analysis. This is in order to test the relationships between the constructs in the research model.

4.1. Measurement Model

Our sample data was tested for suitability for factor analysis and the result showed a KMO and Bartlett's

test values which were below the recommended values. This again we attributed to the small sample size involved. Exploratory factor analysis (EFA) and LISREL analysis was therefore discontinued. We hope to employ LISREL analysis in our future wider study that will accommodate a larger sample size.

A reliability test is usually given as a measure of the degree of consistency between measurement items corresponding to a scale [24]. We used Cronbach's alpha coefficient to measure the internal consistency of the scale. According to Nunnaly et al. [25], a reliability score of 0.70 can be accepted as a minimum though Lance et al. [26] argued that this acceptable minimum can also be misleading. A review of past literature shows 0.70 is the most common acceptable minimum score and we have adopted it as a standard in this study. Due to the small sample size and also low item-total results, we dropped the following measurement items: SYSQ8 (multimedia) for system quality, PEOU5 (mental effort) for ease of use construct, and lastly PU4 (saves money) for perceived usefulness. All

constructs indicated a reliability of between 0.80 and 0.90 except service quality which has 0.75. The reliability of the scale was therefore found to be sufficient.

4.2 Structural Model

Given the success of the reliability test, we proceeded with path coefficient analysis to test the general model fit. Table 2 presents a summary of the overall model fit indices for the proposed research model. Again, due to the small sample size, we did not expect our Chi-square value to be high. A $\chi2$ value of 19.329, with 7 degrees-of-freedom and at a significance level of 0.007 was obtained. This is considered significant. The values for GFI, CFI and NFI were above the recommended value of 0.90. The RMSEA, AGFI and TLI values were at their marginal acceptable levels. For a small size of ours, we believe they should be acceptable. It is worthy of mentioning that SPSS AMOS has the capability of suggesting significant relationships between constructs in order to produce a perfect model based on the sample data. This is usually given in the

modification indices. A significant relationship was found between system quality and attitude. We effected this suggestion and the outcome is what is summarized and presented in Table 3. A $\chi2$ value of 7.761, with 6 degrees-of-freedom and at a significance level of 0.256 was obtained. A p-value of <0.05 is usually recommended. The GFI, NFI, TLI and CFI values were all above the recommended value. We note that the RMSEA for this computer suggested perfect model is 0.074. According to the indices obtained, there is however, no significant difference between our model and the AMOS's suggested model.

4 Discussion

First, there is quite no significant difference between our model and AMOS's suggested model fit. Following from the structural model, we deduce the following; system quality indicates a strong relationship with perceived usefulness (β=0.27, $p<0.01$) and perceived ease of use (β=0.19, $p<0.01$),

Table 2 Fit indices for the structural model

Measure	Research model	Acceptable cut-off values [27]
Absolute fit measures		
Chi-square ( )	19.739	Better to be lower
Degrees of freedom	7	
Significance level	.007**	
Goodness-of-fit index (GFI)	.919**	>.090
Root mean square residual (RMSR)	.181*	<.08
Baseline comparisons	.677*	>.090
Adjusted goodness-of-fit index (AGFI)	.917**	>.090
Normed fit index (NFI)	.824*	>.090
Tucker-Lewis index (TLI)	.941**	>.090
Comparative fit index (CFI)		
Parsimony-adjusted measures	.306*	Higher values are better
Parsimony normed fit index (PNFI)	.314*	Higher values are better
Parsimony comparative fit (PCFI)		

Acceptable thresholds: *(marginal), **(acceptable)

Table 3 Fit indices for the structural model after SPSS AMOS suggested adjustment

Measure	Research model	Acceptable cut-off values [27]
Absolute fit measures		
Chi-square ( )	7.761	Better to be lower
Degrees of freedom	6	
Significance level	.256	
Goodness-of-fit index (GFI)	.963**	>.090
Root mean square residual (RMSR)	.074**	<.08
Baseline comparisons	.825*	>.090
Adjusted goodness-of-fit index (AGFI)	.966**	>.090
Normed fit index (NFI)	.971**	>.090
Tucker-Lewis index (TLI)	.992**	>.090
Comparative fit index (CFI)		
Parsimony-adjusted measures	.276*	Higher values are better
Parsimony normed fit index (PNFI)	.283*	Higher values are better
Parsimony comparative fit (PCFI)		

Acceptable thresholds: *(marginal), **(acceptable)

information quality has strong positive influence on perceived usefulness ((β=0.23, p<0.01) and a rather negative influence on ease of use (we expected the reverse). Service quality has significant influence on perceived usefulness (β=0.18, p<0.01) and a positive relationship with ease of use (β=0.14, p<0.01). System quality shows a slightly higher impact on usefulness and behavioral intention to use internet banking out of the entire external variables considered. This impact rate is quite insignificant when compared with information quality. The results obtained shows that system quality, information quality and service quality mediated by ease of use indicates a strong influence on usefulness, which in turn shows a strong influence on attitude and behavioral intention to use e-banking websites.

The results so far obtained indicate that Interne banking users have identified with online features of Internet banking websites in the e-banking domain, and this is consistent with similar research reported in [14]. In the e-banking domain, the bank's client acts as a system user. The online features of any e-banking website play a very significant role in determining the behavioral intention of customer's continuous use of the Web platform for financial transactions.

Based on our small sample data and the results obtained, TAM produced outcomes which are quite consistent with testing the behavioral intention of bank customers to use e-banking websites. The attitude towards using Internet banking for example, has a great impact on user's behavior to use e-banking websites. User's attitude is mediated by his or her perceived ease of use and perceived usefulness. We obtained path coefficients of 0.46, 0.68 and 0.27 between ease of use and usefulness, usefulness and attitude, and between usefulness and behavioral intention to use. These results are consistent with the submissions of Lin et al. [12] and Ahn et al. [14], thereby confirming that perceived usefulness has a greater and significant relationship with perceived ease of use, and perceived ease of use has a greater and significant impact on perceived usefulness. By implication, perceived usefulness will continue to remain a major determinant of e-banking website usage while perceived ease of use will indirectly affect user's intention to use e-banking websites. We therefore deduce that perceived usefulness is influenced by perceived ease of use. In the same vein, users who find it easy to use e-banking websites will equally find e-banking websites very useful.

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