The Impact of User Demographics on the Perceived Satisfaction and Comfort of use of M-Banking Apps

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Abstract: One of the most trending and current technological innovations in mobile commerce today is mobile banking or m-banking for short. Notably, the ever growing market for mobile phone have led to a consequent parallel mounting opportunities for the growth and saturation of m-banking enterprises with lots of accruing business dividends following. This notwithstanding, the m-banking apps' usage context presents pronounced challenges particularly with regard to usability in mobile context and to the apps acceptability and comfort in use. The uniqueness features of mobile phones such as non-traditional input method, limited memory space and battery life, smallness of screen size among others, make usability very complex, hard and difficult and thus, negatively impacting users' perceived satisfaction, enjoyment, comfort of use and usability of the m-banking apps' interfaces. In the design, service and evaluation of mobile phones, usability is counted as a central issue. This is because users access and use a range of functions and features in an app through the obviously limited user interface regularly whilst they are on the move (or busy doing other activities). These usability challenges by implication have effect on the users' perceived satisfaction and the comfort of use of these apps. This paper reports on a study of comfort-of-use and perceived satisfaction for three banks in Nigeria by users of m-banking apps. In the study, the effect or influence of user demographics such as age, experience, education and gender, on the users' comfort of use and on their perception of satisfaction about the usability of m-banking apps were assessed and evaluated. The study was triggered because of the scarcity of studies related to this very important domain. This study's data was captured online via an online-based survey. The study's outcome reveals that these demographics have significant impact on the comfort of use and the perceived satisfaction and usability of m-banking apps. These results will ultimately assist banks in improving on their m-banking apps so as to capture, sustain, and enhance their customers' loyalty and patronage and improve their revenue standing, return on investment and overall competitive advantage.

Keywords: Application Usability, Mobile Banking, User Satisfaction.

I. INTRODUCTION

Mobile banking or m-banking evolved naturally from electronic banking and is an aspect of mobile commerce or m-commerce (Mohammadi, 2015). It is currently one of the most pervasive mobile innovative technologies that have mobility as its prevailing characteristics paving the way for a more efficient and effective mode of delivery of bank services to the teeming banking customers (Mohammadi, 2015). In fact, older banking methods or channels such as traditional counter channels, internet banking, automatic teller machines (ATMs), and telephony along with other traditional banking channels provide somewhat efficient services, but these channels do not address the needs of moving bank users (i.e., mobile or transit users). Hence, mobile banking provides users the privilege of doing banking business in a mobile context, i.e. whenever and wherever they are on the go (Shaikh & Karjaluoto, 2015). Within the context of mobile banking, users can perform transactions related to banking while on transit or while at the same time doing other tasks. Although this channel of banking has its problems and challenges, it still has some huge intimidating benefits. With it, bank users and customers are offered, timely banking facilities such as monitoring and finding ATM locations, account management, bill payment, money transfer and information inquiry, etc (Afshan& Sharif, 2016). In fact, mobile banking makes it unnecessary to travel and queue to bank branches or ATM locations and therefore offers a lot of convenience to bank customers (Afshan & Sharif, 2016). Users enjoy values such as usage fun, time optimization, immediate information, instant connectivity, convenience, high interactivity, appeal, and ubiquity (Malaquias & Hwang, 2016). All of these advantages have the potential to improve customer satisfaction, positive user experience and loyalty. Using mobile banking, users can do their banking transactions while on the go, at anytime and anywhere, and can quickly connect to banking services using mobile devices to ease their use. Banking services are immediately and interactively provided and offered (Gu et al., 2009). Mobile banking channel improves banks ' operational efficiency and quality of service delivery. It also reduces the service cost of running the banks. Consequently, in addition to being attractive to customers, mobile banking is also in like fashion very attractive and appealing to banks as well (Afshan& Sharif, 2016; Shaikh &Karjaluoto, 2015).

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Mobile banking is likely to improve banking customers ' quality of life and promote bank efficiency (Malaquias & Hwang, 2016). The improved service delivery and the corresponding improved customer satisfaction caused by mobile banking will help to maintain bank customers ' retention, attract new customers and also allow banks to remain competent. In addition, this will result in improved profitability, return on investment, increased market share capital, and a reduction in the cost of failure, price elasticity, reduction in business costs and the cost of attracting new customers to the bank (Bayraktar et al., 2012). In addition, the context of mobile banking also suggests that mobile devices such as smartphones, mobile phones, tablets and personal digital assistants (PDAs) are used as transaction media. Small mobile or portable devices are portending issues and challenges that can affect user satisfaction, user experience of mobile banking users, and usability and convenience of mobile banking applications. These challenges and issues include: poor / limited connectivity, mobile context, small screen size, reduced display resolution, limited processing capability, limited memory size, short battery life, limited input modalities (non-traditional input methods), navigational difficulties, and high power consumption, etc. (Harrisonet al., 2013; Zhang & Adipat, 2005; Lee et al., 2015). Moreover, mobile banking user mobility is a very critical factor in the success or failure of m-bank apps (Harrison et al., 2013). These issues and challenges may provoke the emotional reaction of users and affect their performance in the context of mobile banking. As a result, many mobile banking apps have remained difficult and challenging to use as a result of these challenges. Usability of mobile apps is difficult due to the small screen size of smartphones and the input mechanism (keyboard) is small (Hoehleet al., 2016; Lee et al., 2015). Therefore, in a mobile usability context, it is very important to evaluate the extent of user satisfaction of mobile banking apps.

This study focused on demographics of users such as gender, age, education and experience in order to determine their influence on the perception of satisfaction of users. Previous research argues that the interaction of users with m-banking applications in Nigeria is determined by age, education and experience (Agwu & Carter, 2014). Furthermore, Agwu and Carter (2014) argued that there is a scarcity of academic research in Nigeria's mobile banking usability assessment as past research focused on m-bank adoption and internet banking rather than mobile banking usability assessment (Agwu & Carter, 2014). As a result of the lack of studies on the influence of demographics on perceived usability and satisfaction of mobile banking, this research was prompted.

II. MOBILE BANKING

Mobile banking or m-banking is defined as ' ... a m-commerce application that allows customers to access bank accounts via mobile devices for transactions such as checking the account status, transferring money, making payments, or selling stocks ' (Alafeefet al., 2012; Shaikh & Karjaluoto, 2015). It is an innovative communicative channel that allows customers to interact with their banks

through a mobile or portable device (Akturan&Tezcan, 2012; Masrek et al., 2012). There are four points of access to banks' m-banking services: 1) short messaging service (SMS) for account information notification, 2) smartphone downloadable mobile apps, 3) tablet downloadable apps, and 4) web apps that can be used on any smartphone or mobile phone with a web browser (Shaikh & Karjaluoto, 2015). Several terms are used to denote mobile banking, including branchless banking, m-banking, m-payment, cellular banking, m-finance, m-transfer, and pocket banking (Shaikh & Karjaluoto, 2015). Mobile banking provides alternative banking services that are as simple, easy, fast, secure and reliable (Ravendran, 2013). Juniper Research (2013)posits that mobile banking services are expected to be used globally by more than one billion users by 2017. This forecastis a representation of 15% of the mobile subscription base. About 96% of the world population are subscribed to mobile phones(ITU, 2011; Shaikh &Karjaluoto, 2015). More than 1.9 billion units of mobile devices were actually sold in 2014 alone, and smartphones accounted for 60 percent of mobile phone sales (Gartner Research, 2015). These statistics indicate the likelihood in the nearest future that even more mobile users will be transformed into users of mobile banks. Increasing smartphone pervasiveness statistics along with increasing mobile web usage will most likely propel consumers and users into moving towards mobile banking (Ravendran, 2013). Conversely, the peculiarity of mobile devices in terms of usability may inhibit the rate of conversion of mobile phone users into mobile banking users, but usability enhancement, particularly satisfaction, may positively enhance this rate of conversion, especially in the mobile context. This follows as satisfaction affects users' intent to use or adopt an app (Ravendran, 2013; Kargin et al., 2009).

Mobile Banking Usability, Comfort of Use and User Satisfaction

According to the ISO 9241-11 standard (1997), usability is "the level of effectiveness, efficiency and user satisfaction when using a given product in a specific user situation to achieve a specific goal". Effectiveness as defined in the standard is "the accuracy and completeness with which users achieve their goals"; while efficiency, on the other hand is "the resources used in relation to the accuracy and completeness with which users achieve their goals". The user satisfaction as set out in the standard is ' freedom from discomfort and positive attitude towards product use". Usability (or satisfaction) perception is the convenience of using an app (Ravendran, 2013). Usability is therefore an attribute of software quality and, as ISO 13407 states, it is the degree to which a user can use a product/app to achieve certain objectives (ISO. 1999). Usability is described as "the ease with which a user can learn to operate, prepare inputs and interpret outputs of a system or component" in the IEEE standard (1990). As stated in the standard ISO / IEC 9126-1 (Bevan, 2001), usability is "related to product attributes that make it understandable, learning, easy to use and attractive".

Nielsen (1999) also acknowledged usability as ease of use and learning. In addition, usability can be seen in two ways, notably as perceived and usability of performance. (See Hussain & Mkpojiogu, 2015a; 2015b; Hussain et al., 2015; Hussain et al., 2016a; Hussain et al., 2016b; Hussain & Mkpojiogu, 2017; Hussain et al., 2017 for more information on usability and user satisfaction). Perceived usability (or subjective usability) is the usability of a system or app based on the perception or judgment of users as to how easy it is to use the software platform (Reinecke & Beinstein, 2011). On the other hand, performance usability (or actual or objective usability) is the usability of a system or app based on user performance in a real world situation or setting on specific tasks (Lew et al., 2010). An interface's perceived usability is often more impactful to users when compared to performance usability as perception is usually stronger than reality because it is connected to emotions and feelings (Ravendran, 2013; Phillips & Chapparo, 2009).

In a mobile context, banking efficiency and specifically task efficiency is a very important factor. Users in a mobile context, by using their mobile devices, try to meet their banking needs anywhere and at any time. Mobile banking therefore flags an important signal for user-computer interaction to be more effective and efficient. This need is further hingedon the challenges presented in the mobile context such as the smallness of the screen size of devices and the intense concentration in a shorter period of time on completing the task. Delivering interfaces that are usable in the context of m-banking and that deliver high performance and increased productivity is important. Mobile efficiency is also very important in mobile banking applications. The interface of a m-banking app is closely related to ease of use, simplicity and user friendliness. Complexity in the interface of mobile banking apps is likely to deter the efficacy of such apps, leading to poor usability (Ravendran, 2013; Yoon, 2010). Simplicity and interactivity (i.e. cognitive dimensions) are particularly important precursors and determinants of mobile phone usability. Simplicity plays a key role in the usability of the interface of applications. Through interactivity, it indirectly contributes positively to usability (Lee et al., 2015).

In addition, satisfaction is a perceptive quality of the user that defines to what extent the expectations of the user have been met (Ravendran, 2013; Yoon, 2010). It can also be described in the same way as a summary of the affective response or reaction of a user to a mobile phone use or their overall attitude to its use (Lee et al., 2015). The more the user reflects on his or her positive mobile phone experiences, the more satisfied the user is with some sense of satisfied needs. The relationship between usability and satisfaction is confirmed (Lee et al., 2015). There is a greater likelihood that satisfied online banking users are more likely to purchase from their banks more products and services than unsatisfied users (Ravendran, 2013). Probably this response is the same for users of mobile banking. A key precursor to mobile banking loyalty is customer satisfaction. Customers who are satisfied do usually return and purchase more and do in addition also inform others about their experiences whether positive or negative. A product's comfort of use prompts a positive users' word-of-mouth promotion for that product. On the other hand, usually customers who are heavily dissatisfied leave and leave while those who are weakly satisfied may not leave but will murmur and complain and pass negative comments on the product to others (Bayraktar et al., 2012). Lee et al. (2015) argue that by mediating trust and satisfaction, users ' comfort in use and usability experience turn them into loyalty app users. These set of users actively promote the product at any given opportunity. They are usually willing to return to repurchase and buy again. Conversely, the dissatisfaction of customer makes them to be disloyal, to exhibit distrust and propagate negative word-of-mouth concerning the product they have used. As customer satisfaction increases so do their loyalty (Lee et al., 2015). Furthermore, an app's visual design (i.e., the appeal, hedonic and visual appeal, and design aesthetics) has the likelihood of leading to emotional appeal and spurred user satisfaction and user comfort (Coursaris & van Osch, 2016). The effectiveness and efficiency of an app have direct influence on the satisfaction of users(Coursaris & van Osch, 2016).

In addition, past studies have found demographic factors such as experience and age to influence product usability and satisfaction perceived by users (Kang & Yoon, 2008; Kurniawan, 2008; Mayhorn et al., 2012; Page, 2014; Ghayas et al., 2013). These researchers are however rare and limited in scope and context. Therefore, the main aim of this research is to evaluate the extent of influence of users' demographics (such as experience, gender, education, and age) on the perceived satisfaction of mobile banking apps' usability specifically in the Nigeria context.

This study evaluates the satisfaction of mobile banking users using demographics as the determining factors based on their perception of usability of mobile banking app interfaces. The rest of this paper is structured as follows: section 2 explains the methodology of research; section 3 handles the findings and discussion, while section 4 presents the conclusion and the direction of future research.

III. METHODOLOGY

In this research, a survey method was used to generate data from the field. A sample of 150 participants in the online study was intentionally recruited for the study. Identified and selected the conscripted participants via email and Facebook. All m-bank users in Nigeria were the participants. The study involved three banks. Participants in the study were customers to one of the three banks and users of their respective m-banking applications. Diamond Bank, Skye Bank, and GtBank are the three banks. Questionnaires were distributed online via email and Facebook to the respondents and questionnaires were returned via the same channel. Abubakar et al. (2015) adapted the study instrument used in the study.

Face validation process validated the study instrument. In addition, a validation of the construction was performed. This validation revealed that the instrument was psychometrically appropriate for the study as all items were loaded onto the "perceived satisfaction" construction.

The factor analysis result shows that the main component variance (perceived satisfaction) explained by each item in the instrument ranged from 0.674 to 0.918. The sampling adequacy measure for Kaiser-Meyer-Olkin (KMO) was 0.962 (very close to 1). This shows that for the factor analysis, the correlation matrix of the items in the instrument was fine. The sphericity test by the Bartlett was: approx. $\chi2$ (595) = 15557.52, p=0.000 (i.e. p < 0.01); this indicates that the correlation matrix of the device items was not an identity matrix and therefore implied that the device had good validity.

Additionally, a reliability analysis was performed and the resulting Cronbach alpha coefficient was 0.986, which indicated good internal consistency of the items in the instrument. Values of Cronbach alpha coefficients equal to or greater than 0.70 are usually taken as good estimates of survey instruments ' reliability and internal consistency (Nunnaly, 1973). The study instrument consisted of 37 items; however, due to poor item reliability, two items were eliminated from the analysis. For measuring the items in the instrument, a 9-point likert-type scale was used.

The instrument items measured user satisfaction from the following perspectives: learning ability, compatibility of mobile devices, privacy and reliability, structure and layout of interfaces, structure and presentation of tasks, and overall user impression. The two items that were removed had an overall impression. The data from the filled and returned questionnaires were analyzed using SPSS version 17. A one way ANOVA analysis was conducted to determine the differences in the perception of satisfaction of users of the app interfaces of the three banks and also to capture the differences in the perception of satisfaction of users as determined by demographics such as gender, experience, age and education.

IV. FINDINGS AND DISCUSSION

In this section, the study findings were presented and discussed. The influence of education, age, experience, gender demographics on user perceived satisfaction about mobile banking apps' usability was analysed and assessed.

Table. 1 ANOVA Table on the Influence of Mobile Banking Applications on User Satisfaction Perception

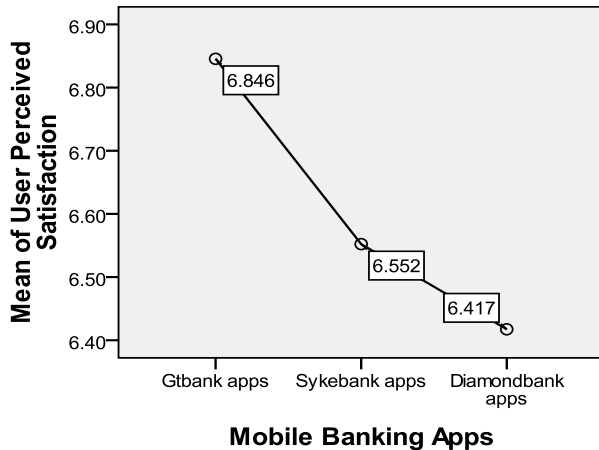|	SS	df	MS	F	Sig.
Between Groups	11.128	2	5.564	4.147	.017
Within Groups	441.431	329	1.342		
Total	452.559	331			

Fig. 1 Mean Plot of M-banking apps' perceived satisfaction

Table 1 showed that mobile banking applications had a significant impact on perceived satisfaction with the usability of mobile banking applications, F(2, 329) = 4.147, p < 0.05. All users of the three bank applications were satisfied with the mobile banking apps interface of their banks, however, as indicated in the mean plot in Figure 1, Gtbank users had the highest perception of satisfaction (M=6,846, SD=1,28), followed by users of the mobile app from Skye Bank (M=6,552, SD=1,05). However, Diamond Bank app users had the least perception of satisfaction with the mobile banking app (M=6.417, SD=0.98). An additional post-hoc pair-wise comparison analysis (using type-1 error correction from Bonferroni) revealed that Gtbank and Diamond Bank pairs were significantly different in their perception of user satisfaction (p<0.05), but all other pairs had the same or similar perception of user satisfaction. This finding showed that the user interface of the Diamond Bank's mobile banking application required some improvement to improve user perception of usability, user comfort and satisfaction of apps.

Table. 2 ANOVA Table on the Influence of Gender on Users Satisfaction Perception

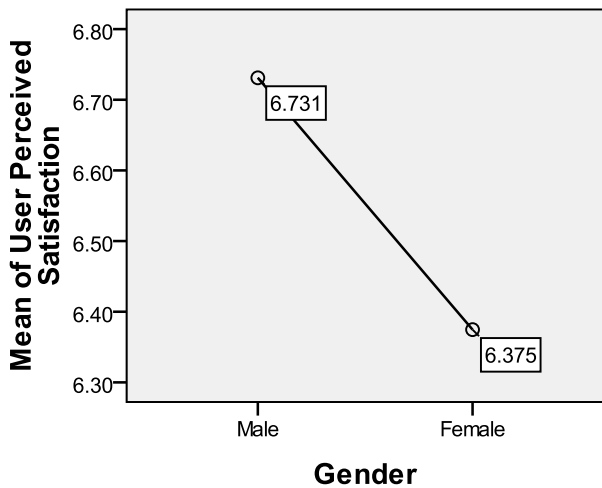|	SS	df	MS	F	Sig.
Between Groups	6.243	1	6.243	4.616	.032
Within Groups	446.316	330	1.352		
Total	452.559	331			

Fig. 2 Mean Plot of M-banking users' perceived satisfaction by gender

The result in Table 2 showed that gender has a significant impact on the perceived satisfaction of users with the usability of mobile banking apps, $F(1, 330) = 4.616$, $p<0.05$. Figure 2 showed that male users (M=6.731, SD=1.22) had a higher perception of mobile banking satisfaction than their female counterpart regardless of banks (M=6.375, SD=0.83). However, to determine why females were less satisfied than males, a further study is required.

Table. 3 ANOVA Table on the Influence of Age on User Satisfaction Perception

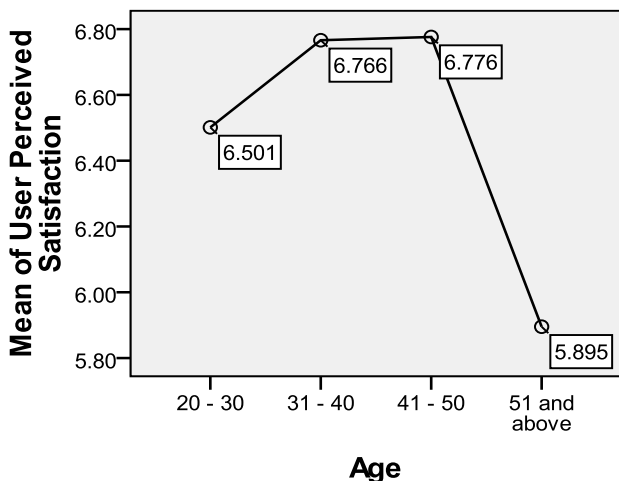|	SS	df	MS	F	Sig.
Between Groups	22.675	3	7.558	5.767	.001
Within Groups	429.883	328	1.311		
Total	452.559	331			

Fig. 3 Mean Plot of M-banking users' perceived satisfaction by age

The analysis showed the results of the one-way ANOVA analysis and showed that the age of users significantly influences the perceived satisfaction with the usability of the mobile banking apps, $F(3, 328)= 5.767$, $p<0.01$ (Table 3). In addition, there appears to be a quadratic trend in the perception of mobile banking usability in the degrees of user satisfaction. The perception of satisfaction of users increases with age from age group 20 to 30 (M=6.501, SD=1.29) to age category 31 to 40 (M=6.766, SD=1.30) to age category 41 to 50 (M=6.776, SD=0.89) and subsequently falls with age category 51 and higher (M=5.895, SD=1.08) (see Figure 3). However, irrespective of age, the users had some degree of satisfaction, the older users (those 51 and above) had the minimum perception of user satisfaction (M=5.895, SD=1.08). The mid-age users (those 31 to 50) seemed to be more elated, enthused and satisfied than all the other age categories (i.e. the younger, ages 20 to 30 and the elderly, ages 51 and older). Additional post-hoc analysis showed that ages 51 and above and between 31 and 40; ages 51 and above and between 41 to 50 were those with significantly different perceptions of satisfaction, but all other pairs had similar perceptions of usability satisfaction.

Table. 4 ANOVA Table on the Influence of Education on Users Satisfaction Perception

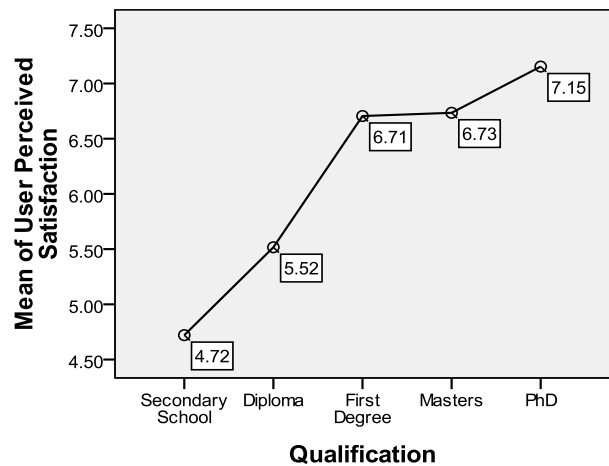|	SS	df	MS	F	Sig.
Between Groups	34.545	4	8.636	6.756	.000
Within Groups	418.014	327	1.278		
Total	452.559	331			

Fig. 4 Mean Plot of M-banking users' perceived satisfaction by educational qualification

Table 4 showed that user education had a significant impact on their perceived satisfaction with the usability of mobile banking applications, $F(4, 327) = 6.756$, $p = < 0.01$. Education had a strong impact on the perception of users ' satisfaction. As education rises, the mean satisfaction perceived by users also rises indicating a growing trend in satisfaction from secondary school (M=4.73, SD=0.00), to graduation (M=5.52, SD=0.84), to first grade (M=6.71, SD=1.14), to masters (M=6.73, SD=1.14), and then to PhD (M=7.15, SD=1.35) (see Figure 4). The more educated the users, the more satisfied they are with the usability of the interfaces of the apps. This means that lack of education overshadows usability perception.

Nevertheless, the first degree and master's degree holders seemed close to the plateau before the perception of user satisfaction increased at the PhD level. PhDs are mobile banking's most satisfied. A pair-wise comparison analysis of Bonferroni type-1 error correction revealed that the perception of user satisfaction of secondary school and diploma users was significantly similar, in addition, the perception of satisfaction of graduates and postgraduates was also significantly the same after the Bonferroni error correction was performed.

Table. 5 ANOVA Table on the Influence of Experience on Users Satisfaction Perception

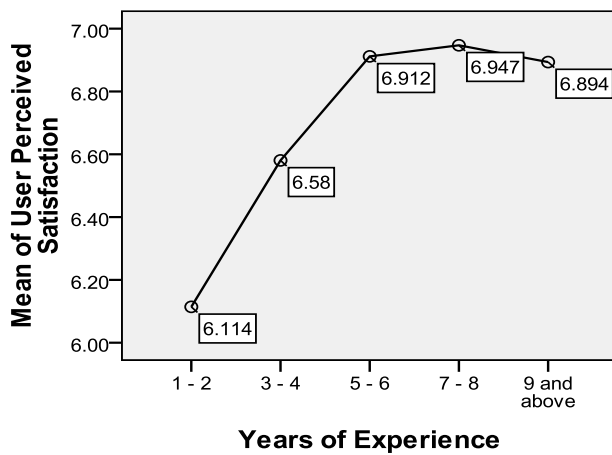|	SS	df	MS	F	Sig.
Between Groups	29.098	4	7.275	5.618	.000
Within Groups	423.461	327	1.295		
Total	452.559	331			

Fig. 5 Mean Plot of M-banking users' perceived satisfaction by years of experience

The findings in Table 5 showed that the experience of users using mobile banking apps had a significant impact on their perceived satisfaction with the usability of mobile banking apps, $F_{(4, 327)}= 5.618$, $p > 0.01$. However, there was a slight quadratic trend in mobile banking users' perception of satisfaction that was based on their experience using mobile banking apps. Users' perception of satisfaction grew with their experience of use (from 1 to 2 years [M=6.114, SD=1.61], to 3 to 4 years [M=6.58, SD=1.04], to 5 to 6 years [M=6.912, SD=0.92], and to 7 to 8 years [M=6.947, SD=0.92], but after most of the experience, there was a drop in 9 years and above (M=6.894, SD=1.25) (see Figure 5). This indicates that there has been a declining return on perception of satisfaction at some point as users grow in their experience of use (precisely in years 9 and above). This can be due to the effects of familiarity and the lack of innovative improvements on the app. Moreover, before the observed fall in perception of satisfaction, there is some sort of plateau from 5 to 6 to 7 to 8 years of experience. Using the type-1 error correction analysis of Bonferroni, it was found that the following categories of years of experience had significant perceptions of user satisfaction, 1 to 2 and 5 to 6, 1 to 2 and 7 to 8, 1 to 2 and 9 and above; However, all other pair-wise comparisons revealed that users in those categories were satisfied with the same or similar perceived usability of the mobile banking application interface.

V. CONCLUSIONS AND FUTURE WORK

There is an interwoven association or interplay between perceived satisfaction, convenience of use, and usability of m-banking applications. Usable interfaces for mobile banking applications are also invariably those that satisfy their users, and when users are satisfied with an interface, it reveals the usability and convenience of the application. However, since satisfaction is an essential usability dimension, it becomes crucial to ensure that usable applications are satisfying applications as well. This study evaluated the perception of user satisfaction of users of mobile banking apps for three major Nigerian banks. The study selected 150 user participants using the mobile banking application Skye Bank, Diamond Bank and/or Gtbank. Their perceptions of satisfaction regarding the usability of the interfaces of the apps were evaluated. The study employed a one-way ANOVA analysis to assess the influence of user demographics like education, age, gender, and usage experience on the users' perceived satisfaction about the usability of mobile banking apps. The outcome indicated that these demographics factors significantly impacted on users' perceived satisfaction about the usability of mobile banking applications. These demographics had significant influence on the degree of user satisfaction perception about the usability of m-banking apps. These results are insightful and assistive as they will help in the enhancement of the mobile banking applications' interfaces of the three banks studied. These enhancements when carried out will aid the banks involved to elicit, maintain, and improve the loyalty and patronage of their customers and enhance their revenue drive and overall competitive market advantage for a sustainable banking business. The study is however limited in the sense that the three banks selected for the study in Nigeria were purposively selected and the sample size is small to guarantee meaningful generalization into the population of banks in Nigeria. This notwithstanding, the findings from the study is very insightful as it revealed the effects of user demographics on the perceived satisfaction of users about the mobile applications' usability. Future studies will utilize randomization methods with higher sample sizes to allow for better generalization of findings beyond the study sample.

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